

**ANT-ASSOCIATED ROVE BEETLES  
(COLEOPTERA: STAPHYLINIDAE) IN BULGARIA**Albena LAPEVA-GJONOVA<sup>1</sup>, Ognyan ILIEFF<sup>2</sup>

<sup>1</sup> Department of Zoology and Anthropology, Faculty of Biology, Sofia University,  
8 Dragan Tsankov blvd., Sofia 1164, Bulgaria, gjonova@abv.bg

<sup>2</sup> University Botanic Garden, St. Constantin and Elena sea resort,  
Varna 9006, Bulgaria, sugarden@mnet.bg

**Abstract** - The data on the findings of 33 species of rove beetles (Coleoptera, Staphylinidae) in the nests of 11 ant species in several regions of Bulgaria are reported. Seven species of Staphylinidae are new for the Bulgarian fauna: *Quedius brevis* Erichson, 1840, *Oligotapumilio* Kiesenwetter, 1858, *Euryusa sinuata* Erichson, 1837, *Dinarda maerkelii* Kiesenwetter, 1843, *Oxypoda formiceticola* Märkel, 1841, *Thiasophila angulata* (Erichson, 1837) and *Piochardia reitteri* (Wasmann, 1894). This is also the first time when species of the genus *Piochardia* have been found in the country. Data about new ant hosts and localities are reported and ethological categories are discussed. Of the species identified, synoeketes (14 species) and facultative myrmecophiles (13 species) are the most numerous. There are also three species of synechthrans, one species of a symphile, and two non-myrmecophilous species. The finding of numerous specimens of facultative species in the nests raises the question of their accidental entrance.

KEY WORDS: ants, Bulgaria, myrmecophiles, Staphylinidae.

**Izveček - Z MRAVLJAMI POVEZANI HROŠČI KRATKOKRILCI  
(COLEOPTERA: STAPHYLINIDAE) V BOLGARIJI**

Predstavljeni so najdbe 33 vrst kratkokrilcev (Coleoptera, Staphylinidae) v gnezdih 11 vrst mravelj v več območjih Bolgarije. Sedem vrst kratkokrilcev je novih za bolgarsko favno: *Quedius brevis* Erichson, 1840, *Oligota pumilio* Kiesenwetter, 1858, *Euryusa sinuata* Erichson, 1837, *Dinarda maerkelii* Kiesenwetter, 1843, *Oxypoda formiceticola* Märkel, 1841, *Thiasophila angulata* (Erichson, 1837) in *Piochardia reitteri* (Wasmann, 1894). To je tudi prvič, ko je bil rod *Piochardia* najden v državi. Predstavljeni so podatki o novih mravljah gostiteljicah in najdiščih, obravnavane so

etoloske kategorije. Med določenimi vrstami so najštevilnejši sineketi (14 vrst) in priložnostni mirmekofili (13 vrst). Poleg njih so tri vrste sinehtrani, ena vrsta simfila in dve nemirmekofilni vrsti. Najdba številnih primerkov priložnostnih vrst v gnezdih zastavlja vprašanje o njihovem naključnem vstopu.

KLJUČNE BESEDE: mravlje, Bolgarija, mirmekofili, Staphylinidae.

## Introduction

Rove beetles represent the most abundant group of arthropods which inhabit ant nests as permanent or temporary guests, commonly known as myrmecophiles (Wheeler 1910, Donisthorpe 1927, Dlussky 1967, Hölldobler & Wilson 1990). Different species display a varying degree of ant-association - from facultative entering in the nests as casual predators or temporary nest commensals (Päivinen et al. 2002) to close association and complex behavioural interactions with the ants (true myrmecophiles).

Wasmann (1894) suggested ethological classification of myrmecophiles, applicable to most myrmecophilous species and currently in use. He divided myrmecophilous arthropods into five categories depending on their relations to ants: synechthrans (persecuted guests), synoeketes (indifferently tolerated guests), symphiles (true guests), trophobionts (guests that provide trophic secretions to the ants) and parasites. However, some species take on different roles in the nests and they fit into more than one category (Hölldobler & Wilson 1990).

The species which can exist both in and outside ant nests are known as facultative myrmecophiles. They do not need ants for their survival. As a rule, obligate myrmecophiles associate with a single species or a group of closely related species of ants (specific), whereas facultative myrmecophiles typically associate with a variety of ant species, often from different genera or subfamilies (non-specific) (Pierce et al. 2002).

