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ZooNotes is peer-reviewed, open access, electronic journal in which scientific reports are quickly published by Bulgarian researchers or papers of foreign authors concerning the Bulgarian fauna. The papers are in the fields of taxonomy, faunistics, zoogeography and animal ecology. Bibliographies, check-lists and catalogs could also be published as Supplements.

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Zooplankton species composition of Cladocera and Cyclopoida (Copepoda) in the Vaya Lake

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Abstract. Nine species of Cladocera and three species of Cyclopoida were identified in the Vaya Lake during the period 2003-2007. The results show a complete change in the species composition of cyclopoids compared to the period 1953-1957, when the only systematic study of the zooplankton of the Vaya Lake was conducted. From Cladocera, only two species are common for both periods.

Key words: zooplankton, Vaya Lake.

Introduction

One of the first studies on the zooplankton and zoobenthos of the Vaya Lake was carried out by Valkanov (1936). Zashev and Angelov (1958) performed the only systematic studies of the zooplankton and zoobenthos lake fauna.

The authors established a poor and uniform species composition throughout the lake during the period 1954-1957. The zooplankton and zoobenthos found were euryhalinic. This could be explained by the wide range of salinity variations during the period (0.76-18.40 ‰). Salinity of the lake increases thanks to the inflow of seawater through the channel between the lake and the Black Sea. Most of the planktonic species identified during this study period were predominantly marine. Later, Naydenov (1967) reported 3 species of Rotifera, 5 species of Cladocera, and 3 species of Copepoda. Dimoff (1967) examined the zooplankton of the Vaya Lake and found a predominance of Cyclopoida and Cladocera. Konsulov (1973) found 9 species of Cladocera and 4 species of Copepoda. In the last 50 years the Vaya Lake has gone through various significant changes – most notable of which are shallowing, combined with the evening of the bed, the reduction of water surface and volume, along with the dramatic decrease of lake salinity. During the period 1999-2000, Pandourski (2001) identified 10 species of Cladocera and 4 species of Copepoda, predominantly widespread eurybiontic representatives.

The goal of the study was to determine zooplankton of Cladocera and Cyclopoida for the period 2003-2007. Until then, the only complete systematic and long-term studies on the Vaya Lake were carried out by Zashev and Angelov during the period 1953-1957. Some other studies were done but they are sporadic, fragmentary and just for short periods of time. The sampling points were selected to have close coordinates to those investigated by Avgelov and Zashev, and the results were compared.

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Material and Methods

Zooplankton specimens were collected seasonally during the period 2003 – 2007 from 14 permanent stations with an Apstein type net - 16 cm inlet diameter and mesh size 55 µm (Fig.1). The station coordinates were determined with an Etrex Summit GPS receiver (GARMIN).

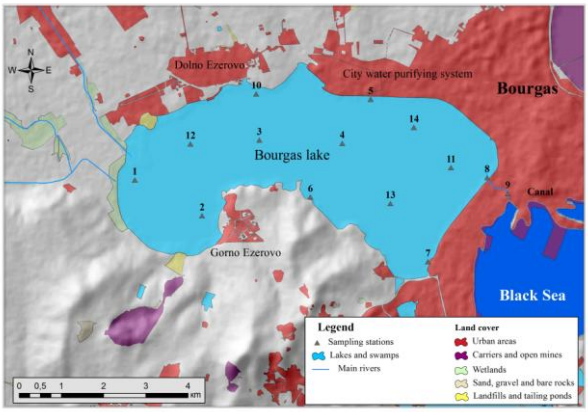

Fig. 1. Map of the Vaya Lake with the location of the stations.

A total of 167 planktonic samples were collected and fixed in 4% formalin. The zooplanktons were sorted under a stereomicroscope. They were determinate to a species or a genus level. To evaluate the diversity of zooplankton in the Vaya Lake α-diversity indices are used.

Results and Discussion

Two families (Daphnidae and Bosminidae) were identified from Cladocera with 3 genera and 8 species (Tab. 1). The α-diversity indices showed that the number of species found in this group were distributed relatively even between the stations. Seven species have been established in stations 1, 2, 6, 8, 9 and 10, and 6 species were installed in stations 3, 4, 5, 7 and 11. From Cyclopoida we identified representatives of 3 genera and 3 species (Tab. 1).

The representatives of the genus *Daphnia* are the main cladocerans in our samples. *Daphnia pulex* (Leydig, 1860) was found with the highest frequency of occurrence (pF = 43.11%) - in the fall of 2003 and 2004 at an average temperature of 14.4°C and 17.9°C; the winter of 2004 and 2007 at 13.8°C and 11.3°C; spring 2004, 2005 and 2006 at 17.7°C, 18.1°C and 17.4°C. *Daphnia longispina* (Müller, 1785) (pF = 34.73%) was found in spring and winter 2004, spring 2005, spring 2006 and winter 2007. The strongest development is in the southern and eastern parts of the Lake and at the mouth of the channel. *Daphnia magna* (Straus, 1820) was detected at oxygen concentrations above 3mg/l in the winter of 2004 and in the spring of 2004, 2005 and 2006 (pF = 13.17%). The lowest occurrence rate found for *Daphnia galeata* (Sars, 1864) is pF = 5.39%. *Daphnia curvirostris* (Eylmann, 1887) was established in winter 2004 and spring 2006 at high pH - above 7 (pF = 12.57%). Single representatives of the species *Daphnia cucullata* (Sars, 1864), have also been found. *Moina micrura* (Kurz, 1875) (pF = 23.35%) is characterized exclusively by summer samples, which is related to its preference for higher temperatures. The eurybiotic species *Bosmina longirostris* (Müller, 1785) was detected in spring 2005 and 2006 and autumn 2006 at a frequency of occurrence of pF = 20.96%.

From the order of Cyclopoida with 100% frequency of study, copepodites and nauplii stages were established in all seasons and in all stations. *Cyclops vicinus* (Uljanin, 1875) was one of the most commonly found in our samples, the dominant species among copepods. It is found in all seasons of all three studied years with a frequency of occurrence pF = 86.83%. The thermophilic species *Thermocyclops oithonoides* (Sars, 1863) was found

from Cyclopoida to be pF = 44.31%. It occurs in the summer and autumn of all years (except for the autumn of 2006). *Acanthocyclops vernalis* (Fischer, 1853) was found only once in October 2004.

Tab. 1. Species composition of Cladocera and Cyclopoida in the Vaya Lake during the two periods: 2003 - 2007 and 1953 - 1957 ("-" - missing species for one or the other period).

2003 - 2007	1953 - 1957
Cladocera (Arthropoda, Crustacea, Branchiopoda)	
Daphnia pulex (Leydig, 1860)	-
Daphnia longispina (Müller, 1785)	-
Daphnia magna (Straus, 1820)	*Daphnia magna* (Straus, 1820)
Daphnia curvirostris (Eylmann, 1887 emend.	-
Daphnia cucullata (Sars, 1864)	-
Daphnia galeata (Sars, 1864)	-
Daphnia sp.	-
Moina micrura (Kurz, 1875)	*Moina micrura* (Kurz, 1875)
Bosmina longirostris (Müller, 1785)	-
-	*Alona guttata* (Sars, 1862)
-	*Rhynchotalona rostrata* (Koch, 1841)
Cyclopoida (Arthropoda, Crustacea, Copepoda)	
Acanthocyclops vernalis (Fischer, 1853)	-
-	*Metacyclops minutus* (Claus, 1863)
Cyclops vicinus (Uljanin, 1875)	-
-	*Halicyclops sp*
Thermocyclops oithonoides (Sars G.O., 1863)	-
Copepodites	Copepodites
Nauplii	Nauplii

Pandourski (2001) recorded *D. longispina* in March and May 2000 for the Vaya Lake, which coincides with our spring finding of the species. *D. magna* is commonly found in calcium-rich alkaline waters, high in inorganic salts and low brackish water (Potts & Fryer, 1979). This is the reason this species is also found among Angelov – Zashev's planktonic samples, but in larger quantities (when salinity drops to an average of 1.5 ‰). It has been identified with a relative increase in the content of calcium and magnesium at the expense of sodium ions, which proves the continued change of Vaya Lake from salt to freshwater (Nenova et al., 2007). The low frequency of the *D. galeata* according to Bendorf *et al.* (2001), is due to the high summer temperatures and the predatory press. Urabe and Watanabe report probable toxic effects of *Microcystis aeroginosa* (Kützing, 1846) on *D. galeata* (algae is the preferred trophic resource for this species). *Daphnia cucullata* (Sars, 1864) is a typical species of eutrophic water basins (Naidenow, 1994). Its poor occurrence may be due to the predatory press, although such small cladocers as *D. cucullata* usually have a well-developed phenotypic plasticity (Laforsch & Tollrian, 2004). As the trophic status of the lake progresses, *B. longirostris* gradually displaces other species of this genus. The poor species diversity, accompanied by a high degree of dominance of one species, was due to the massive development of Nauplii and Copepodites of Copepoda. This could be indicative of the destabilization of the environment. A possible cause might be the advanced eutrophication of the lake, which advantegaes the development of species, resistant to these conditions, such as *C. vicinus*. Pandourski (2001) cites *C. vicinus* as the dominant species for Lake Vaya. The copepodites and adult stages of *C. vicinus* dominate and represent more than half of the total zooplankton biomass. The low water level of the lake, as well as the additional influence of snowy winters and reduced rainfall during certain periods may have contributed to the low species diversity. In worse hydrological conditions, the degradation processes in the sediments increases and significantly load the water with biogenes and

detritus. This is a prerequisite for phytoplankton flowering and major development of small detritus plankton. As the most thermophilic species of the established cyclopoids, *Thermocyclops oithonoides* (Sars, 1863) may be an indicator of changes in the thermal regime of the waters in our country. The winter diapause of *Th. oithonoides* may be an adaptation to avoid low oxygen content and low water temperatures.

The results obtained from our studies showed changes in the species composition of the studied zooplankton groups compared with the results of the studies conducted in the period 1953-1957 by Zashev & Angelov (1958) (Tab. 1). This is likely mainly due to the disrupted connection with the sea, the imbalance of the trophic levels, and the ongoing eutrophication of the lake. Influences that alter the physical and chemical parameters of the environment or alter the balance in the zooplankton community may lead to the disappearance of some species and the emergence of others. Of course, environmental factors interact, which explains why the same species may behave differently in different habitats and have different seasonal distributions.

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First study of fungus gnats (Insecta: Diptera: Sciaroidea) in Tisata Reserve (SW Bulgaria)

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Abstract. As a result of the study in "Tisata" Reserve - 2 families, included 18 genera, from which 19 species of fungus gnats were identified. *Coelosia fusca* is a newly recorded species for the fauna of Bulgaria.

Key words: fungus gnats, Keroplatidae, Mycetophilidae, Tisata Reserve, *9560 endemic forests of *Juniperus spp.*

Introduction

The fungus gnats belong to the families of Bolitophilidae, Diadocidiidae, Ditomyiidae, Keroplatidae and Mycetophilidae, and to the superfamily Sciaroidea (Insecta: Diptera: Nematocera). So far, 318 species of fungus gnats are known from Bulgaria (Bechev 2006, 2010; Bechev & Pavlova 2012, 2016; Kurina & Chandler, 2018; Pavlova & Stojanova (in press)). For the first time a study on fungus gnats is carried on in the "Tisata" Reserve, near Kresna village. Thus far, data about Diptera have been provided by Hubenov (2001) with information about flies in the Kresna Gorge. The old Management Plan of "Tisata" Reserve states that the reserve had not been a subject of a targeted study with respect to any taxonomic group of invertebrates except one study on several families of round worms. After a study for the purpose of the new Management Plan, a total of 339 invertebrate species were identified without mentioning any data for Diptera.

Material and Methods

The material of the present study was collected during a period of one year (02.12.2018-01.12.2019) The study was carried out in Natura 2000 priority habitat 9560* endemic forests with *Juniperus* spp. in "Tisata" Reserve, near town of Kresna (146 m, UTM: BG FM72, coordinates N 41.76691; E 23.15095) with all needed permits. The habitat is a sparse Mediterranean forest dominated or bush area dominated by *Juniperus excelsa*. It is included in the Red Data Book of Bulgaria as "Critically Endangered" under the name 39G3 Forests of Grecian juniper (*Juniperus excelsa*). The material was collected using two stationary invertebrate trapping methods – tree and soil traps. Modified Moericke traps were used (Langourov 2001): conical white plastic banks with a base diameter of 65 mm, an opening of 88 mm and height of 118 mm - 10 tree and 10 soil traps with propylene glycol as preservative and 2 control traps with 4% formaldehyde solution. The traps were changed each month. The taxonimic list belwo follows Bechev (2006, 2010). Information for each species includes: valid taxa name, place and month of collection, type of trap used, number and sex of specimens. The species marked with an asterisk (*) is a new record the for Bulgarian fauna.

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Results

Faunistic list

Family KEROPLATIDAE

Subfamily KEROPLATINAE

***Pyratula zonata* (Zetterstedt, 1855)**

Material examined: Tisata Reserve, 09.2019, tree traps: 2♂♂, 4♀♀; 10.2019, tree traps: 25♂♂, 27♀♀; 11.2019, tree traps: 1♀

Family MYCETOPHILIDAE

Subfamily MYCOMYINAE

***Mycomya (Mycomya) marginata* (Meigen, 1818)**

Material examined: Tisata Reserve, 11.2019, tree traps: 1♂

***Mycomya (Mycomya) prominens* (Lundström, 1913)**

Material examined: Tisata Reserve, 03.2019, tree traps: 2♂♂; 11.2019, tree traps: 1♂

Mycomya sp. ♀♀

Material examined: Tisata Reserve, 10.2019, tree traps: 2♀♀; 11.2019, tree traps: 1♀

Note: Female species from *Mycomya* that are not associated with any other male species.

