

FIRST LIST OF SCATHOPHAGID FLIES (DIPTERA: SCATHOPHAGIDAE) RECORDED IN CROATIA

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The present faunistic report on Scathophagid flies (Diptera: Scathophagidae) has resulted in the recording of 17 species, of which *Acanthocnema glaucescens* (Loew, 1864) is the last recorded for the fauna of Croatia. Seventeen Scathophagid species are currently known from Croatia, classified in 10 genera. The genus *Scathophaga* is represented by six species, followed by *Amaurosoma* and *Norellisoma* with two species each, while genera *Acanthocnema*, *Cleigastra*, *Coniosternum*, *Cordilura*, *Norellia*, *Paralleloma*, *Phrosia*, are represented by one species each.

Key words: Diptera, Scathophagidae, Plitvice Lakes, Croatia

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Ovo faunističko priopćenje o muhama balegarkama (Diptera: Scathophagidae) rezultiralo je bilježenjem sedamnaest vrsta, od kojih je *Acanthocnema glaucescens* (Loew, 1864) posljednja zabilježena vrsta za faunu Hrvatske. Sedamnaest vrsta iz porodice Scathophagidae zabilježeni u Hrvatskoj svrstano je u deset rodova. Rod *Scathophaga* zastupljen je sa šest vrsta, slijede *Amaurosoma* i *Norellisoma* s dvije vrste, te rodovi *Acanthocnema*, *Cleigastra*, *Coniosternum*, *Cordilura*, *Norellia*, *Paralleloma* i *Phrosia* zastupljeni s jednom vrstom.

Ključne riječi: Diptera, Scathophagidae, Plitvička jezera, Hrvatska

INTRODUCTION

The world fauna of the family Scathophagidae has 362 valid species in 65 genera, the number of genera or subgenera depending on the criteria applied by the individual authors (ŠIFNER, 2008, 2009; BERNASCONI & ŠIFNER, 2021). The Palearctic region has 256 described species classified in 44 genera (BERNASCONI & ŠIFNER 2021). The number of species identified in Europe varies greatly from country to country. In many European countries the fauna of Scathophagid flies is poorly researched or remains unexplored (ŠIFNER, 2008). Unfortunately, data on the fauna of Scathophagid flies in Croatia are very scarce. The earliest data about the fauna of Scathophagid flies from Croatia appeared during the 1860s in "Fauna Austriaca" (SCHINER, 1864). During that time, Croatia was a part of the Austro-Hungarian monarchy, and some spe-

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cies were deposited in insect collections of Naturhistorisches Museum in Vienna (Austria). The adult specimens from this family are predaceous on insects and other small invertebrates or coprophagous and saprophagous. Adults mainly occur in sheltered and moist habitats of various types for instance in forests, lowland to montane meadows, littoral vegetation, marshes and peatbogs (ŠIFNER, 2008). The larvae are phytophagous and usually they mine in the leaves and stems of monocotyledonous plants, and much more rarely of dicotyledonous plants, while some larvae can be predaceous or saprophagous, living in the soil and stagnant and running waters (ŠIFNER, 2008). Larval development is only known for a limited number of species (ŠIFNER, 2008). The principal aim of this study was to summarize all available data on the Scathophagid flies (Scathophagidae) fauna of Croatia. Hence, this article is based on literature findings and data obtained from a faunistic study from the Plitvice Lakes (Plitvice Lakes National Park).

MATERIAL AND METHODS

During 2017 and 2019 seven specimens of Scathophagid flies were collected in Plitvice Lakes National Park (NP), located in the west Dinaric Mountains in Croatia. The Plitvice Lakes system consists of 16 karstic, oligotrophic, dimictic and fluvial lakes divided by tufa barriers. The system is supplied with water from the Matica Stream, which is formed by the merging of Crna rijeka and Bijela rijeka Streams and ends with the forming of the Korana River. All specimens were collected by two emergence traps (emergence traps P4 and P5) on one site, at the spring of the Bijela Rijeka Stream (Fig. 1). Six pyramid-type emergence traps were operated from February 2007 to December 2019. Traps were sited so as to ensure representative sampling of emergence from all microhabitats present at each site. Each trap was a 50-cm tall,



Fig. 1. Spring of the Bijela Rijeka Stream.

four sided pyramid with a base of 45×45 cm, fastened to the streambed to allow the free movement of larvae in and out of the sampling area. The side frames of the traps were covered with 1-mm mesh netting (IVKOVIĆ *et al.*, 2013). For collected specimens sex, locality, month, and year are recorded.

RESULTS

At the site the spring of the Bijela rijeka Stream, Plitvice Lakes NP 07.2017, emergence trap P5, 1♂ and also in the same trap 06.2019 1♀, 3♂ of the species *Acanthocnema glaucescens* (Loew, 1864) were recorded. At the same site spring of the Bijela Rijeka Stream, Plitvice Lakes NP 05.2019, emergence trap P4 and 07.2019, emergence trap P5, one specimen from the genus *Scathophaga* was recorded in each trap, however precise identification to species level is difficult because these specimens are quite damaged. Findings of *Acanthocnema glaucescens* represent the last faunal record from Scathophagidae family in Croatia (IVKOVIĆ *et al.*, 2020). This species is readily distinguished from other members of the family by the presence of a short stout ventral apical spine on the front tibia (BALL, 2014). *Acanthocnema glaucescens* is a slender, dark grey species with dark legs, grey frons and darkened wings. The third antennal joint is entirely dark in both sexes. All three upper frontal orbitals are long and curved outwards (BALL, 2014). Adults fly from April to September. This species prefers mossy boulders in shady streams, but also sometimes occurs in woodland or in the splash zones of small waterfalls or on open moorland (BALL, 2014). *Acanthocnema glaucescens* is distributed in the European Alps, Austria, Bosnia and Herzegovina, Croatia, Czech Republic, Finland, France, Germany, Great Britain, Hungary, Norway, Poland, Slovakia, Slovenia, and Sweden (BALL, 2014; ŠIFNER, 2008).