Myrmecophilous species are still understudied in Bulgaria. They are reported in certain faunistic publications on particular taxonomic groups. Species of rove beetles from ant nests on Bulgarian territory have been reported mainly in the following works: Joakimov (1904), Rambousek (1909), Scheerpeltz (1937), Karaman (1972), Vasilev & Ilieff (1987), Zerche (1988), Ilieff & Lapeva (1997), Lapeva-Gjonova (2004) and Hlavač et al. (2007).

This paper documents new faunistic and host-range data about ant-associated rove beetles in Bulgaria and summarizes their ethological categories based on the current literature.

## Material and Methods

The rove beetles were collected from the nests of 11 ant species: *Formica pratensis* Retzius, 1783, *Formica rufa* Linnaeus, 1761, *Formica exsecta* Nylander, 1846, *Formica lugubris* Zetterstedt, 1838, *Formica pressilabris* Nylander, 1846, *Formica cinerea* Mayr, 1853, *Lasius brunneus* (Latreille, 1798), *L. fuliginosus* (Latreille,

1798), *Tetramorium caespitum* (Linnaeus, 1758), *Myrmica rugulosa* Nylander, 1849 and *Cataglyphis nodus* (Brullé, 1833).

Mound nests of the genus *Formica* were most thoroughly studied, as this type of nest is known to present a greater diversity of ecological niches for more cohabitants and to last for a longer period of time (Dlussky 1967, Hölldobler & Wilson 1990).

With the exception of *Piochardia reitteri*, collected in the Eastern Rhodopes, all other staphylinids from ant nests are from southwest Bulgaria: Vitosha Mountain, the Zemen Gorge, Belasitsa Mountain, Rila Mountain, the city of Sofia and the village of Petrelik (Mesta River Valley).

Specimens were extracted by two methods - by hand and by photothermolectors (Tullgren funnels). The second method involves the placement of soil material from ant nests into laboratory basins where all ants are hand-removed from the sample. After that the nest materials are placed in Tullgren funnels for 48 hours for the guests extraction.

## Results

STENINAE MACLEAY, 1825

### ***Stenus aterrimus* Erichson, 1839**

Material examined: Vitosha Mt., above Zheleznitsa Vill., 1250 m, 17.08.1998: 1 ex. in a nest of *Formica pratensis*.

Note. Synoekete in ant nests of *Formica rufa* and *F. pratensis* (Franc 1992). The species was reported from Bulgaria (Bistritsa Vill., 1000 m) from nests of *F. pratensis* (Ilieff & Lapeva 1997).

### ***Stenus heydeni* L. Benick, 1915**

Material examined: Vitosha Mt., above Simeonovo Vill., 1600 m, 06.10.1998: 1 ex. in a nest of *Formica rufa*.

Note. This species was not previously known from ant nests.

PAEDERINAE FLEMING, 1821

### ***Astenus gracilis* (Paykull, 1789)**

Material examined: Zemen Gorge, west of Zemen, 580 m, 28.02.1998: 1 ex. in a nest of *Formica pratensis*.

Note. Facultative myrmecophile reported by Päivinen et al. (2003) from nests of *Formica* spp., and by Staniec & Zagaja (2008) from nests of *F. fusca* Linnaeus, 1758, *F. polycetena* Förster, 1850 and *Myrmica ruginodis* Nylander, 1846.

### ***Sunius melanocephalus* (Fabricius, 1793)**

Material examined: Vitosha Mt., above Bistritsa Vill., 1050 m, 31.10.1998: 2 ex. in a nest of *Formica rufa*.

Note. Facultative myrmecophile. Roubal (1932) established this species in nests of *Lasius fuliginosus* and *Formica pratensis*. Päivinen et al. (2002) also observed it in association with *L. fuliginosus*.

***Scopaeus pusillus* Kiesenwetter, 1843**

Material examined: Vitosha Mt., above Bistritsa Vill., 1000 m: 31.05.1995: 2 ex.; 15.08.1995: 4 ex.; 16.08.1997: 1 ex.; 21.08.1997: 3 ex., 1 ex. 1 meter away from the nest (all other from nests of *Formica pratensis*); Vitosha Mt., above Bistritsa Vill., 1050 m, 31.10.1998: 1 ex. (in a nest of *F. rufa*).

Note. Päivinen et al. (2002) note the relation of this species to *Formica rufa*. In the present paper it is referred as a facultative myrmecophile.

***Scopaeus sulcicollis* (Stephens, 1833)**

Material examined: Vitosha Mt., above Bistritsa Vill., 1000 m, 16.08.1997: 1 ex. in a nest of *Formica pratensis*.

Note. It is known from a nest of *Camponotus ligniperdus* (Latreille, 1802) (Staniec & Zagaja 2008) but more often out of ant nests.