***Neoempheria lineola* (Meigen, 1818)**

Material examined: Tisata Reserve, 10.2019, tree traps: 2♂♂; 11.2019, tree traps: 1♂

Subfamily SCIOPHILINAE

***Azana (Azana) flavohalterata* Strobl, 1909**

Material examined: Tisata Reserve, 05.2019, tree traps: 1♂, 3♀♀; soil traps: 8♂♂, 11♀♀

Note: Rare species, reported for Bulgaria with single male specimen as *Azana bulgarense* Coher, 1995. Known distribution is Spain, Bulgaria, Greece, Cyprus and Israel.

Subfamily GNORISTINAE

***Boletina gripha* Dziedzicki, 1885**

Material examined: Tisata Reserve, 02.2019, tree traps: 2♂♂, 03.2019, tree traps: 1♂

Boletina sp. ♀♀

Material examined: Tisata Reserve, 10.2019, tree traps: 1♂

Note: Female individuals that cannot be associated with any males species.

****Coelosia fusca* Bezzi, 1892**

Material examined: Tisata Reserve, 02.2019, tree traps: 26♂♂,119♀♀; soil traps: 10♂♂, 22♀♀; 03.2019, tree traps: 7♂♂, 8♀♀; soil traps: 3♂♂, 3♀♀; 11.2019, tree traps: 2♀♀.

Note: **New species for Bulgaria.**

Subfamily LEIINAE

***Docosia gilvipes* (Walker, 1856)**

Material examined: Tisata Reserve, 03.2019, tree traps: 2♂♂; 10.2019, tree traps: 5♂♂, 2♀♀

***Docosia lastovkai* Chandler, 1994**

Material examined: Tisata Reserve, 03.2019, tree traps: 1♂; 10.2019, tree traps: 1♂; 11.2019, tree traps: 4♂♂, 3♀♀

***Leia bimaculata* (Meigen, 1804)**
Material examined: Tisata Reserve, 03.2019, tree traps: 2♂♂, 1♀; 10.2019, tree traps: 3♂♂, 7♀♀; 11.2019, tree traps: 1♂, 1♀

***Leia winthemi* Lehmann, 1822**
Material examined: Tisata Reserve, 11.2019, tree traps: 1♂

Subfamily MYCETOPHILINAE
Tribe EXECHIINI

***Brevicornu fissicauda* (Lundström, 1911)**
Material examined: Tisata Reserve, 02.2019, tree traps: 1♂♂

Brevicornu sp. ♀♀
Material examined: Tisata Reserve, 03.2019, soil traps: 1♀; 05.2019, soil traps: 1♀
Note: Female individuals that cannot be associated with any males species.

***Cordyla fissa* Edwards, 1925**
Material examined: Tisata Reserve, 03.2019, tree traps: 1♂

***Cordyla nitidula* Edwards, 1925**
Material examined: Tisata Reserve, 05.2019, soil traps: 3♂♂

***Exechia fusca* (Meigen, 1804)**
Material examined: Tisata Reserve, 11.2019, tree traps: 1♂, 2♀

***Stigmatomeria crassicornis* (Stannius, 1931)**
Material examined: Tisata Reserve, 02.2019, soil traps: 1♀

Synplasta sp. ♀♀
Material examined: Tisata reserve, 12.2018, tree traps: 1♀
Note: Female individual that cannot be associated with any males species.

***Tarnania nemoralis* (Edwards, 1941)**
Material examined: Tisata Reserve, 12.2018, tree traps: 1♂

Tribe MYCETOPHILINI

***Mycetophila ruficollis* group**
Material examined: Tisata Reserve, 11.2019, tree traps: 1♂
Note: *Mycetophila ruficollis* group after Jürgenstein et al., 2015

***Phronia biarcuata* (Becker, 1908)**
Material examined: Tisata Reserve, 11.2019, tree traps: 1♂, 1♀

***Trichonta clavigera* Lundstrom, 1913**
Material examined: Tisata Reserve, 12.2018, tree traps: 4♂♂, 1♀

Discussion

After our study there are 2 families, 18 genera and 19 species of fungus gnats known to the endemic *Juniperus* sp. forests which are a habitat of priority for the Natura 2000 project. *Coelosia fusca* is a new record for the fauna of Bulgaria. Palaearctic species, known from the Mediterranean (Chandler & Ribeiro 1995), Israel (Chandler 1994) and (Montenegro

(Kolscar & Salmela (2017). The information is valuable not only in terms of completing data on the fauna of Bulgaria, but contributes to the planning of conservation measures in the reserve and the priority Natura 2000 habitat Kresna - Ilindentsi BG0000366.

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New record of the steppe longhorn beetle species *Phytoecia* (*Musaria*) *argus* (G. F. Frölich, 1793) (Cerambycidae: Lamiinae) in Bulgaria

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Abstract. New data on the distribution of *Phytoecia argus* (G. F. Frölich, 1793) (Cerambycidae: Lamiinae) in Bulgaria are presented. Six specimens were collected by net sweeping and by hand collection around the host plant *Trinia glauca* (L.) Dumort. in steppe grasslands in Chepan Mts. The species is probably more widespread in suitable habitats in Western Bulgaria.

Key words: *Phytoecia argus*, steppe habitats, Bulgaria

Introduction

Phytoecia (*Musaria*) *argus* (G. F. Frölich, 1793) (Cerambycidae: Lamiinae) is distributed from Central to Eastern Europe: Austria, Czech Republic, Slovakia, Slovenia, Hungary, Croatia, Bosnia and Herzegovina, Bulgaria, Romania, Moldova, Ukraine and Russia (Central and South European territories) (Danilevsky 2019). The species is also reported in NE Italy (Sama & Rapuzzi 2011) and NW Greece (Pesarini & Sabbadini 2007). In Bulgaria, *Ph. argus* is known only by a single record from Skakavitsa railway station in Zemen Gorge (Ganev 1984) and is considered to be extremely rare (Bringmann 1998, Migliaccio *et al.* 2007). New data on the distribution and host plant association of the species in Bulgaria are presented here.

Material and Methods

The material for this study was collected in May 2019 by net sweeping and by direct hand collection from dry calcareous grasslands in Chepan Mountains. The studied habitat (Fig. 1A) belongs to the mountain petrophytic steppes (Tzonev *et al.* 2011) and it is located within NATURA 2000 ecological network (site "Dragoman", site code BG0000322). The specimens examined are deposited in the Zoological Collection at Faculty of Biology (BFUS) of Sofia University "St. Kliment Ohridski".

Results and Discussion

***Phytoecia argus* (G. F. Frölich, 1793)** (Fig. 1C, Fig. 2A, B)

Material examined: Bulgaria: W Stara Planina range, Chepun Mts., 2,5 km NW Golemo Malovo Vill., 42°57'17.9"N 22°59'06.6"E, 1065 m., dry calcareous grassland, 11.05.2019, 1 ♂, net sweeping, I. Gjonov leg. (BFUS); the same data, but 42°57'17.5"N 22°59'12.6"E, 1078 m., 17.05.2019, 3 ♂♂, 2 ♀♀, hand collection, D. Gradinarov & I. Gjonov leg. (BFUS). All

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specimens collected by hand collection were found individually around the stems of *Trinia glauca* (L.) Dumort. (Apiaceae), on the ground (Fig. 1B, C).

Fig. 1. Habitat of *Phytoecia argus* in Chepan Mts. A: General view of the habitat; B: *Trinia glauca*; C: Female among grasses on the ground.

Species of the genus *Seseli* L. (Apiaceae) are most commonly cited as host plants of *Ph. argus* (Bense 1995, Rejzek *et al.* 2001, Sama 2002, Migliaccio *et al.* 2007, Hoskovec *et al.* 2019). Known host plants of *Seseli* genus are summarized by Rejzek *et al.* (2001), including the following species – *S. pallasii* Besser (syn. *S. varium* Trev.), *S. annuum* L., *S. montanum* subsp. *tommasinii* (Rchb. f.) (syn. *S. tommasinii* Rchb.f.) and *S. devenyense* Simonk. Along with this more accepted view, Zettel (2006) and Merkl & Szél (2012) reported a relationship of *Ph. argus* also with *T. glauca* from the same plant family for Austria and Hungary, respectively. According to Merkl & Szél (2012), beetles can be found as early as April at the base of both *Trinia* Hoffm. and *Seseli* host plants. Adult beetles are active from April to June and the larval development is at the roots of both *T. glauca* and *Seseli* spp. (Merkl & Szél 2012). Our record seems to confirm the ability of *Ph. argus* to use *T. glauca* as a host plant as well.

The distribution of *Ph. argus* seems to be restricted to the remnants of natural steppe habitats in the Western Palaearctic (Schoppmann 1990, Pokorný 2005, Zettel 2006, Merkl 2008, Shapovalov 2012, Dedyukhin 2016). We conclude that the species may be useful as an indicator species for the assessment of the conservation status of natural steppe habitats in Europe.

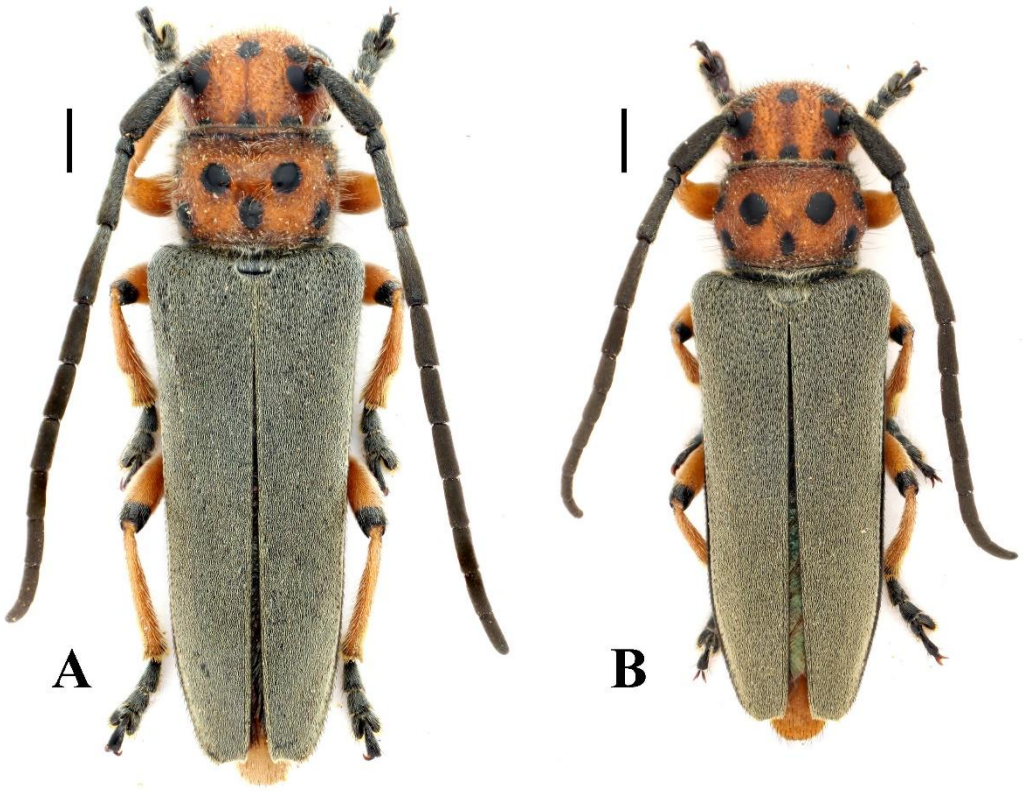

Fig. 2. *Phytoecia argus* (G. F. Frölich, 1793), Chepun Mts., 17.05.2019. A: male; B: female. Scale bar: 1 mm.

The mountain petrophytic steppes are widespread in the low mountain regions of Western Bulgaria at an altitude of 500 to 1500 m (Tzonev *et al.* 2011). The first report of *Ph. argus* from Bulgaria (Ganev 1984) lacks information on the habitat type and host plant, but petrophytic steppes are also present in the area of the Zemen Gorge. The species is likely to be more widespread in suitable habitats in Western Bulgaria. In faunistic studies, host plants of both *Seseli* and *Trinia* genera must be checked for the presence of beetles.

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New Distributional Records and Another Case of Winter Activity of *Malpolon insignitus* (Geoffroy Saint-Hilaire, 1827) (Reptilia: Psammophiidae) in South-Western Bulgaria

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Abstract. Six new localities of *Malpolon insignitus* have been recorded lately in south-western Bulgaria, which supplement its known distribution. One of the observations is the second case of winter activity of the species in the country.

Key words: Eastern Montpellier Snake, seasonal activity, new localities.

Introduction

Hibernation of amphibians and reptiles is a direct response to cold temperatures and secondarily to changes in resource availability during changing seasons. As winter approaches in temperate zones, most amphibians and reptiles seek shelter where the minimum environmental temperatures will not fall below freezing (Vitt & Caldwell 2014). In Bulgaria these animals fall into prolonged hibernation in the late autumn, winter and early spring. Nevertheless, there were numerous records of active species in this period (including in the middle of winter) when the weather was warm, and calm (Beshkov 1977). Observations of winter activity (December, January or February) of snakes in Bulgaria have been very rare. In most cases active individuals were registered on separate winter days without paying particular attention to this activity. Most of these registrations were made a long time ago and their number was low. Till 2011, when Stojanov *et al.* (2011) published their summary work on the Bulgarian herpetofauna winter activity had been registered for 5 species of snakes (from 18 distributed in the country). There were reported winter records of *Dolichophis caspius* (Gmelin, 1789) (Buresch & Zonkov 1934; Beshkov 1964; two in total), *Telescopus fallax* (Fleischmann, 1831) (Stojanov *et al.* 2011; two records), *Natrix natrix* (Linnaeus, 1758) (Undjian 2000; one record), *Natrix tessellata* (Laurenti, 1768) (Buresch & Zonkov 1934; one record), *Vipera ammodytes* (Linnaeus, 1758) (Buresch & Zonkov 1932; Beshkov 1993; four in total). Recently Pulev *et al.* (2018b) published one winter record of *Malpolon insignitus* (Geoffroy Saint-Hilaire, 1827) (on 14.02.2016, maximum daytime air temperature +19.5 °C), so the number of the Bulgarian snake species with registered winter activity becomes six.