In all, seventeen species of the family Scathophagidae have been recorded in Croatia.

The list of Scathophagidae species recorded in Croatia

Family: Scathophagidae Robineau-Desvoidy, 1830

Subfamily: Scathophaginae Robineau-Desvoidy, 1830

Tribe: Cordilurini Šifner, 2003

Genus: *Cordilura* Fallén, 1810

1. *Cordilura umbrosa* Loew, 1873

Literature records: Osijek (LANGHOFFER, 1928).

Genus: *Parallelomma* Becker, 1894

2. *Parallelomma albipes* (Fallén, 1819)

Literature records: Sljeme, Borongaj (Zagreb), Bakar, Orehovica (LANGHOFFER, 1928).

Genus: *Phrosia* Robineau-Desvoidy, 1830

3. *Phrosia albilabris* (Fabricius, 1805)

Literature records: Zagreb, Zlatar (LANGHOFFER, 1928).

Genus: *Norellisoma* Wahlgren, 1917

4. *Norellisoma alpestre* (Schiner, 1864)

Literature records: Croatia (SCHINER, 1864; ŠIFNER, 2008).

5. *Norellisoma spinimanum* (Fallén, 1819)
Literature records: Croatia (ŠIFNER, 1995, 2008).
Genus: *Norellia* Robineau-Desvoidy, 1830
6. *Norellia spinipes* (Meigen, 1826)
Literature records: Podsused, Sljeme (Zagreb) (LANGHOFFER, 1928).
Tribe: Microprosopini Šifner, 2003
Genus: *Acanthocnema* Becker, 1894
7. *Acanthocnema glaucescens* (Loew, 1864)
Recent records: Spring of the Bijela Rijeka Stream, Plitvice Lakes NP 07.2017, emergence trap P5, 1♂; same site, 06.2019, 1♀, 3♂.
Literature records: Spring of the Bijela Rijeka Stream, Plitvice Lakes NP, tufa barrier Kozjak – Milanovac, Plitvice Lakes NP (IVKOVIĆ et al., 2020).
Tribe: Cleigastrini Šifner, 2003
Genus: *Cleigastra* Macquart, 1835
8. *Cleigastra apicalis* (Meigen, 1826)
Literature records: Croatia (Hvar Island) (ŠIFNER, 2008).
Tribe: Amaurosomini Šifner, 2003
Genus: *Amaurosoma* Becker, 1894
9. *Amaurosoma brevifrons* (Zetterstedt, 1838)
Literature records: Ludbreg, Zagreb (LANGHOFFER, 1928).
10. *Amaurosoma flavipes* (Fallén, 1819)
Literature records: Zagreb (LANGHOFFER, 1928).
Tribe: Scathophagini Robineau-Desvoidy, 1830
Genus: *Coniosternum* Becker, 1894
11. *Coniosternum decipiens* (Haliday, 1832)
Literature records: Croatia (LANGHOFFER, 1916).
Genus: *Scathophaga* Meigen, 1803
12. *Scathophaga cineraria* (Meigen, 1826)
Literature records: Risnjak (LANGHOFFER, 1928), Croatia (Plitvice Lakes, Klis) (ŠIFNER, 2008).
13. *Scathophaga inquinata* (Meigen, 1826)
Literature records: Senj (LANGHOFFER, 1928).
14. *Scathophaga litorea* (Fallén, 1819)
Literature records: Croatia (Split, Hvar), (STROBL, 1893, 1900; ŠIFNER, 2008).
15. *Scathophaga lutaria* (Fabricius, 1794)
Literature records: Zagreb (LANGHOFFER, 1928).
16. *Scathophaga scybalaria* (Linnaeus, 1758)
Literature records: Sljeme (Zagreb), Blato (LANGHOFFER, 1928).
17. *Scathophaga stercoraria* (Linnaeus, 1758)
Literature records: Osijek, Orehovica, Mihovljan, Senj, Zagreb (LANGHOFFER, 1928), Croatia (STROBL, 1900; ŠIFNER, 2008).

DISCUSSION

The summarized data of Scathophagid flies fauna of Croatia are hard to compare with those of neighbouring countries in the Western and Central Balkans or Central Europe, mainly due to sampling being sporadic. Altogether, 17 species of Scathophagid flies were recorded in Croatia. These data clearly show that the fauna of Scathophagid flies has been poorly studied in Croatia. Also, the number of species identified in various countries throughout Europe varies greatly and mostly depends on the level of faunistic and taxonomic research. Some European countries are still entirely unexplored with respect to Scathophagid flies, for instance Bulgaria, Romania and Greece (ŠIFNER, 2008). In neighbouring Hungary, 30 species of Scathophagid flies were recorded, and the occurrence of another 28 species is expected (PAPP, 2001), while in Great Britain 21 species have been recorded (BALL, 2014). The present list does not represent a complete report of Croatian Scathophagid flies. We can expect to record some species that are known in Central Europe, for instance in Hungary.

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