## STAPHYLININAE LATREILLE, 1802

***Leptacinus formicetorum* Märkel, 1841**

Material examined: Vitosha Mt., above Simeonovo Vill., 1600 m, 25.10.1998: 7 ex. (in a nest of *Formica rufa*); Vitosha Mt., Turf Reserve, 1900 m, 06.10.1998: 3 ex. (in a nest of *F. exsecta*).

Note. Synechthran in nests of different ant species - *Lasius brunneus*, *Formica rufa*, *F. pratensis*, *F. exsecta*, *F. polycytena* and *F. rufibarbis* Fabricius, 1793 (Roubal 1949, Franc 1992, Janak & Vysoky 1992, Päivinen et al. 2002, 2003, Staniec & Zagaja 2008). The species was established in Bulgaria from nests of *F. pratensis* (Ilieff & Lapeva 1997). This is the first time it has been found with *F. rufa* in Bulgaria.

***Gyrophypnus angustatus* Stephens, 1833**

Material examined: Vitosha Mt., above Bistritsa Vill., 1000 m: 15.10.1995: 1 ex. (in nests of *Formica pratensis*); Vitosha Mt., above Simeonovo Vill., 1600 m, 25.10.1998: 1 ex. (in a nest of *F. rufa*).

Note. Facultative myrmecophile. Janak & Vysoky (1992) collected it with *Formica pratensis* in Bohemia. Päivinen et al. (2002) reported the species from nests of *Lasius fuliginosus* and *F. rufa* in Finland and Denmark.

***Xantholinus linearis* (Olivier, 1795)**

Material examined: Vitosha Mt., above Bistritsa Vill., 1000 m, 15.08.1995: 1 ex.; Zemen Gorge, west of Zemen, 580 m, 18.10.1998: 1 ex. (all in nests of *Formica pratensis*).

Note. The level of ant association of *X. linearis* has not been fully studied yet. The species is often found in ant nests and is rather widespread. According to Wheeler (1910) it belongs to the group of synechthrans, while Sieber (1982) categorises it as "a winter guest". In Bohemia it was reported from a nest of *F. rufa* (Janak & Vysoky 1992), Päivinen et al. (2002) reported it for *Lasius fuliginosus* and *F. rufa*, while Staniec & Zagaja (2008) also observed it with *Myrmica ruginodis*. This is the first time the species has been found with *F. pratensis*.

***Gabrius splendidulus* (Gravenhorst, 1802)**

Material examined: Sofia, Borisova Gradina Park, 17.04.2000: 2 ex. in a nest of *Lasius brunneus*.

Note. Facultative myrmecophile. Janak & Vysoky (1992) reported this species from nests of *Formica truncorum* Fabricius, 1804 and *F. rufa* in Bohemia. Päivinen et al. (2002) also reported it from nests of *F. rufa*, while Staniec & Zagaja (2008) established it with 8 different ant species in Poland. This is the first record of its cohabitation with *L. brunneus*.

***Quedius brevis* Erichson, 1840**

Material examined: Vitosha Mt., above Bistritsa Vill., 1000 m, 14.11.1997: 11 ex.; above Bistritsa Vill., 1050 m, 31.10.1998: 1 ex.; above Simeonovo Vill., 1600 m, 06.10.1998: 3 ex.; above Simeonovo Vill., 950 m, 25.10.1998: 2 ex. (all in nests of *Formica rufa*).

Note. Synecchthran living in colonies of *Formica rufa*, *F. pratensis*, *F. sanguinea* Latreille, 1798, *F. lugubris*, *F. exsecta*, *F. polycтена*, *Lasius fuliginosus* and *L. brunneus*. A new species for Bulgarian fauna.

TACHYPORINAE MACLEAY, 1825

***Ischnosoma splendidum* (Gravenhorst, 1806)**

Material examined: Southwest Bulgaria, Zemen Gorge, 530 m, 19.04.1998: 1 ex. in a nest of *Lasius brunneus*.

Note. A facultative myrmecophilous species usually found under stones, in leaf litter and water detritus. Luze (1901) reported finding it also in a nest of the dendrobiotic species *L. umbratus* (Nylander, 1846). This is the first report of association with *L. brunneus* up to date.

***Tachyporus hypnorum* (Fabricius, 1775)**

Material examined: Vitosha Mt., above Bistritsa Vill., 1000 m: 15.08.1995: 1 ex.; 15.10.1995: 1 ex.; 20.06.1997: 1 ex. (all in nests of *Formica pratensis*).