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According to Vitt & Caldwell (2014) temperature is the main limiting factor in the distributional and diversity patterns of amphibians and reptiles. One of the Bulgarian snake species – *M. insignitus* is a Mediterranean faunal element which inhabits only the warmest areas in the southern part of the country, in south-western Bulgaria - the valleys of Struma and Mesta Rivers (Pulev 2016; Pulev *et al.* 2018b). Literature data about its distribution in these valleys were summarized and mapped by Pulev *et al.* (2018b), and supplemented by subsequent publications by Manolev *et al.* (2019), and Dyugmedzhiev *et al.* (2019).

Material and Methods

In the majority of cases, *M. insignitus* was recorded incidentally during car journeys and once during a field trip in south-western Bulgaria. All new distributional records are from 2019.

The locations of the species (new and published) were grouped according to their affiliations to the squares of the Universal Transverse Mercator (UTM) grid with a resolution of 5×5 km. The grid-cells were indicated by the codes of the 10-km quadrates of Military Grid Reference System (MGRS; spatially identical with UTM). Capital letters (A-D) were used to denote the separate 5×5 km squares within every 10×10 km square (A indicates the south-western square, B – the north-western, C – the south-eastern, and D – the north-eastern). Mapping and map visualization were done in the projection coordinate system "WGS 84 UTM 35N" by means of ArcGIS v. 10.1 (ESRI, Redlands, CA, USA).

Results and Discussion

An adult individual of *Malpolon insignitus* was recorded by Georgi Gogoushev at 12:20 *p.m.* on 05.02.2019 SW of the village of Oshtava (N41°46'14" E23°12'25", 578 m, UTM: FM82B) (Fig. 1). The site was open, with sparse shrub vegetation and south-eastern exposure. The weather was sunny and comparatively warm for the beginning of February – the air temperature was +12.5°C (similar to the previous 2-3 days). The observed individual was sunbathing and very lazy and slow (in semi-torpid state) after being frightened.

Compared to the first winter registration of *M. insignitus*, the new one was done earlier in February and at lower air temperatures. Probably (as in the first case) the individual temporarily left the hibernaculum, because of the sunny and relatively warm weather. In general, the species tolerates lower temperatures well – it is the first species (out of seven) to emerge from hibernation in the vicinity of the town of Kresna (Dyugmedzhiev *et al.* 2019).

Despite the second case of winter record of *M. insignitus* in Bulgaria, the identified winter activity of the species as *unusual* by Pulev *et al.* (2018b) seems to be correct. Winter observations of the Bulgarian snakes are extremely rare, unlike of some lizards (for example the genus *Podarcis* species, especially *P. muralis* (Laurenti, 1768)). The winter activity of *M. insignitus* (as well as of other reptiles in Bulgaria) is probably related to the character and geographical location of the places of hibernation, the exposure of the wintering grounds, the altitude, the weather conditions, and not least to the ecological requirements of the species.

Several recently road-killed individuals of *M. insignitus* have also been registered. The new records are: N of Zheleznitsa Village (N41°55'59" E23°06'12", 311 m, UTM: FM74A), 24.05.2018, 6:15 *p.m.*, 1 ad.; SE of Zheleznitsa Village (N41°55'09" E23°06'57", 303 m, UTM: FM74C), 15.10.2018, 2:45 *p.m.*, 1 subad.; NE of Strumyani Village (N41°38'36" E23°12'47", 209 m, UTM: FM81A), 24.05.2018, 3:30 *p.m.*, 1 ad.; E of Zlatarevo Village (N41°23'53" E22°59'10", 193 m, UTM: FL68C), 27.05.2018, 5:05 *p.m.*, 1 ad.; W of Parvomay Village (N41°24'04" E23°05'44", 151 m, UTM: FL78D), 25.05.2018, 8:05 *a.m.*, 1 ad. (Fig. 1).

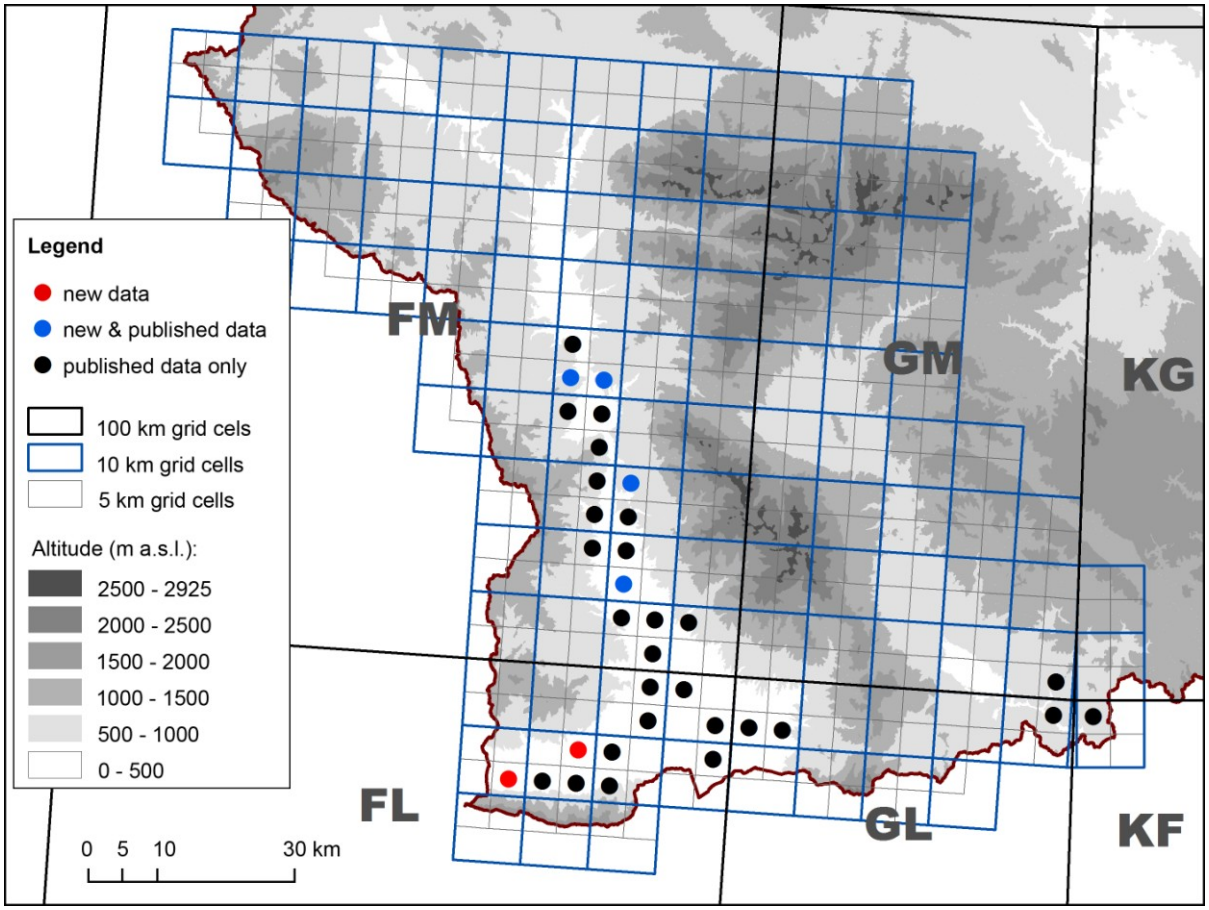

Fig. 1. Distribution of *Malpolon insignitus* in south-western Bulgaria, based on a 5 km UTM grid.

The known localities of *M. insignitus* in south-western Bulgaria fall into 33 squares of a 5 km UTM grid. The published localities refer to 31 squares (for 4 of them new data are presented here as well), and the new ones fall in other 2 squares (Fig. 1). The new data supplement the already known distribution of the species in the research area and confirm its presence in Oranovo Gorge (two records). They also show that a large number of the recorded individuals have been victims of traffic. Beshkov & Nanev (2002) stated that according to its abundance the snake was found as road-killed much more often in comparison with other snakes inhabiting the same areas.

The mapped species distribution (Fig. 1) visualizes pretty well the area with the Mediterranean influence on the territory of south-western Bulgaria. It shows the spread of Struma and Mesta Mediterranean areas (part of Mediterranean biogeographic subregion) suggested by Pulev *et al.* (2018a) in this part of the country.

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New Psocoptera (Hexapoda, Insecta) records from Belarus

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Abstract. Six Psocoptera species (barkflies) from the genera *Lepinotus*, *Psyllipsocus* and *Liposcelis* were collected from Belarus. All of them are new country records. They were found in domestic situations and three of them also in ant nests.

Key words: Psocoptera, distribution, new records, ant nests.

Introduction

The Psocoptera fauna of Belarus is not well studied (Lienhard & Smithers 2002, Lienhard 2016). In this short note we report six species from this insect order as new records to the country. Three species of the apterous genus *Liposcelis* were not only found in domestic situations but also in ant nests. The psocid fauna of ant nests is in general poorly known (Lienhard 1998).

Material and Methods

The study was carried out between 29.05.2016 and 18.10.2019 in four localities of Belarus. The barkflies were collected by Artsiom Ostrovsky, using a sieve or by hand. They were preserved in 96% ethanol. After identification they were deposited in the collection of Dilian Georgiev, and some *Liposcelis* specimens from ant nests, identified by Charles Lienhard, also in the collection of the Natural History Museum of Geneva, Switzerland (MHNG). Species identifications are based on Lienhard (1998). As a supporting source, Saville (2008) was also used.

Results and Discussion

One species of the genus *Lepinotus*, one species of the genus *Psyllipsocus* and four species of the genus *Liposcelis* were identified. All these species can regularly been found in domestic situations and are widely distributed (Lienhard 1998). However, it is interesting that three *Liposcelis* species (*L. bostrychophila, L. corrodens, L. decolor*) have here also been found in nests of the ants *Formica rufa* or *F. pratensis*.

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Trogiidae

***Lepinotus inquilinus* Heyden, 1850**

Material examined: Belarus, Gomel area, Buda-Koshelevo district, Uvarovichi village, in an old water tower, among garbage remains and dry bird feces, 52°36'18"N, 30°44'54"E, 131 a.s.l., 23.05.2019, 1♀.

Psyllipsocidae

***Psyllipsocus ramburii* Selys-Longchamps, 1872**

Material examined: Belarus, Gomel city, Auerbaha Str., in dwelling, 52°25'49"N, 30°59'12"E, 139 a.s.l., 20.07.2019, 1♀; 08.10.2019, 1♀.

Liposcelididae

***Liposcelis bostrychophila* Badonnel, 1931**

Material examined:

1. Belarus, Gomel city, Auerbaha Str., in entomological collection, 52°25'49"N, 30°59'12"E, 139 a.s.l., 28.09.2019, 6♀; 12 and 18.10.2019, 3♀.

2. Belarus, Gomel area, Buda-Koshelevo district, Uvarovichi village, in an old water tower, among garbage remains and dry bird feces, 52°36'18"N, 30°44'54"E, 131 a.s.l., 23.05.2019, 2♀.

3. Belarus, Gomel area, Gomel district, roadside of the railway embankment East of the horticultural partnership "Lisichki", in the nest of *Formica pratensis* Retz., 52°22'41"N, 31°04'22"E, 128 a.s.l., 13.10.2019, 1♀ MHNG (det. C. Lienhard).

***Liposcelis corrodens* (Heymons, 1909)**

Material examined:

1. Belarus, Gomel city, Auerbaha Str., in entomological collection, 52°25'49"N, 30°59'12"E, 139 a.s.l., 12.12.2017, 20♀; 28.09.2019, 1♀.

2. Belarus, Gomel area, Buda-Koshelevo district, Uvarovichi village, in an old water tower, among garbage remains and dry bird feces, 52°36'18"N, 30°44'54"E, 131 a.s.l., 23.05.2019, 3♀.

3. Belarus, Gomel area, Gomel district, pine forest between the horticultural partnership "Glushets" and Mikhal'ki village, in the nest of *Formica rufa* L., 52°14'34"N, 30°50'18"E, 132 a.s.l., 28.10.2018, numerous females and some males, some of them MHNG (det. C. Lienhard).

***Liposcelis decolor* (Pearman, 1925)**

Material examined:

1. Belarus, Gomel city, Auerbaha Str., in entomological collection, 52°25'49"N, 30°59'12"E, 139 a.s.l., 12 and 18.10.2019, 8♀.

2. Belarus, Gomel area, Gomel district, pine forest between the horticultural partnership "Glushets" and Mikhal'ki village, in the nest of *Formica rufa* L., 52°14'34"N, 30°50'18"E, 132 a.s.l., 28.10.2018, 3♀ MHNG (det. C. Lienhard).

***Liposcelis pearmani* Lienhard, 1990**

Material examined: Belarus, Gomel city, Auerbaha Str., in entomological collection, 52°25'49"N, 30°59'12"E, 139 a.s.l., 18.08.2017, 30♀; 10.10.2019, 120♀, 23♂ (Fig. 1).

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Fig. 1. General view of a female *Liposcelis pearmani* from Belarus (collected on 10.10.2019, Gomel city, Auerbaha Str., in entomological collection, 52°25'49"N, 30°59'12"E, 139 a.s.l.). Photo: D. Georgiev, light microscope, 10x.