Note. Facultative myrmecophile. Luze (1901) found it in the nests of different ant species: *Lasius niger* (Linnaeus, 1758), *L. fuliginosus*, *Formica exsecta* and *Messor structor* (Latreille, 1798). In Bohemia (Janak & Vysoky 1992) it was found in nests of *Formica truncorum*, while in Finland and Denmark (Päivinen et al. 2002) in nests of *F. polycтена*. Besides of ant nests, *T. hypnorum* is found under stones, moss, and leaf litter. This is the first report of the species from nests of *Formica pratensis*.

***Tachyporus nitidulus* (Fabricius, 1781)**

Material examined: Southwest Bulgaria, Petrelik Vill., 05.05.2002: 1 ex. in a nest of *Lasius fuliginosus*.

Note. Facultative myrmecophile. Luze (1901) reported finding it in nests of *Lasius fuliginosus*, *L. niger* and *Formica rufa*. Outside nests, it is found under moss, stones, leaf litter and water detritus. In Bohemia it has also been found in nests of *F. rufa* (Janak

& Vysoky 1992). Päivinen et al. (2002) report it with *F. polyclena*. *Tachyporus nitidulus* is spread in a number of regions in Bulgaria.

***Tachinus rufipes* (Linnaeus, 1758)**

Material examined: Vitoshka Mt., above Simeonovo Vill., 1600 m, 06.10.1998: 1 ex. close to a nest of *Formica rufa*.

Note. Sieber (1982) classified the species as a winter guest in nests of *Formica rufa*, while Päivinen et al. (2002) as a saprophile associated with *Lasius fuliginosus* and *F. rufa*.

ALEOCHARINAE FLEMING, 1821

***Oligota pumilio* Kiesenwetter, 1858**

Material examined: Vitoshka Mt., above Bistritsa Vill., 1000 m, 20.06.1997: 3 ex. in a nest of *Formica pratensis*.

Note. This species was not previously known from ant nests. A new species for the Bulgarian fauna.

***Oligota inflata* (Mannerheim, 1830)**

Material examined: Vitoshka Mt., above Bistritsa Vill., 1000 m: 20.06.1997: 11 ex.; 17.04.1998: 1 ex.; 27.06.1998: 1 ex.; Zemen Gorge, west of Zemen, 580 m, 18.10.1998: 1 ex. (all in nests of *Formica pratensis*).

Note. No reference has been found in the relevant literature to any association between this species and ants, but *O. inflata* might be actively entering the nests, considering the number. In the present study the species is related to the group of facultative myrmecophiles.

***Euryusa sinuata* Erichson, 1837**

Material examined: Sofia, 500 m, 17.04.2000: 1 ex. in a nest of *Lasius brunneus*.

Note. Synoekete usually found in nests of *Lasius brunneus* and very rarely in nests of *L. fuliginosus*. Both ant species are dendrobionts. A new species for the Bulgarian fauna.

***Anaulacaspis nigra* (Gravenhorst, 1802)**

Material examined: Vitoshka Mt., above Bistritsa Vill., 1000 m, 08.08.1994: 1 ex. in a nest of *Formica pratensis*.

Note. Facultative myrmecophilous species. Lokay (1905) found it with *Lasius niger*, *L. fuliginosus* and *Tetramorium caespitum*, while Roubal (1932) established it in a nest of *Formica rufa*. There are no previous reports from nests of *Formica pratensis*.

***Notothecta flavipes* (Gravenhorst, 1806)**

Material examined: Zemen Gorge, west of Zemen, 580 m, 28.02.1999: 5 ex. in a nest of *Formica pratensis*; Vitoshka Mt., above Bistritsa Vill., 1050 m, 31.10.1998: 1 ex.; Belasitsa Mt., above Belasitsa Hut, 1000 m, 01.05.2001: 1 ex. (in nests of *F. rufa*).

Note. Synoekete in nests of *Formica rufa* and *F. pratensis* and, less frequently, in nests of *F. sanguinea* (Roubal 1949). Reports for Bulgaria are from nests of *F. pratensis* (Ilieff & Lapeva 1997) in Vitosha Mountain. This is the first time when the species is found to cohabit with *F. rufa* in Bulgaria. The Zemen Gorge and Belasitsa Mountains are new localities for the species in the country.

#### ***Lyprocorrhe anceps* (Erichson, 1837)**

Material examined: Zemen Gorge, 7 km west of Zemen, 580 m, 28.02.1999: 12 ex. in a nest of *Formica pratensis*.

Note. Synoekete mainly in nests of *Formica rufa* and *F. pratensis* (Franc 1992). Previous publications from Bulgaria report it from nests of *F. pratensis* (Ilieff & Lapeva 1997) in Vitosha Mountain. The Zemen Gorge is a new locality for this species in Bulgaria.

#### ***Drusilla canaliculata* (Fabricius, 1787)**

Material examined: Zemen Gorge, west of Zemen, 580 m, 11.04.1998: 2 ex.; 09.05.1998: 2 ex. (in nests of *Tetramorium caespitum*).

Note. Synechthran. Lokay (1905) reported a variety of its hosts - *Lasius niger*, *L. flavus*, *Tetramorium caespitum*, *Tapinoma erraticum* (Latreille, 1798), *Myrmica rubra* Linnaeus, 1758 and Päivinen et al. (2002) added *M. scabrinodis* Nylander, 1846, *M. ruginodis*, *M. sulcinodis* Nylander, 1846, *Leptothorax acervorum* (Fabricius, 1793), *Lasius fuliginosus*, *L. brunneus*, *L. alienus* (Förster, 1850), *F. sanguinea*, *F. fusca*, *F. exsecta*, and *F. rufa* to its host range. The first reports for Bulgaria are from Sofia (Joakimov (1904) as *Myrmedonia canaliculata*); later on the species was reported from Varna as well (Scheerpeltz 1937). The Zemen Gorge is a new locality for this species in Bulgaria.

#### ***Lomechusa emarginata* (Paykull, 1789)**

Material examined: Zemen Gorge, west of Zemen, 580 m: 05.04.1998: 5 ex.; 18.04.1998: 1 ex.; 16.03.2002: 3 ex. (in nests of *Myrmica rugulosa*); Zemen Gorge, west of Zemen, 580 m, 16.03.2002: 1 ex. (outside an ant nest, together with *Formica cinerea* worker).

Note. Symphile in nests of *Myrmica* spp. and *Formica* spp. The species was reported for Bulgaria from the Zemen Gorge (Vasilev & Ilieff 1987).

#### ***Dinarda hagensii* Wasmann, 1889**

Material examined: Vitosha Mt., Turf Reserve, 1900 m, 11.07.1998: 1 ex.; Goli Vrah Peak, 1850 m, 19.08.1998: 1 ex.; Turf Reserve, 1900 m, 06.10.1998: 1 ex. (in nests of *Formica exsecta*).

Note. Synoekete in nests of *Formica exsecta* and, very rarely, in nests of *F. pratensis*. In Bulgaria, the species is known from the Rila Mountain (2000 m), where it was found in nests of *Formica exsecta* (Zerche 1988). Vitosha Mountain is a new locality for the species in Bulgaria.

***Dinarda maerkelii* Kiesenwetter, 1843**

Material examined: Vitoshka Mt., above Bistritsa Vill., 1000 m, 11.05.1994: 6 ex.; 16.10.1994: 1 ex.; 30.01.1995: 4 ex. (in ant nests of *Formica pratensis*).

Note. Synoekete in nests of *Formica rufa*, *F. polyctena* and rarely with other ant species of the genus *Formica*. A new species for the Bulgarian fauna.

***Oxypoda formiceticola* Märkel, 1841**

Material examined: Vitoshka Mt., under Goli Vrah Peak, 1800 m, 02.09.1998: 3 ex. in a nest of *Formica rufa*; Vitoshka Mt., under Malak Rezen Peak, 2150 m, 11.07.1998: 6 ex. in a nest of *Formica lugubris*.

Note. Synoekete in nests of *Formica* spp. All of these ant species are monogynous. In Germany, Zerche (1986) collected specimens of this species predominantly in the periods of March through May and July through October. He considers that pre-imaginal development occurs chiefly in the summer months, while the individuals found in autumn are from a new generation. A new species for the Bulgarian fauna.

***Oxypoda haemorrhoea* (Mannerheim, 1830)**

Material examined: Vitoshka Mt., above Bistritsa Vill., 1000 m: 21.08.1997: 1 ex., 2 ex. 1 metre off the nest; Vitoshka Mt., above Zhelezmitsa Vill., 1200 m, 02.03.2002: 1 ex. (all in ant nests of *Formica pratensis*).

Note. Synoekete in nests of *Formica rufa* and *F. pratensis* (Wasmann 1925, Roubal 1949, Franc 1992). Zerche (1988) reported finding the species in Rila Mountain and Vitoshka Mountain in nests of *F. exsecta*.

***Oxypoda pratensicola* Lohse, 1970**

Material examined: Vitoshka Mt., above Bistritsa Vill., 1000 m: 31.10.1998: 1 ex.; 24.02.2002: 2 ex.; Zemen Gorge, west of Zemen, 550 m, 28.02.1999: 1 ex. (all in ant nests of *Formica pratensis*).