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New high altitude nesting site of White Stork (*Ciconia ciconia* Linnaeus, 1758) in Bulgaria

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Abstract. We observed a new White storks' breeding site in 2014-2019 in Yundola village at 1390 m a.s.l. The first successful nesting was in 2016. The breeding pair had produced two hatchlings per year for three successive years until 2018. The nest site is new for Bulgaria.

Key words: White Stork, high mountains, nesting site.

Introduction

Throughout its breeding habitat in Europe, the White Stork (*Ciconia ciconia*) inhabits mainly lowlands and areas at low altitude (Michev & Stoyanova 1986; Glutz von Blotzheim & Bauer 1987; del Hoyo *et al.* 1992; Tsachalidis & Papageorgiou 1996; Baltag *et al.* 2009; Profus 2014; Cheshmedjiev *et al.* 2016; Matasaru *et al.* 2018). Avoids areas with persistent cold, wet weather and tracts of tall, dense vegetation, such as reedbeds and forests (del Hoyo *et al.* 1992). Although the species prefers lowlands, rarely it could be seen higher up (Profus 2006; Abuladze *et al.* 2014), e.g. at 3500 m a.s.l. in the Caucasus (del Hoyo *et al.* 1992).

White Stork is widespread in Bulgaria, inhabiting open areas, wetlands, cultivation, often near pools, marshy areas, slow streams or ditches, water meadows, flooded or damp pastures, lakesides, a wide variety of human constructions and also rubbish dumps mainly in lowlands, but also in the high fields, e.g. near Samokov and Batak (Patev 1950, Simeonov et al. 1990). The only exception in Bulgaria is occurring of White Stork in mountainous terrains with a large vertical partition or dense forest areas devoid of wetlands (Petrov et al. 2007). According to Michev & Stoyanova (1986), in the 1980s White Stork' nests at low altitude (0-200 m) predominated (3937 nests out of 5622 examined were found below 200 m a.s.l.). During this period nests over 1100 m a.s.l. were not recorded at all (Michev & Stoyanova 1986). In 1994-2004 four breeding pairs were registered at the height above 1000 m, (Kmetova 2005). The highest known nesting site so far in Bulgaria is situated at 1270 m a.s.l. in the Nova Mahala village, near Batak (Western Rhodope Mts.; Cheshmedjiev *et al.* 2016).

Results

We observed occupied breeding territory of a pair of White Storks between 2014 and 2019 in the village of Yundola (Fig.1,2).

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Fig. 1. White Stork (*Ciconia ciconia*) at the nest in Yundola village in 16.07.2015 (Photograph: S. Stoyanov).

Fig. 2. The nest of White Stork (*Ciconia ciconia*) in Yundola village, 13.07.2016. (Photograph: G. Gruychev).

The nest site is new for Bulgaria, located GM36 (N4203; E2351). The nest is situated on a tree of Scots pine (*Pinus sylvestris* L.) at a height of 21 meters and in 1390 meters above sea level. In 2014, two birds appeared and occupied a breeding territory. That same year, they laid the fundament of a nest with several branches. In 2015, the nest building was completed, but again there was no nesting (Fig.1). The first successful nesting was in 2016 (Fig. 2). Between 2016 and 2018, the breeding pair had produced two hatchlings per year for three successive years, but the hatches throughout the observation period were late. On August 17, 2016, we observed the adults carrying food in the nest. The juveniles were still not able to fly. Each of these three years of successful breeding they have leaved the nest after August 20. In the winter of 2018-2019 the nest has fallen and in the spring of 2019 the pair was not observed.

Discussion

Creutz (1988) reported a White Stork nesting site situated at 2500 m a.s.l., specifying the nutritional supply as a major determinant of species distribution. Nests at high altitude were also reported in Georgia – between 1250 and 2140 m a.s.l. (Abuladze *et al.* 2014) and in the Caucasus – at 3500 m (del Hoyo *et al.* 1992). In Europe some of the highest breeding habitats of White Storks are recorded in the Iberian and the Balkan Peninsula – 1350 m a.s.l. and 1300 m a.s.l. (Profus 2006). The studied nesting site is the highest known so far in Bulgaria. It is adjacent to previously known localities (Petrov *et al.* 2015; Cheshmedjiev *et al.* 2016).

The breeding success of the observed pair was lower than typical for nests situated in lowlands, but still fell within the range reported for the White Stork (Glutz von Blotzheim & Bauer 1987; Simeonov *et al.* 1990; Cheshmedjiev *et al.* 2016). Breeding success is known to be negatively affected by altitude (Matasaru *et al.* 2018) and depends mainly on the food supply in breeding area (Djerdali *et al.* 2008). We suggest that the pair abandoned breeding territory most likely due to scanty food resources in Yundola at this high altitude with typical mountain terrain. However, the reported nest location with three successive years of breeding success considerably completes the White Stork's breeding biology in the country. It could be dependent by the shortage of suitable nesting sites in the lowlands or even due the climate changes in last decades.

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First record of *Galeruca* (*Haptoscelis*) *melanocephala* (Ponza, 1805) in Bulgaria (Insecta: Coleoptera: Chrysomelidae)

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Abstract. The leaf beetle *Galeruca melanocephala* (Ponza, 1805) is recorded for the first time in Bulgaria. A description of the distribution and photos of adult specimens are presented.

Key words: *Galeruca melanocephala*, first record, Bulgaria.

Introduction

Leaf beetles in Bulgaria have been studied for a long period. The outstanding two volumes on Bulgarian Chrysomelidae by Gruev & Tomov (1984, 1986) provided a standard for the identification of Bulgarian leaf beetles. Even maps are available to show the distribution of leaf beetle species in Bulgaria (Gruev & Tomov 2007). Although there are still gaps in the knowledge of the detailed distribution of leaf beetles in Bulgaria, it is surprising when new species are recorded. This paper presents the first record of *Galeruca melanocephala*, observed in Vinarovo Village, Vidin Province, Northwest Bulgaria (Fig. 1).

The garden in which the specimens were observed has a semi-natural vegetation with indigenous plants like *Rumex* spp., *Veronica* spp., *Lamium purpureum*, *Viola odorata*, and cultivars like *Petroselinum crispum*, *Mespilus germanica* and *Prunus armeniaca*.

Galeruca melanocephala is the only European member of the subgenus *Haptoscelis* Weise, 1886. This subgenus is characterized by compact antennal segments, with intermediate segments, more or less as wide as long, and flat elytra. *Galeruca melanocephala* has red pronotum and elytra and a black head and legs. The elytra have no costae. Body length: 3,5 – 5,0 mm.

Although *Galeruca melanocephala* was not recorded from Bulgaria before, it's included in the Bulgarian Chrysomelidae book (Gruev & Tomov 1986) and can be identified with it.

Results and Discussion

Galeruca melanocephala is known from large parts of Europe (Beenen 2010). In his excellent series on leaf beetles of Poland, Warchałowski (1985-2000) presented European distribution maps of Chrysomelidae species. For *Galeruca melanocephala* the distribution includes parts of Germany, France, Austria, Switzerland, Czech Republic, Croatia, Serbia, Hungary and Romania. The distribution area in Romania is delimited just north of the Danubian Plain. Apart from that, isolated records are known form Denmark, Sweden,

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Poland, the northern and the southern part of European Russia (Warchałowski 1994). In Asia this species is known from the Near East and also from Western Siberia (Beenen 2010).

The first record in Bulgaria is not far away from the distribution as depicted by Warchałowski (1994). It seems likely that the leaf beetle specimens are part of a natural population. However, no specimens of this species have been found in the surroundings before. In fact, it is likely that this species may be found in other localities in the Danubian Plain in Bulgaria, just like in Northern Germany, where *Galeruca melanocephala* occurs along the river Elbe. According to Rheinheimer & Hassler (2018) this species lives on muddy banks of large rivers. Kulbe (2019) found it close to a river among marshes in Mecklenburg-Vorpommern (Germany), and in the French Alsace *Galeruca melanocephala* also occurs on dry and rocky hills (Rheinheimer & Hassler 2018).

Records from Europe are not common and from several regions only old records are known. In the Red List of Germany it is classified as critically endangered (Stark gefährdet) (Geiser 1998; Vom aussterben bedroht (F. Fritzlar, pers. comm.). From other parts of Europe we don't know the state of endangerment. Recent European records are published from Poland (Jałoszyński & Konwerski 2001), Romania (Iliie et al. 2019), Germany (Esser 2013, Rheinheimer & Hassler 2018) and Northeast France (Callot & Matter 2003, Callot 2018).

Host plants of *Galeruca melanocephala* are several Polygonaceae of the genera *Polygonum* and *Rumex* (Urban 1932, Koch 1992, Böhme 2001). Although species of *Polygonum* are not specified, it is likely that species now included in *Persicaria* are host plants too.

Fig. 1. *Galeruca melanocephala* (Ponza, 1805), Vinarovo Village, Vidin Province, 147 m a.s.l., 44.0988° N, 22.8127° E, 22.02.2020, male specimen, leg. T. Tsvetanov (R. Beenen's collection, Nieuwegein); same locality, 12.03.2020, 1 ex., obs. T. Tsvetanov.

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Mesophleps oxycedrella (Lepidoptera: Gelechiidae) in association with *Juniperus excelsa* (Cupressaceae) in Bulgaria

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Abstract. *Mesophleps oxycedrella* (Millière, 1871) is recorded for the first time in Bulgaria, feeding on female cones of *Juniperus excelsa* M.-Bieb. Photographs of the moth and female genitalia are provided.

Key words: new record, distribution, faunistics.

Introduction

The Greek juniper *Juniperus excelsa* M.-Bieb is among the plant species with limited distribution in Bulgaria. It is known only from three localities in the southwestern part of the country. The most representative communities are found in "Tisata" Reserve on the slopes of Kresna Gorge. The other two are located in "Izgorialoto gyune" Reserve (above Krichim city) and near Asenovgrad city (Rhodope Mt.). A few lepidopteran species using *J. excelsa* as a larval host plant have been recorded so far: *Gelechia senticetella* (Staudinger, 1859) (in fact *Gelechia obscuripennis* (Frey, 1880), see Huemer 2019), *Pammene mariana* (Zerny, 1920) (Zlatkov 2008) and *Lithophane* (*Prolitha*) *lapidea* (Hübner, 1808) (Beshkov 1996). One of them, *G. senticetella*, is considered a major insect pest on this tree species in Bulgaria (Mirchev et al. 1995, Georgiev et al. 1996). During a study of the insect fauna trophically connected with *J. excelsa* three female moths of *Mesophleps oxycedrella* (Millière, 1871) emerged from the collected female cones (also called fruits or galbuli). This species has not previously been recorded from Bulgaria.

Material and Methods

One hundred and ninety-six ripe female cones of *J. excelsa* were collected from "Tisata" Reserve" (UTM: 34 T 679265.09 m E, 4622765.67 m N, 25.iv.2019, leg. G. Zaemdzhikova and D. Doychev). They were stored in plastic containers in laboratory conditions in the Laboratory of Entomology in University of Forestry (Sofia) till emergence of moths. The moths were set and stored at the collection of the National Museum of Natural History, Sofia. The genitalia of the moths were dissected and mounted after Robinson (1976), then photographed through an Amplival (Carl Zeiss Jena) compound microscope

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equipped with a digital camera Canon EOS 1300d. One of the moths was photographed under a stereomicroscope Stemi 2000c (Zeiss) with the same camera.

Results and Discussion

Familia Gelechiidae Stainton, 1854

***Mesophleps oxycedrella* (Millière, 1871)**

One moth emerged on 06.v.2019 and the others on 07.v.2019 and 13.v.2019. There is one more specimen that emerged the previous year on 20.ii.2018 (the collected material is from the same locality). The species is easily recognised by its wing pattern (Fig.1): this is the only species of the genus with large markings on the forewings (Li & Sattler 2012). Its identity was confirmed by the structure of the female genitalia with medially incised sterigma (Fig. 2). The head is ochreous with porrect brown palps and long filiform antennae. The thorax and forewings are also ochreous, the latter with several brown markings, the hindwings are brownish grey with incised termen. The forewing length of the examined specimens vary significantly: 3.36–5.93 mm (mean 4.71, n=3). The abdomen is grey. The female genitalia are characterised by the shape of sterigma. The biology of *M. oxycedrella* is thoroughly described by Millière (1859–1871). According to him, the larva feeds on the soft tissue of the female cone. It leaves the cone through a hole and pupates on the ground. The moth emerges usually in early July. According to other authors however, the larva does not leave the cone and pupates within, since exuvia hanging from the holes were observed (Ribes Escolà & Askew 2009, Piskunov & Solodovnikov 2016). The pupation within the cone is corroborated by our results.

The known host plants of the species are *Juniperus macrocarpa* Sibth. & Sm., *J. oxycedrus* L., *J. phoenicea* L. (Li & Sattler 2012), *J. excelsa* M.-Bieb., *J. foetidissima* Willd. (Piskunov & Solodovnikov 2016), *Tetraclinis articulata* (Vahl) Mast. (Ben Jamaa & Roques 1999), *J. turbinata* Guss. (Dionisio et al. 2013), *J. thurifera* L. (Roques et al. 1984) and *Cupressus sempervirens* L. (Cupressaceae) (Ben Jamaa & Roques 1999, Roganović 2007, Roques et al. 1999). Thus, two microlepidopteran species feeding into the galbuli of *J. excelsa* in Bulgaria are already known: *M. oxycedrella* and *Pammene mariana*.

M. oxycedrella is a new addition to the Bulgarian fauna. The published records of the species are from Spain, southern France, Italy, Portugal, Sicily, Corsica, Sardinia, Canary Islands, Croatia (Li & Sattler 2012, Piskunov & Solodovnikov 2016, Requena 2009), Balearic islands (Ferriz et al. 2006), Ukraine (Crimea, Savchuk & Kajgorodova 2017), Western Caucasus (Piskunov & Solodovnikov 2016), Montenegro (Roganović 2007), Albania, Greece, Malta (Roques et al. 1999), Turkey (Tosun 1976), Algeria (Roques et al. 1984), Tunisia (Ben Jamaa & Roques, 1999), Morocco (Requena 2009). Other observations published in an internet site originate from Croatia and Germany. Although the latter record does not fit the expected distribution of the species, the specimen seems correctly identified (Rennwald 2020), and is probably a case of an accidental introduction.

According to Roques et al. (1999) *M. oxycedrella* never attacks more than 1% of *Cupressus sempervirens* seed cones in the third year of development. The moth was observed in 0.6% of the cones in Malta and 4.3% of the cones in Turkey. A stronger attack was reported from Montenegro – 8% of the cones (Roganović 2007). Our results showed that the damage of the galbuli is insignificant – 1.5% of the collected material from “Tisata” Reserve. As reported by Fertin (2010) *Mesophleps oxycedrella* may directly affect the natural regeneration of *Juniperus thurifera.*

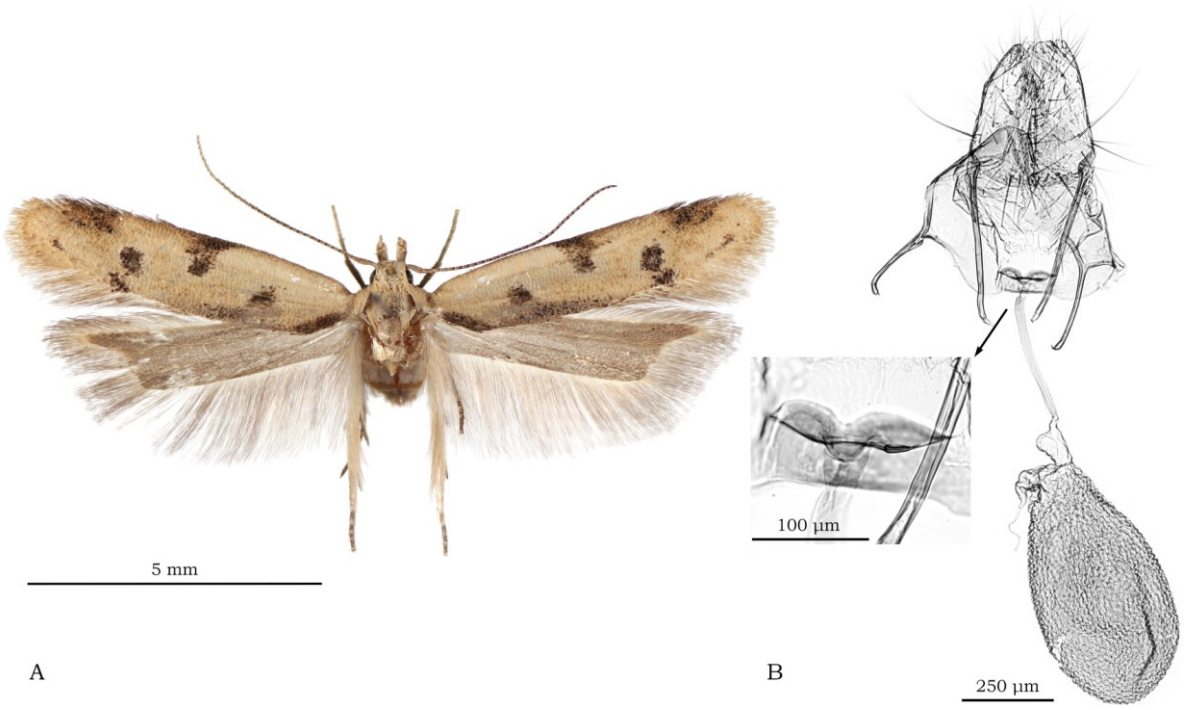

Fig. 1. Adult of *Mesophleps oxycedrella*. A - female, Kresna Gorge, e.l. 20.ii.2018. B - female genitalia of the same specimen, inset: detail of sterigma.

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First records of *Xylotrechus pantherinus* (Savenius, 1825) and *X. stebbingi* Gahan, 1906 (Cerambycidae: Cerambycinae) in Bulgaria

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Abstract. Two species of the genus *Xylotrechus* Chevrolat, 1860 are reported for the first time in Bulgaria. A single male of the rare species *X. pantherinus* (Savenius, 1825) was found among entomological materials collected in Sofia. A female specimen of *X. stebbingi* Gahan, 1906 alien in Europe was collected by light trapping in the vicinity of Lilyanovo Vill., SW Bulgaria.

Key words: *Xylotrechus stebbingi*, *X. pantherinus*, Bulgaria

Introduction

Three species of the genus *Xylotrechus* Chevrolat, 1860 are known in Bulgaria: *X. rusticus* (Linnaeus, 1758), *X. antilope* (Schoenherr, 1817) and *X. arvicola* (Olivier, 1795) (Migliaccio *et al.* 2007). In the present study, two new species of the genus are reported in the country - *X. pantherinus* (Savenius, 1825) and the alien species *X. stebbingi* Gahan, 1906.

Material and Methods

The specimen of *X. stebbingi* was collected at the end of June 2019 in the vicinity of Lilyanovo Vill., above the town of Sandanski, near Sandanska Bistritsa River (SW Bulgaria, Pirin Mts.). The specimen was attracted to light („light tower" with a 160 W MBFT lamp, blacklight fluorescent tube and actinic lamp) on the road passing through a sycamore forest (Fig. 1). Most common tree species in the surrounding area are *Platanus orientalis* L., *Juglans regia* L. and *Alnus glutinosa* (L.). Solitary trees and shrubs of *Carpinus betulus* L., *Salix alba* L., *Corylus avellana* L., *Robinia pseudoacacia* L., *Malus domestica* Borkh., *Prunus* spp., *Pyrus* sp., and *Sambucus nigra* L. are also present in the habitat. The hill slope adjacent to the site is covered with *Quercus pubescens* Willd. and *Juniperus communis* L.

The specimen of *X. pantherinus* was collected by students in a field course in the city of Sofia and the surrounding area in June 2015. Additional data about the collection event are not available.

The examined specimens are deposited in the Zoological Collection of Sofia University "St. Kliment Ohridski", Faculty of Biology (BFUS).

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Results and discussion

***Xylotrechus* (*Rusticoclytus*) *pantherinus* (Savenius, 1825)** (Fig. 2: A)

Material examined: Bulgaria: Sofia, June 2015, 1 ♂ (unknown collector).

X. pantherinus is a Eurosiberian species with boreomontane distribution in Europe (Hellrigl 2012). The species is monophagous on *Salix* spp. (Salicaceae) (in the European part of its range - on *S. caprea* L.) (Sama 2002). Almost throughout all its European range, the species is considered to be rare (Laugsand *et al.* 2008, Kierdorf-Traut 2009, Serafim 2009, Ilić & Ćurčić 2015). Only in this century the species was reported in France (Brustel *et al.* 2002) and in Lithuania (Tamutis *et al.* 2011). The apparent rarity of *X. pantherinus* may be due to its fragmented distribution and peculiarities in its biology (e.g. Laugsand *et al.* 2008, Hellrigl 2012). Considering that the species is known from Romania (Serafim 2009) and Serbia (Ilić & Ćurčić 2015), its presence in Bulgaria is not surprising. The species has probably been overlooked in previous studies. New findings of this species from the country are desirable.

Fig. 1. Locality of *X. stebbingi* in Bulgaria (picture taken on 12.09.2019).

***Xylotrechus* (*Xylotrechus*) *stebbingi* Gahan, 1906** (Fig. 2: B)

Material examined: Bulgaria: Pirin Mts. above the town of Sandanski, SW Lilyanovo Vill., 41°36'44.85"N 23°18'42.90"E, 470 m, 27 June 2019, 1 ♀, at light, O. Sivilov & B. Zlatkov leg.

X. stebbingi originated from Central and South Asia and has recently been introduced in the Mediterranean region (Gahan 1906, Sama 2002). In Europe, by the end of the 20th century the species was found in Italy, Switzerland, France and Greece (Sama 2002). In the present century *X. stebbingi* was reported in Slovenia, Croatia (Brelih *et al.* 2006), Spain (Recalde & San Martín 2015) and Albania (Kovács 2015). The known localities of the species in Northern Greece (Sidirokastro and Himmaros) are only 15-20 km from the Bulgarian border (Dascălu *et al.* 2012), with the closer Sidirokastro being about 40 km from the species locality in Bulgaria. So, the species most probably has come to Bulgaria as a result of natural dispersal from Greece without assistance of human activity. Usually after its establishment in a new territory this species continues to expand its range (e.g.

Cocquempot *et al.* 2012, del Peral *et al.* 2017). Therefore, new records in Bulgaria are quite possible. In Europe, *X. stebbingi* is polyphagous on deciduous trees (Sama 2002). Negative effect of *X. stebbingi* on the trees has been reported by Braud *et al.* (2002). Assessment of the impact of the species on forest habitats in Bulgaria is desirable.

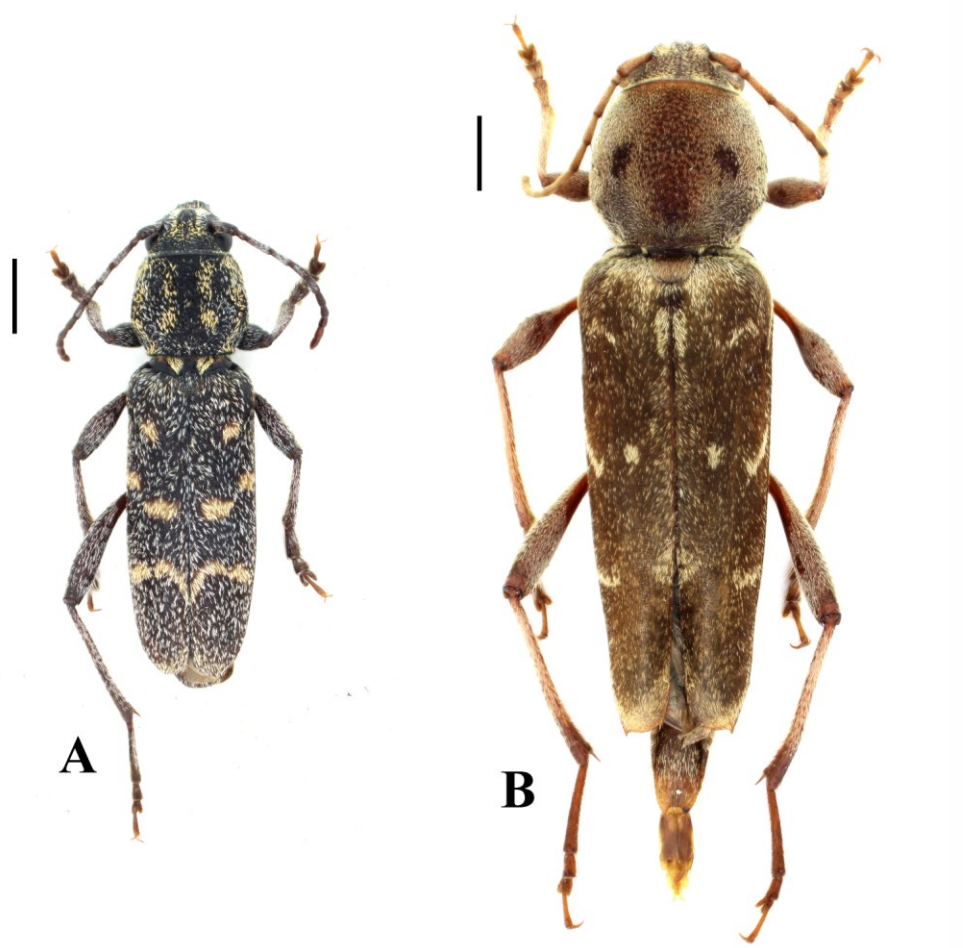

Fig. 2. *X. pantherinus* (A) and *X. stebbingi* (B), collected in Bulgaria. Scale bars: 1 mm.

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First record of *Reesa vespulae* (Milliron, 1939) in Bulgaria (Insecta: Coleoptera: Dermestidae)

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Abstract. The dermestid beetle *Reesa vespulae* (Milliron, 1939) is recorded for the first time in Bulgaria.

Key words: *Reesa vespulae*, first record, Bulgaria.

Introduction

Reesa vespulae (Milliron, 1939) is the only representative of genus *Reesa* Beal, 1967. This monotypic genus is placed in subtribe Trogodermina, tribe Megatomini, subfamily Megatominae (Háva 2015, 2020). It was described as *Perimegatoma vesuplae* (Milliron, 1939) from wasp nests from St. Paul, Minnesota state (USA). In 1967 Beal transferred this species to a new genus *Reesa* (Beal 1967). A short period after it has been recorded from the territory of the United States, *Reesa vespulae* was found in Canada (Spencer 1948, 1954, 1956). In his paper Beal (1967) took note on possible danger to natural history collections caused by this species.

The species is native to the Nearctic region and began to appear in Europe during the 1950's, first collected in Germany in 1957-1958 (Bahr & Nussbaum 1974). The first records of this species spreading to Europe came from Finland (Mäkisalo 1970), Sweden (Anderson 1973), USSR (Zhantiev 1973), Germany (Bahr & Nussbaum 1974), Norway (Mehl 1975), the United Kingdom (Adams 1978), Iceland (Ólafsson 1979) and it has since become widespread.