Note. Synoekete in nests of *Formica pratensis* and, rarely, in nests of *F. exsecta* (Zerche 1986, Franc 1992). In the course of his research in Germany, Zerche (1986) found out that the species is unevenly distributed across the observed nests. In the majority of the cases the author collected specimens in the period from February to May and in early November. Pre-imaginal development occurs in the summer months. Publications concerning Bulgaria report *O. pratensicola* from nests of *F. pratensis* (Ilieff & Lapeva 1997). The Zemen Gorge is a new locality for the species in Bulgaria.

***Oxypoda rugicollis* Kraatz, 1856**

Material examined: Vitoshka Mt.: Turf Reserve, 1900 m, 09.07.1998: 4 ex.; 11.07.1998: 5 ex.; 06.10.1998: 7 ex.; Sedloto Peak, 2050 m, 18.07.1998: 1 ex.; Vitoshka Mt., at the foot of Goli Vrah Peak, 1830 m, 19.08.1998: 2 ex.; Goli Vrah Peak, 1850 m, 19.08.1998: 6 ex.; Rila Mt., at the foot of Kamenna Mandra Peak, 2100 m, 24.07.1998: 1 ex. (all in ant nests of *Formica exsecta*); Vitoshka Mt., Kamen Del Peak, 1800 m, 09.07.1998: 1 ex. (in a nest of *Formica pressilabris*).



Note. Synoekete in nests of *Formica exsecta*. There are reports of the species cohabiting with *F. rufa* in Finland, but Zerche (1986) considers this a mistake. He found the species in Germany in the following periods: from early to mid-May, in late June, early August, early and mid-September, early October and in April on the following year. It has been observed that the pre-imago stages occur during the summer. In Bulgaria the species is known from Rila Mountain from nests of *F. exsecta* (Zerche 1988). This is the first time it is found in association with *F. pressilabris*. Vitosha is a new locality for *O. rugicollis* in Bulgaria and the southernmost one for the species in Europe.

#### ***Thiasophila angulata* (Erichson, 1837)**

Material examined: Vitosha Mt., above Bistritsa Vill., 1000 m, 14.11.1997: 27 ex.; Vitosha Mt., above Simeonovo Vill., 950 m, 25.10.1998: 10 ex.; Vitosha Mt., above Bistritsa Vill., 1050 m, 31.10.1998: 2 ex.; Rila Mt., Panichishte Vill. 1400 m, 25.07.1998: 1 ex.; Belasitsa Mt., above Belasitsa Hut, 1000 m, 01.05.2001: 4 ex. (all in nests of *Formica rufa*).

Note. Synoekete in nests of *Lasius fuliginosus*, *L. brunneus* and *Formica* spp. (Franc 1992, Staniec & Zagaja 2008). A new species for the Bulgarian fauna.

#### ***Thiasophila canaliculata* Mulsant & Rey, 1875**

Material examined: Vitosha Mt., Stenata Slope, 2000 m, 05.07.1998: 1 ex.; Vitosha Mt., Goli Vrah Peak, 1850 m, 19.08.1998: 1 ex. (in nests of *Formica exsecta*).

Note. Synoekete which lives solely in colonies of *Formica rufa* and *F. exsecta* (Päivinen et al. 2002). It is considered a rare species with local distribution. In Bulgaria it was reported by Zerche (1988) from the Rila Mountain (Borovets) and Vitosha Mountain (2000 m).

#### ***Thiasophila lohsei* Zerche, 1987**

Material examined: Zemen Gorge, west of Zemen, 550 m, 28.02.1999: 1 ex. (in a nest of *Formica pratensis*).

Note. Synoekete in *Formica pratensis* nests (Zerche 1986; Franc 1992). Pre-imaginal development occurs in the summer months. The autumn specimens found by Zerche (1986) were not fully coloured. The only reports for Bulgaria so far are from the Vitosha Mountain, from nests of *F. pratensis* (Ilieff & Lapeva 1997). The Zemen Gorge is a new locality for this species in the country.

#### ***Piochardia reitteri* (Wasmann, 1894)**

Material examined: Eastern Rhodopes: Madzharovo Vill., 01.05.2003: 3 ex.; Eastern Rhodopes: near Meden Buk Vill., 04.05.2009: 2 ex. (in ant nests of *Cataglyphis nodus*).

Note. The data on the relations of this species with the host are scarce, but another species, *Piochardia oberthuri* (Fauvel, 1878), is known to feed on the cuticles shed by ants without behaving in an aggressive way towards their cohabitants (Assing 1999). We propose that *Piochardia reitteri* could be defined as part of the synoekete group.