In the Nearctic region it is mostly a wild species occurring in bee hives and other hymenopteran nests where larvae develop on dead insects and detritus. In Europe *Reesa vespulae* generally occurs in domestic premises where the adults may be found in the spring and summer. There are few records of the species occurrence in the wild, but in general it is synanthropic, inhabiting human dwellings and stores etc. It rarely causes damage in domestic situations although it can feed on dried fruits, and large populations can establish in cellars where they feed upon fungi growing on exposed wood. The species is known to infest a wide range of products including various stored seed and plant material, museum specimens, dead insects and it is a pest in seed stores (Stejskal & Kučerová 1996).

The larvae are omnivorous and can cause serious damage not only in natural history collections (Mäkisalo 1970, Bahr & Nussbaum 1974, Mehl 1975), but also on products such as seeds of wheat, rye and other plants, and dried plant materials (Stejskal & Kučerová 1996). They also feed on other materials such as dried milk, flour, dried mushrooms, bread crumbs and food residues (Kadej *et al.* 2017). The larva is very distinctive among

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Dermestidae being small, 4-6 mm in length, pale brown to yellow, pubescent with long golden setae at the abdominal apex.

The adult *Reesa vespulae* is 2-4 mm in length and distinctive due to its long-oval shape and colouration. The head and pronotum are shiny black, elytra dark brown at the base becoming lighter towards the apex and with a transverse band of light brown or yellowish pubescence in the basal third, which does not extend to the suture. The entire upper surface is finely punctured and clothed with fine, semi-erect and curved pubescence. The antennal cavities are shallow and poorly defined, situated on the front of the head before the convex and very prominent eyes. Antennae are 11-segmented, pale with the club darker. The club is 4-segmented, elongate and only weakly differentiated. Pronotum evenly rounded with the basal margin bisinuate and the hind angles acute. Scutellum distinct. Elytral punctation random, quite strong and moderately dense, in many specimens there are larger punctures that form loose longitudinal rows on each elytron. The species is parthenogenetic as males have never been found and the females lay eggs that develop to complete the life cycle without being fertilized (Peacock 1993).

Results and Discussion

Material: Sofia, Lyulin district, 14.06.2020, 2 ex., obs. T. Tsvetanov, leg. T. Tsvetanov, 1 ex. in J. Háva's collection.

On 14.06.2020 the first author observed 2 specimens of *Reesa vespulae* in his apartment in Lyulin district, Sofia. One of the specimens is deposited in the collection of the second author and the other one is photographed (Fig. 1).

Reesa vespulae is nearly cosmopolitan species (Hagstrum & Subramanyam 2009, Háva 2015, 2020). The distribution of the species is Europe, Algeria, Egypt, Morocco, Tunisia, Canada, Mexico, USA, Argentina, Chile, Afghanistan, China, Japan, Korea, Russia, Australia, New Zealand (Háva 2020). In Europe the species is known from Austria, the Czech Republic, Denmark, Finland, France, Germany, Hungary, Iceland, the Netherlands, the United Kingdom, Lithuania, Latvia, Norway, Poland, Russia, Slovakia, Sweden, Switzerland, Serbia, Romania, Spain, Italy and Estonia.

Dermestidae family is known for the ability of many species to introduce in new areas and there is no surprise in recording a new species from this family in Bulgaria.

Fig. 1. *Reesa vespulae* (Milliron, 1939), Lyulin district, Sofia, 595 m a.s.l., 14.06.2020, obs. T. Tsvetanov.

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A contribution to the knowledge of the malacofauna of the Bulgarian part of the Falakro Mts

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Abstract. A total of 44 mollusc species was recorded during a one day study of the area. The main part of the material came from river deposits of the Matnitsa River near the village of Petrelik.

Key words: Mollusca, distribution, faunistics.

Introduction

The Falakro Mts (Mramoritsa – Bulgarian, Bozdag – Turkish) are a mountain ridge situated mainly in the northern part of Greece, whose northern mountain slopes reach into Bulgaria as a little, hilly area. These mountains are not well studied considering their malacofauna. Some species from the Greek part were published by Reischütz (1988), Riedel, (1992), Wiktor (2001) and Georgiev (2016).

No information on molluscs is available from the Bulgarian part of these mountains. Here I present results from a case, one day study from this area.

Material and Methods

All samples were collected on 9.5.2020 around one spot: near the village of Petrelik, close to Matnitsa River (41° 29' 24.7" N, 23° 51' 27.5" E; 487 m a.s.l.). Most shells were collected from the fine floating deposits of the river on its bank. Some species were found living along or in the same stream.

Results and Discussion

A total of 44 mollusc species was recorded (Table 1). This fact and the very short study period (one day) indicate a rich malacofauna in the area of the catchment of Matnitsa River. Further detailed research is recommended.

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Table 1. Mollusc species found in the area of Matnitsa River, Petrelik village area, Falakro Mts.

Species	Locality
Terrestrial	
Acanthinula aculeata (O. F. Müller, 1774)	river deposits
Aegopinella minor (Stabile, 1864)	river deposits
Bulgarica (*Bulgarica*) *denticulata thessalonica* (Rossmässler, 1839)	river deposits
Carychium minimum O. F. Müller, 1774	river deposits
Carychium tridentatum (Risso, 1826)	river deposits
Cattania haberhaueri (Sturany, 1897)	river deposits
Caucasotachea vindobonensis (C. Pfeiffer, 1828)	river deposits
Cecilioides jani (De Betta et Martinati, 1855)	river deposits
Chondrula (*Chondrula*) *microtragus* (Rossmässler, 1839)	river deposits
Cochlicopa lubrica (O. F. Müller, 1774)	river deposits
Cochlicopa lubricella (Porro, 1838)	river deposits
Daudebardia (*Daudebardia*) *rufa* (Draparnaud, 1805)	river deposits
Deroceras (*Agriolimax*) *turcicum* (Simroth, 1894)	under stones
Deroceras (*Deroceras*) *sturanyi* (Simroth, 1894)	under stones
Euconulus fulvus (O. F. Müller, 1774)	river deposits
Helix (*Helix*) *lucorum* Linnaeus, 1758	among grass
Laciniaria plicata (Draparnaud, 1801)	river deposits
Mediterranea hydatina (Rossmässler, 1838)	river deposits
Merdigera obscura (O. F. Müller, 1774)	river deposits
Monacha (*Monacha*) *cartusiana* (O. F. Müller, 1774) - complex	among grass
Monacha (*Monacha*) *oshanovae* I. Pintér et L. Pintér, 1970	river deposits
Oxychilus (*Morlina*) *glaber striarius* (Westerlund, 1881)	river deposits
Punctum pygmaeum (Draparnaud, 1801)	river deposits
Succinella oblonga (Draparnaud, 1801)	river deposits
Tandonia kusceri (H. Wagner, 1931)	under stones
Truncatellina claustralis (Gredler, 1856)	river deposits
Truncatellina cylindrica (A. Férussac, 1807)	river deposits
Vallonia costata (O. F. Müller, 1774)	river deposits
Vallonia pulchella (O. F. Müller, 1774)	river deposits
Vertigo (*Vertigo*) *antivertigo* (Draparnaud, 1801)	river deposits
Vertigo (*Vertigo*) *moulinsiana* (Dupuy, 1849)	river deposits
Vertigo (*Vertigo*) *pygmaea* (Draparnaud, 1801)	river deposits
Vertigo (*Vertigo*) *substriata* (Jeffreys, 1830)	river deposits
Vertigo (*Vertilla*) *angustior* (Jeffreys, 1830)	river deposits
Vitrea contracta (Westerlund, 1871)	river deposits
Vitrea neglecta Damjanov et L. Pintér 1969	river deposits
Xerolenta obvia (Menke, 1828)	among grass
Zonitoides nitidus (O. F. Müller, 1774)	river deposits
Freshwater	
Gyraulus albus (O. F. Müller, 1774)	river deposits
Galba truncatula (O. F. Müller, 1774)	river deposits
Pisidium personatum Malm, 1855	river deposits
Pisidium pseudosphaerium Schlesch, 1947	river deposits
Planorbis planorbis (Linnaeus, 1758)	river deposits
Radix labiata (Rossmässler, 1835)	in the river

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Studen Kladenets Reservoir (CS Bulgaria), a stopover of the migratory Great White Pelicans (*Pelecanus onocrotalus* Linnaeus, 1758) through the Balkan Peninsula

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Abstract. An observation of a flock of 30 birds on 26 August 2020 on the coast of the Studen Kladenets Reservoir is discussed in the light of the species migration and conservation.

Key words: Great White Pelican, bird autumn migration, Important Bird Areas

The Great White Pelican (*Pelecanus onocrotalus* Linnaeus, 1758) is categorized as "Least Concern" species globally (BirdLife International 2018) and in Europe (BirdLife International 2015).

Introduction

Status in Bulgaria. An extinct species in Bulgarian fauna (Michev & Profirov 2011).

Former distribution. The subfossil record proved its distribution throughout the country in the last ca. 5000 years (Early Bronze Age – Middle Ages): Urdoviza (Early Bronze Age, 5000-4000 BP; Boev & Ribarov 1990), Kabile (2700 BC- 6th c. AD; Boev & Ribarov, 1993), Novae (1st -7th c. AD; Schramm 1975), Kostinbrod (end of 3rd-early 4th c. A. D.; Boev 2006), Durankulak (Ancient and medieval settlement; Boev 2018) and Krivnya (Medieval fortress; Boev 1999). The six known subfossil localities lie out of the the recent species' breeding range (Hagemeiger & Blaire 1997).

Results

Observation. On 26 August 2020 between 10:45 and 11:55 h summer time EET (UTC+02:00 time zone) a flock of 30 birds was resting on a shallow sandy coast (Fig. 1) of the uncovered bottom of the reservoir because of the low level of water. We observed the birds from a considerable distance of ca. 450-500 m from an excellent position, the top of the Monyak peak (586 m a.s.l.). The birds were preening their plumage and sometime making short flights of ca. 50-150 m (Fig. 2).

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Fig. 1. Flock of 30 Great White Pelicans, Studen Kladenets Reservoir, 26 August 2020. Photo: Z. Boev.

Fig. 2. A Great White Pelican, Studen Kladenets Reservoir, 26 August 2020. Photo: Zlatozar Z. Boev.

Weather. The maximum temperature in the vicinity of the Lisitsite village (Kardzhali Region), the nearest settlement in the region was about 35° C. The weather was sunny, windless and calm all the period between 22 and 28 August 2020.

Locality: The Studen Kladenets Reservoir (41°37'30"N, 25°31'55"E) was constructed between 1955 and 1957. It is the third largest reservoir (15 995.6 ha; 388,000,000 m^3) in Bulgaria. It is 29 km long and up to 1.5 km wide and its surface elevation is 227 m a.s.l. In the summer at low level of water vast areas of dam's bottom are visited by many birds for feeding and resting along the shallow coast edges. The site is an Important Bird Area BG013 and supports 219 bird species, 91 of which are listed in the Red Data Book for Bulgaria (Iankov *et al.* 2007).

Discussion

After Michev (1990) in the past *P. onocrotalus* in Bulgaria was nesting, migratory and passage species, at present only on passage and by exception a wintering species. The only ringed birds, found in Bulgaria originated from Romania (Danube Delta) and all they have been registered along the Bulgarian Black Sea Coast. No data on inland migration routes so far through the Eastern Rhodopes are available. Iankov & Nyagolov (1987) report on a juvenile bird, shot in the autumn of 1974 in the vicinities of the Studen Kladenets village (Kardzhali Region). They also note the local hunters' records of several individuals of pelicans (*Pelecanus* spp.) during the winter season of 1980-s in the Studen Kladenets Reservoir. Michev & Kutsarov (2007) list 0-2 breeding pairs in the country, although they accept the species' status as extinct in Bulgaria: "Incidental breeding of 1-2 pairs - quite low and non-typical numbers for a species normally nesting in numerous colonies ..." (p. 60). Nankinov & Sapetin (1978) state that little flocks could be observed in the inner wetlands of the Balkan Peninsula. After these authors the autumn migration occurs in September – December. Up to 12 Dalmatian pelicans (*Pelecanus crispus* Bruch, 1832) have been recorded as wintering in the reservoir and no one of *P. onocrotalus* (Iankov *et al.* 2007).

Our record of 30 birds on 26 August 2020 is the first observation of a relatively numerous amount of individuals of *P. onocrotalus* at the beginning of the autumn migration far of the habitual migration route (Via Pontica) in this part of the Balkan Peninsula. It widens our knowledge on the possible species' inland dispersion in the non-breeding period, an important detail for its spatial conservation on the territory of Bulgaria.

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New records of non marine molluscs from Thassos Island (North Aegean, Greece)

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Abstract. Five mollusc species were recorded on Thassos Island as new for the fauna of the island: Four gastropods (*Aegopinella minor*, *Carychium minimum*, *Deroceras thersites*, *Limax graecus*), and one clam (*Pisidium personatum*). Now the number of species recorded on the island is 83. This is one of the richest island malacofaunas of Greece.

Key words: Mollusca, distribution, Mediterranean.

Introduction

Thassos is a roughly circular island about 30 kilometers in diameter and is covering an area of about 300 square kilometers. The island is dominated by the mountain ranges of Ypsario (1204 metres) and the neighboring Profitis Ilias (1100 metres). The majority of the island's central area is covered by commercially managed pine forests. Towns and villages are mainly confined to the narrow, low-lying, coastal fringe, where olive groves are a prominent feature of the landscape (Fowles, 2016).

The non marine molluscs of Thassos are relatively well studied. A total of 77 species had been reported (Angelov 1959, Bank & Menkhorst 1992, Boettger 1907, Butot & Subai 1981, Fowles 2002, Frank 2018, Leeuwen 2005, Reischütz 1983, 1988, Riedel 1988, 1992, Urbanski 1960, Wiktor 2001). In this short note I add five new species to the faunal list of this island.

Material and Methods

Material was collected by hand or sieves as empty shells or living animals during 17.-21.08.2020 on Thassos Island (North Aegean, Greece). After identification they were deposited in the collection of the author.

Results and Discussion

Five mollusc species were recorded on Thassos Island in addition to its faunal list: Four gastropods, and one clam:

Gastropoda

***Aegopinella minor* (Stabile, 1864)**

17.08.2020, Potamia vill., *Platanus orientalis* forest, near a stream, N40° 42' 58.0", E24° 43' 30.5", 160 m a.s.l.

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***Carychium minimum* O. F. Müller, 1774**

21.08.2020, Panagia vill., near and below the entrance of Drakotrypa Cave, in detritus and limestone rocks, N40° 43' 55.4'' E24° 43' 54.1'', 160 m a.s.l.

***Deroceras* (*Agriolimax*) *thersites* (Simroth, 1886)**

21.08.2020, Skala Potamia, grass terrain near walls of a building, under an old board, N40° 43' 02.8'' E24° 45' 21.3'', 12 m a.s.l.

***Limax* (*Limax*) *graecus* (Simroth, 1889)**

21.08.2020, Panagia vill., on the path to Drakotrypa Cave, near a karstic spring, N40° 44' 00.9'' E24° 43' 53.2'', 146 m a.s.l.

Bivalvia

***Pisidium personatum* Malm, 1855**

21.08.2020, Panagia vill., below Drakotrypa Cave, in a karstic spring near the path, N40° 44' 00.9'' E24° 43' 53.2'', 146 m a.s.l.

Fig. 1. *Deroceras thersites* from Thassos Island (Skala Potamia, N40° 43' 02.8'' E24° 45' 21.3'', 12 m a.s.l.).

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A new predator on pine processionary moth larvae in Bulgaria

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Abstract. *Oecanthus pellucens* (Scopoli, 1763) (Gryllidae) is recorded for the first time as a predator on the larvae of *Thaumetopoea pityocampa* (Denis & Schiffermüller, 1775) (PPM) in Bulgaria. The Italian tree crickets were observed in black pine plantations (*Pinus nigra* Arn.), in the region of Fotinovo vill. (Eastern Rhodope Mts.), occupied by the PPM summer population.

Key words: new record, predator, pine processionary moth.

Introduction

Oecanthus pellucens is common and widely distributed all over the Palearctic region, especially in the countries around the Mediterranean with a focus on Southern Europe (Labadessa & Todisco 2016, Sutton et al. 2017). In Bulgaria it is distributed in the Western and Eastern Rhodopes (Asenovgrad, Zlatograd, Kardjali, Madjarovo) (Popov & Chobanov 2004, Chobanov 2012). *O. pellucens* is thermophilic species. It prefers trees and tall shrubs is mostly confined above 300 m a.s.l. (Cordero *et al.* 2009). The adults can be encountered from July-October. These crickets are omnivorous and usually feed on leaves or delicate flower parts, but also on animals such as aphids, spiders and insect larvae (Bastiaan & Jackman 1998).

PPM is considered to be the most important pest in the pine ecosystem, also in Bulgaria. Along with conventional control methods regulating PPM attacks, the role of natural enemies, such as parasitoids, pathogens and predators is also considered important (Way *at al.* 1999, Mirchev 2005, Mirchev *et al.* 2019a). In Bulgaria, the role of predatory insects on PPM eggs has been studied by Mirchev & Tsankov (2005) and Mirchev *et al.* (2019a). Only two bushcrickets have been found in the country – *Ephippiger ephippiger* (Fiebig 1784) and *Pterolepis* (=*Rhacocleuis*) *germanica* (Herrich-Schäffer, 1840) (Orthoptera: Tettigoniidae), which destroyed PPM egg-batches.

The Rhodope Mts. have long been a known area of distribution of PPM (Tsankov 1960), where both summer and winter populations coexist (Mirchev *et al.* 2019b).

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Material and Methods

The identification of *O. pellucens* was done using publication of Cordero *et al.* (2009). In order to determine the extent of damage by predators at the sampling site, in laboratory conditions, the scales of the egg-batches (57 in number) were removed and the eggs were analysed under a stereomicroscope (x40).

Results and discussion

Two female specimens of *O. pellucens* were observed in plantation of *Pinus nigra* Arn., feeding on first instar larvae of PPM in the region of Fotinovo vill. (N41°53'54.65", E24°20'52.72", 08.08.2020, 454 m a.s.l.).

In our research, all collected PPM egg-batches were checked for cricket gnawing damage. No damage from these predators was found. This is a preliminary result, from which it may be concluded that this cricket prefers to feed on PPM larvae. This is the first scientific report in which *O. pellucens* is reported as a natural enemy of PPM larvae. Until now, only in Portugal, the cricket has been reported as a predator on the eggs of PPM (Ferreira 1998). Known insect predators of the PPM (on eggs, larvae or adults) are: *Formica fusca* (Linnaeus, 1758), *Formica rufa* Linnaeus, 1761, *Crematogaster scutellaris* (Olivier, 1792), *Lasius emarginatus* (Olivier, 1792), *Lasius niger* (Linnaeus, 1758), *Tapinoma nigerrimum* (Nylander, 1856), *Linepithema humile* (Mayr, 1868) (Hymenoptera: Formicidae) (Way *et al.* 1999, Pimentel 2004, Zamoum *et al.* 2017); *Calosoma sycophanta* Linnaeus, 1758 (Kanat & Mol 2008), *Carabus graecus* Dejean, 1826 (Coleoptera, Carabidae) (Schmidt *et al.* 1990); *Dermestes lardarius* Linnaeus, 1758 (Coleoptera, Dermestidae) (Tsankov 1960); *Ephippiger ephippiger*, *Pterolepis germanica*, *Steropleurus andalusius* (Rambur, 1838), *Thyreonotus corsicus* Rambur, 1839, *Tettigonia viridissima* Linnaeus (1758) (Operophtera: Tettigoniidae) (Demolin & Delmos 1967, López-Sebastián *et al.* 2004, Mirchev & Tsankov 2005, Hódar *et al.* 2013, Zamoum *et al.* 2017); *Xanthandrus comtus* (Diptera, Syrphidae) (Branco *et al.* 2008); *Sphodromantis viridis* Forskal (1775) (Mantodea, Mantidae), *Coccinella septempunctata* Linnaeus (1758) (Coleoptera, Coccinellidae), *Vespa germanica* Fabricius (1793) (Hymenoptera, Vespidae) (Zamoum *et al.* 2017); *Forficula auricularia* Linnaeus, 1758 (Dermaptera: Forficulidae) (Kailidis 1962).

In recent decades, the expansion of the range to the north of *O. pellucens* and PPM has been observed in central European countries, with global warming being the likely cause (Battisti *et al.* 2005, Robinet 2015, Sutton *et al.* 2017). The expansion of the PPM in Central Bulgaria is also recorded (Zaemdzhikova *et al.* 2018). This case can be considered as an example of synchronization in the extension of the host and predator range, in which the natural symbiotic relationship between them is preserved. An important circumstance is that our observations were made in an area inhabited by the summer population of PPM. As the vital activity of the Italian tree cricket ends in October, this species will be an effective regulator of the summer populations of PPM. Assuming that summer populations are rare, this may explain why the behavior we observed has not been reported in the available literature.

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Impatiens glandulifera, a new host of the tortrix *Pristerognatha fuligana* in Bulgaria

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Abstract. In October 2020, larvae of *Pristerognatha fuligana* ([Denis & Schiffermüller], 1775) (Lepidoptera: Tortricidae) were found in stems of the invasive alien species *Impatiens glandulifera* Royale in Sofia region on the slopes of Plana and Lozenska Mt. The trophic connection of this tortrix moth with *I. glandulifera* is new for Bulgaria.

Key words: invasive plants, insect-plant interactions, food web.

Introduction

Impatiens glandulifera (Himalaya balsam) is a highly adaptive and invasive neophyte, participating mainly in monodominant or mixed hygrophytic communities with the native vegetation along the rivers (CABI 2015). The species is widely known as an invasive alien in temperate areas in Europe, Asia, North America and New Zealand. In Bulgaria *I. glandulifera* was first recorded in 1978 (Petrova *et al.* 2020). Hymalayan balsam poses a significant threat to habitat status and biodiversity (Tokarska-Guzik *et al.* 2012). Its expansion can reduce species richness by as much as 25% can reduce species richness by as much as 25% (Hulme & Bremner 2005). At present, the mechanisms for limiting the distribution and impact of its populations have been sufficiently studied, including the possibilities for biological control (Sheppard *et al.* 2006). For now, the task is to identify the natural enemies of the Hymalayan balsam, such as insect pests.

In Bulgaria, studies related to pests of this invasive species are isolated. Until now one such insect species has been found – *Chrysolina herbacea* (Duftschmid, 1825) (Coleoptera: Chrysomelidae) (Belilov *et al.* 2020). This necessitates additional research on insect pests of *I. glandulifera*, trophically associated with this invasive plant in order to determine their regulatory role in its population.

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Material and Methods

The study was carried out in October 2020, at the end of the vegetation season, in four test plots in Sofia region. In each test plots, the stems of invasive plants were checked for *Pristerognatha fuligana*'s caterpillars. Two plots were selected in **Plana Mt.** – one in the vicinity of Dolni Okol vill. (42°29'40.51"N 23°29'12.81"E, 8.10.2020, 1066 m a.s.l., 8 larvae) and another one in Dyavolski most area (42°33'36.85"N 23°25'21.69"E, 12.10.2020, 650 m a.s.l., 4 larvae) and further two were studied in **Lozenska Mt.** – one in "Sipei" area 42°34'2.076"N 23°25'48.594"E, 15.10.2020, 655 m a.s.l., 9 larvae) and another close to Kokalyane vill. (42°34'44.555"N 23°25'34.075"E, 21.10.2020, 650 m a.s.l., 11 larvae). Larvae were found on each plot.

The *P. fuligana*'s larvae were determined according to Swatschek (1958). We also used lepiforum.de 2019, the German web portal of Lepiforum. The larvae of this moth are pale greenish with light brown heads and prothoracic plates (Fig. 1).

The larvae of moth were photographed in laboratory condition with a Nikon D750 camera mounted on StackShot Automated Macro Rail plus a Nikon AF-S VR Micro-NIKKOR 105 mm Lens and Raynox DCR-250 Macro Lens. Forthy nine selected images were combined with Helicon Focus (version 7.6.1) software. Finally, the resize, color balance, contrast and sharpness were adjusted using Adobe Photoshop CS6.

Fig. 1. *P. fuligana*'s larva in stem of *I. glandulifera.*

Results and Discussion

As a result, a number of 5.5 larvae of *Pristerognatha fuligana* per site were found in the rotting stems of *I. glandulifera*. In each case, only one caterpillar per stem was found. They were observed to feed close to the discoid webs of the host plant. No pupae or traces of holes in the stems were found. The tortrix larvae were observed in 80% of the stems of plants each of plot. *P. fuligana* has been first reported in the country in the Sofia region by Velcheva (2000), but so far it had not been associated with a food plant. The trophic connection of *P. fuligana* with *I. glandulifera* is new for Bulgaria. *P. fuligana* is monophagous, the larvae feed on tissues inside the stems of *I. glandulifera* and *Impatiens*

noli-tangere L. In the literature, the Himalayan balsam is a well-known food plant of the moth, but it had been reported only in two countries – Belgium and Switzerland (Meert & Nossent; Burkhart & Nentwig 2008). The natural habitat of *P. fuligana* covers Western and Eastern Europe and expands to the East Palaearctic region as far as Japan, but it is not known in its native distribution range of Himalaya (Razowski 2003; Burkhart & Nentwig 2008). The tortrix moth has one generation, at least two ones are possible. Imagines fly from April to August and eggs are laid during this period in the stems of touch-me-not balsam and Himalayan balsam, where the stem-mining caterpillar feeds and hibernates (Razowski 2003). In Bulgaria, another species of *Pristerognatha* occurs, *P. penthinana* (Guenée, 1845) (Zlatkov 2011). However, this moth is monophage feeding only on *Impatiens noli-tangere* (Razowski 2003).

In our study, no negative effect of moth on the growth of *I. glandulifera* was found. In Switzerland it has also been shown that *P. fuligana* did not have an effect on the development of the Himalayan balsam and did not harm the plant (Burkhart & Nentwig 2008).

I. glandulifera is a fairly large plant and the impact of just one caterpillar of *P. fuligana* is too small to affect its growth. Also, the plant regenerates easily, which helps to quickly close holes from caterpillars feeding, thus also preventing its further infection by pathogens. Finally, we conclude that this moth is not an effective natural regulator of this highly invasive species. However, there seems to be a considerable impact of specialised herbivores in its native area (Liu & Stiling 2006). Therefore, the study of its enemies might nevertheless result in a method to control its invasion in Bulgaria.

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Impacts of resource limitations on the reproduction behaviour in the Agile Frog (*Rana dalmatina*) on the territory of Natura park "Shumensko plato"

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Abstract. The Agile Frog (*Rana dalmatina*) is one of the anurans species inhabiting the Nature Park "Shumensko Plato" (north-eastern Bulgaria). In 2019 and 2020 we studied the general ecology of the population in the Park and in particular the breeding activity of the frogs. During our survey we registered extension of the breeding season and we also report on the longest amplexus for *R. dalmatina* - 12 days (detected in an artificial water basin).

Key words: Key words: amplexus, breeding activity, artificial ponds.