The species is known from the Southern Balkans to Anatolia, Caucasus, Iraq, Syria, and Iran. A new genus and species for Bulgaria.

## Discussion

The present study on the cohabitation of myrmecophilous fauna with various ant species resulted in finding 33 species of Staphylinidae, seven of which are new for the Bulgarian fauna - *Quedius brevis* Erichson, 1840, *Oligota pumilio* Kiesenwetter, 1858, *Euryusa sinuata* Erichson, 1837, *Dinarda maerkelii* Kiesenwetter, 1843, *Oxypoda formiceticola* Märkel, 1841, *Thiasophila angulata* (Erichson, 1837) and *Piochardia reitteri* (Wasmann, 1894). *Piochardia reitteri* is also the first species of the genus found in Bulgaria.

Data have been collected on ant species that have not previously been reported as hosts of some of the guest species. The species *Xantholinus linearis*, *Tachyporus hypnorum* and *Anaulacaspis nigra* have been collected for the first time from nests of the meadow ant *Formica pratensis*, and *Sunius melanocephalus* - from nests of *Formica rufa*. *Formica pressilabris* has not previously been reported as a host to *Oxypoda rugicollis*, while *Lasius brunneus* - to *Gabrius splendidulus* and *Ischnosoma splendidum*. With the exception of *Oxypoda rugicollis* and *O. formiceticola*, all these species of staphylinids facultatively enter ant nests and are usually found with a wide range of ant species.

Three of the species have not previously been found in cohabitation with ants - *Stenus heydeni*, *Oligota pumilio* and *Oligota inflata*. In the present paper we propose *Oligota inflata* as a facultative myrmecophile due to the significant number of beetles found to regularly enter anthills.

Based on the ethological classification of myrmecophiles suggested by Wasmann (1894) and elaborated by Wheeler (1910), the greatest number of species found belong to the synoekete group (14 species), there are three synechthrans, while a single species is a symphile. We relate the remaining 13 to facultative myrmecophiles, while 2 of the species are non-myrmecophiles.

The finding of numerous specimens of facultative and non-myrmecophilous species in the nests raises the question of their accidental entrance. Most representatives of facultative myrmecophiles are not associated to a single host, but in most cases they are found with various ant species from the same genus or even from various genera and subfamilies. Further data are needed about this group, which frequently enter ant nests and represents a sizeable portion of the inhabitants. The difficulties derive from the group's heterogeneity and the various roles played by the particular species in the nests.

## References

- Assing, V., 1999: A revision of the genus *Piochardia* Heyden, 1870 (Insecta: Coleoptera: Staphylinidae: Aleocharinae). *Ann. Nat. hist. Mus. Wien*, 101 B: 277-301.