Introduction

The Agile Frog (*Rana dalmatina* Fitzinger in Bonaparte, 1838) is a terrestrial ranid species that is widely distributed in Europe, hence these anurans do not form dense populations (Naumov 1999). On the Balkan-peninsula the adults of *R. dalmatina* emerged from hibernation in late February to early March. In this species, the breeding period starts immediately after hibernation (Stojanov *et al.* 2011, Iosob & Prisecaru 2014). The amplexus in these frogs is of pectoral type and benefits to the cloacal alignment and thereby helping successful fertilization (Mollov et al. 2010). In *R. dalmatina* the larger males are able to hold the females in amplexus for longer periods of time, but the size of the female is not definitive for the length of the amplexus (Vági & Hettyey 2016). In the present study we report on some peculiarities in the breeding behaviour of the Agile Frogs from the Nature park "Shumensko plato".

Material and Methods

In this survey we studied the breeding activity of the Agile Frog on the territory of the Nature Park "Shumensko Plato". We mapped all water basins on the investigated territory by using hand held GPS system Garmin Etrex 30 (Garmin International Inc., Kansas, USA). In a total area of 3930,7 hectares we detected only 4 water basins which retain water volumes for prolonged time. These basins are grouped two by two in two sites with the following coordinates: N43.248888; E26.893333 and N43.248888; E26.892777 (Datum: WGS84). They are located in habitat of high conservation priority (European Directive 92/43/EEC). According to the Palearctic habitat classification of Moss & Davies (2002) theses habitats may be classified as type 41.2B Pannonic oak-hornbeam forests.

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We provided daily direct observation during the whole breeding period of the Agile Frogs. To determine the total duration of the spawning period, our visits to the study area started in mid-February and ended in the middle of May. In the winter of 2019 we set up a small artificial pond with dimensions 50 x 25 x 20 cm to gain information on the breeding behaviour of limited number of frogs which may be identified and documented daily. We used Nikon D7000 for photography and photo trap Ltl Acorn 5210M for predator detection.

Results and Discussion

In the Agile Frogs, the males are the first to arrive at the breeding sites (Hettyey *et al.* 2005, Lode & Lesbarreres 2004, Pavignano *et al.* 1990). In 2019 a male *Rana dalmatina* appeared in the studied ponds on 06.03 and in 2020, the first frog appeared earlier due to the warmer weather – on 25.02.

The duration of the breeding season in *R. dalmatina* lasts for of about 30 days (Biaggini *et al.* 2018, Combes et al. 2018, Hettyey et al. 2005, Vági & Hettyey, 2016). In the investigated ponds, the first egg-clutch was detected on 06.03 in 2019 and on 28.02 in 2020. In both years, new egg-clutch were still appearing until the end of April. This indicates on extraordinary prolonged breeding seasons in the investigated population (see Stojanov *et al.* 2011). For the Agile Frogs Ward & Griffiths (2015) reported a prolonged spawning period of six to seven weeks. These authors propose that the increase in the population had caused the extend in the breeding time. The population of *R. dalmatina* on the territory of the Natura park "Shumensko plato" is apparently not dense and the reason for the prolonged breeding season have to be related with the limitation in the number of the ponds suitable for spawning. Naumov (1999) reports that the Agile Frogs overwinter in the vicinity of the water basins they use for reproduction. Presumably, in our case, the specimen which are hibernating besides the water basins that normally forms after winters with high snow and rain falls, had to migrate for prolonged time to reach the only two water basins available after the dry winters of 2019 and 2020. The patterns of the road mortality of the Agile Frogs in the vicinity of the ponds strongly support that hypothesis. In the first morning with detected frog activity we found 20 killed frogs on a 30 m long road section in 2019 and 30 more were found in the same circumstances in 2020. After the initial period of the activity, more road kills were detected, but they were only sporicidal and scattered on wider section of the road. A possible explanation can be related to an initial mass migration on a narrow front of the "local" male frogs overwintering in the vicinity of the ponds and migrating simultaneously in the first night of activity.

During the prolonged breading seasons, around 20 egg-clutches were registered out of the water near the ponds every year (Fig. 1). In 2019 the last such case was observed on 11.05 and in 2020 on 12.05. The presence of females carrying eggs so late in the season is a strong indication of a prolonged reproduction season. It is possible that these females migrate from far destinations toward the few water basins suitable for spawning. Our camera trap revealed that such female frogs were attacked by day active birds of prey (*Buteo buteo, B. rufinus, Aquila pennata*). Selas et al. (2007) and Swan (2011) reported that some frogs are regular part of the common buzzard's diet. In the investigated region of the park lives a resident pair of common buzzards and 87% of the attacks were performed by these birds. By consuming of the frogs, the birds removed the eggs.

On 08.03.2019 a *R. dalmatina* male occupied the small artificial basin that we had prepared in the winter. On 14.03.2019 two specimens (male and female) were observed in amplexus (Fig. 2). On the base of the photo documentation, we were able to identify these specimens in the next days. The male had released the female after the egg deposition on the 12-th day of the amplexus (25.03.2019). For *R. dalmatina* was reported that the male may not be able to release the female until the spawning is complete (Hettyey *et al.* 2005). These authors report that the amplexus in the Agile Frog can extend from several hours up

to 4 days. In 2020 a male Agile Frog occupied the artificial pond on 28.02. This specimen was detected inside the basin until 10.03. During this period, the presence of a female was not registered, but on 11.03 an egg-clutch was found. On 30.03.2020 another male was registered inside the basin. However, no new egg-clutches was observed. The larvae from the only egg-clutch in the artificial pond hatched on 14.04 (after 34 days). In 2019 the larvae needed 31 days to hatch. These results confirmed the data known from Bulgaria according to which the average duration of the egg phase is 30 days (Naumov 1999).

Fig. 1. Registered egg-clutches out of the water near the ponds.

Fig. 2. Male and female *Rana dalmatina* in an artificial basin in amplexus for 12 days.

Miaud & Merilä (2001) explain the variation of the beginning of reproduction among populations as a result of adaptation of the local populations to specifics in the environments. The feeding activity before hibernation may also impact the breeding behaviour (Elmberg & Lundberg 1991). Such factors may limit the reserves of the frogs during the hibernation, and may impact the reproduction activity (Hartel 2005). In the case of our study, the aberrations in the breeding behaviour of the local population can be explained by the limitation of the resources in form of suitable spawning basins in the region. The prolonged duration of the breeding season, the extremely long amplexus time

and the presence of many egg clutches out of the water in the middle of May reflects the reaction of the Agile Frogs on the meteorological and hydrological conditions in 2019 and 2020.

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Golden jackal (*Canis aureus* Linnaeus, 1758) and Red fox (*Vulpes vulpes* Linnaeus, 1758) population dynamics in Sarnena Sredna Gora Mts., Bulgaria based on hunting statistics

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Abstract. Golden jackal (*Canis aureus* Linnaeus, 1758) and Red fox (*Vulpes vulpes* Linnaeus, 1758) are the most common medium-sized canid species in Bulgaria. Annual harvest hunting data base for 2009-2019 was used as a method for assessing changes in their population trends. The study area covers approximately 100,000 ha comprising the areas of State Forestry Stara Zagora, State Forestry Kazanlak, State Forestry Maglizh and State Forestry Chirpan (Bulgaria). The hunting bag data for jackals and foxes varied considerably during the study period, ranging from 340 to 899 specimens for the jackals, and from 143 to 299 for the foxes, respectively. It can be concluded that the dynamics in the number of the Golden jackal and the Red fox in the region of Sarnena Sredna Gora Mts. and its adjacent territories was of different intensity over the years and proceeded independently.

Key words: Key words: hunting bag, abundance, predators.

Introduction

Golden jackal (*Canis aureus* Linnaeus, 1758) and Red fox (*Vulpes vulpes* Linnaeus, 1758) are the most common medium sized canid species in Bulgaria. The fox is widely spread from the seacoast to the subalpine zone, and the jackal inhabits primarily the low and semi-mountainous areas avoiding high altitudes (Popov & Sedefchev 2003). Hunting practice provides raw data for statistics, biological samples, animal carcasses, as well as non-invasive sampling and observations of species (Cretois *et al.* 2020). Management measures for the conservation or population control of species in England are based on accurate methods of reporting their distribution and abundance, implemented through the National Gamebag Census (Whitlock *et al.* 2003). Hunting is one of the reliable methods for the census of the foxes (Beltran *et al.* 1991). Although some authors argue on the accuracy derived from shooting data (Smedshaug *et al.* 1999, Sadlier *et al.* 2004), others use them to assess the number, density and development trends of jackal and fox populations (for Romania - Banea *et al.* 2012, for Slovakia - Guimaraes *et al.* 2019, for Greece - Giannatos 2004 and for Hungary - Toth *et al.* 2009). In Bulgaria, the fox and the jackal are a hunting source according to the Law for hunting and protection of the game (SG 2000). The changes in the numbers of the two species are of particular interest, as they are related to the numbers of the other hunted species. The correlation between the number of the smaller predator and that of the larger one is still discussable, provoking the investigation of jackal and fox populations dynamics in the Sarnena Sredna gora Mts. and its adjacent areas.

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Material and Methods

According to Krofel *et al.* (2017) hunting bags data for competing species needs to be collected and analyzed at a finer spatial scales, for their spatial segregation could be very narrow, as in the case with jackal and wolf in some regions. The study area represents homogeneous, semi-mountainous hilly terrain, covered by forest and shrub vegetation providing suitable habitat for jackals and foxes. It is a part of Sarnena Sredna Gora Mts. with its adjacent areas. The area covers approximately 100,000 ha comprising the territories of State Forestry Stara Zagora, State Forestry Kazanlak, State Forestry Maglizh and State Forestry Chirpan. Annual harvest hunting data base for 2009-2019 was used as a method for assessing changes in population trends. Statistical data processing was performed by Statistica 6 Stat. Software.

Results and Discussion

The hunting bag data for jackals and foxes varied greatly during the study period, with values for jackals ranging from 340 to 899 specimens, and for foxes from 143 to 299, respectively.

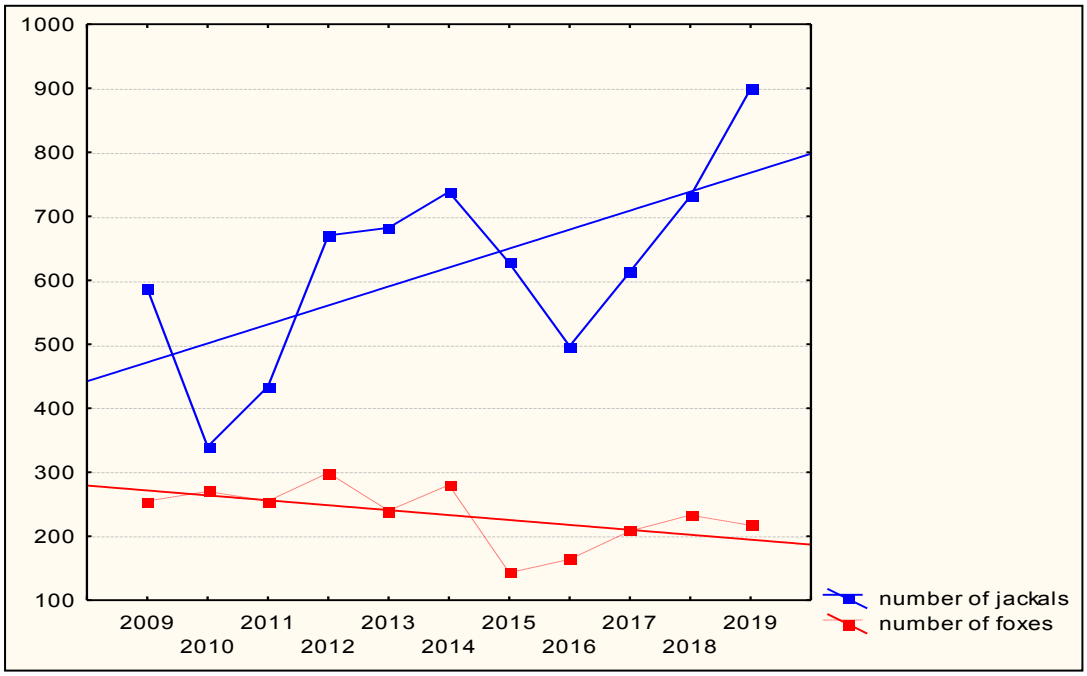

Fig. 1. Golden jackal (*Canis aureus* L.) and Red fox (*Vulpes vulpes* L.) population dynamics trends in Sarnena Sredna Gora Mts., Bulgaria, for a period of 11 years based on the analysis of the hunting data base (number of shot individuals)

On average, 620 jackals and 233 foxes were shot each year throughout the study area. Assuming that the success of hunting for both species was the same, it turns out that the jackals were significantly more (2.66 times) compared to foxes. The number of jackals varied more over the years (SD=154.84 and Vc=24.98) compared to that of the foxes (SD=47.64 and Vc=20.44). It can be concluded that the jackal population was more unstable than that of the fox, with two strong declines in 2010 and 2016 (Fig. 1). The fox population was more stable, with one significant decline in 2015. After this period until now, both predators have seen a simultaneous increase in numbers. In accordance with assumption of Banea *et al.* (2018), the jackal does not exert a decreasing effect on fox numbers, just as in Romania, Serbia and Hungary. Following the median, built on the basis of statistical values, it can be summarized that the jackal population was rising, while that of the fox was decreasing in the study area for the period of 2009-2019 (Fig. 1). The sharp

increase in the number of jackals in Bulgaria began from 2003 to 2009, as reported in a larger scale study (Stoyanov 2012). It can be summarized that the dynamics in the number of the Golden jackal and the Red fox in the region of Sarnena Sredna Gora Mts. with its adjacent territories was being of different intensity over the years and was proceeding independently.

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