- Donisthorpe, H. St. J. K.**, 1927: The guests of British ants, their habits and life histories. George Routledge & Sons, London. 244 pp.
- Dlussky, G. M.**, 1967: [The ants from the genus *Formica* (Hymenoptera, Formicidae, G. Formica)]. Nauka, Moscow. 235 pp. (In Russian).
- Franc, V.**, 1992: Myrmecophilous beetles of Slovakia with special reference to their endangerment and perspectives for protection. *Acta Univ. Carol. Biol.*, 36: 299-324.
- Hlaváč, P., Bekchiev, R., Riižička, J. & Lackner, T.**, 2007: Contribution to the knowledge of myrmecophilous beetles (Coleoptera) of Bulgaria. *Acta Soc. Zool. Bohem*, 71: 127-132.
- Hölldobler, B. & Wilson, E. O.**, 1990: The ants. Cambridge, Massachusetts: Harvard University Press. 732 pp.
- Ilieff, O. & Lapeva, A.**, 1997: Rove beetles (Coleoptera, Staphylinidae) from nests of the meadow ant *Formica pratensis* Retz. (Hymenoptera, Formicidae). *Acta Zool. Bulg.*, 49: 102-104.
- Janák, J. & Vysoky, V.**, 1992: Kurzflügler in haufenförmigen Nestern der Ameisen der Gattung *Formica* in Nordwestböhmen (Coleoptera: Staphylinidae). *Fauna Bohemiae Septentr.*, 17: 131-145.
- Joakimov, D.**, 1904: [A contribution to the Bulgarian insect fauna]. *Sbornik Narodni Umotvorenija, Nauka i Kniznina (Sofia)*, 20: 1-43 (In Bulgarian).
- Karaman, Z.**, 1972: Vier balkanische und eine italienische neue Pselaphiden Arten. *Fragm. Balc. Mus. Mac. Sci. Nat.*, 9(4): 37-51.
- Lapeva-Gjonova, A.**, 2004: Pselaphinae (Coleoptera, Staphylinidae) from ant nests (Hymenoptera: Formicidae) in Southwestern Bulgaria. *Acta Zool. Bulg.*, 56 (1): 67-73.
- Lokay, E.**, 1905: [Myrmecophilous Coleoptera in Bohemia]. *Cas. České Spol. Entomol.*, 2: 33-50 (In Czech).
- Luze, G.**, 1901: Revision der europäischen und sibirischen Arten der Staphylinidengattungen *Tachyporus* Grav. und *Lamprinus* Heer. *Verh. Zool.-Bot. Ges. Wien*, 51: 146-185.
- Päivinen, J., Ahlroth, P. & Kaitala, V.**, 2002: Ant-associated beetles of Fennoscandia and Denmark. *Entomol. Fenn.*, 13: 20-40.
- Päivinen, J., Ahlroth, P., Kaitala, V., Kotiaho, J. K., Suhonen, J. & Virola, T.**, 2003: Species richness and regional distribution of myrmecophilous beetles. *Oecologia*, 134: 587-595.
- Pierce, N. E., Braby, M. F., Heath, A., Lohman, D. L., Mathew, J., Rand, D. B. & Travassos, M. A.** 2002: The ecology and evolution of ant association in the Lycaenidae (Lepidoptera). *Annu. Rev. Entomol.*, 47: 733-771.
- Rambousek, J.**, 1909: [Contribution to the knowledge of Bulgarian Pselaphidae and Scydmaenidae]. *Cas. České Spol. Entomol.*, 6: 16-24. (In Czech).
- Roubal, J.**, 1932: Aus der Praxis des Käfersammlers. XIX. Zum Verzeichnis der mitteleuropäischen myrmecophilen Koleopteren. *Koleopterol. Rundsch.*, 18(3/4): 120-125.

- Roubal, J.**, 1949: Catalogue of myrmecophilous Coleoptera in northeast Bohemia, with bibliography and notes of Bohemians myrmecophilous Coleoptera. *Cas. České Spol. Entomol.*, 46(3-4): 157-165.
- Scheerpeltz, O.**, 1937: Wissenschaftliche Ergebnisse einer von Herrn Hofrat F. Schubert seinem Sohne Herrn cand. Phil. F. Schubert und Herrn Prof. Ing. K. Mandl im Sommer 1935 (1936) nach Bulgarien unternommenen Studienreise. Coleoptera: I. Staphylinidae. (24. Beitrag zur Kenntnis der palaearctischen Staphylinidae, gleichzeitig 1. Beitrag zur Kenntnis der Staphylinidae Bulgariens). *Mitt. Königlich. Naturwiss. Inst. Sofia*, 10: 185-246.
- Sieber, M.**, 1982: Ergebnisse einer Siebeprobe zum quantitativen Verhältnis von Coleopteren in *Formica rufa* Nestern. *Entomol. Nachr. Ber.*, 26: 137-138.
- Staniec, B., Zagaja M.**, 2008: Rove beetles (Coleoptera, Staphylinidae) of ant nests of the vicinities of LeZajsk. *Ann. Univ. Mariae Curie-Sklodowska Sect. C Biol.*, 63(1): 111-127.
- Vasilev, I., Ilieff, O.**, 1987: [New rove beetle species (Coleoptera, Staphylinidae) for the fauna of Bulgaria]. *Acta Zool. Bulg.*, 35: 90-92. (In Bulgarian).
- Wasmann, E.**, 1894: Kritisches Verzeichniss der myrmecophilen und termitophilen Arthropoden. Felix Dames, Berlin. 231 pp.
- Wasmann, E.**, 1925: Die Ameisenmimikry. Ein exakter Beitrag zum Mimikryproblem und zur Theorie der Anpassung. Gebrueder Borntraeger, Berlin. 164 pp.
- Wheeler, W. M.**, 1910: Ants: their structure, development and behaviour. Columbia University Press, New York. 663 pp.
- Zerche, L.**, 1986: Revision der *Oxypoda formiceticola*-Gruppe der Untergattung *Demosoma* Thomson, 1861 (Coleoptera, Staphylinidae, Aleocharinae). *Beitr. Entomol.*, 36(1): 79-98.
- Zerche, L.**, 1988: Myrmecobionte Aleocharinae bei *Formica exsecta* (Nylander) aus Bulgarien (Coleoptera, Staphylinidae). *Entomol. Nachr. Ber.*, 32: 271-272.

Received / Prejeto: 13. 10. 2011