FOLIA ENTOMOLOGICA HUNGARICA
ROVARTANI KÖZLEMÉNYEK
Volume 79 2018 pp. 101–106

First record of the parasitoid Idris flavicornis (Hymenoptera: Scelionidae) from eggs of the wolf spider Pardosa agrestis (Araneae: Lycosidae)

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Abstract – The egg-parasitoid wasp species *Idris flavicornis* Förster, 1856 has been recorded from several countries of Europe. It parasitizes eggs of lycosid spiders, mainly those belonging to the genus *Pardosa*. The first published record of *Idris flavicornis* is reported from Hungary. Wasps emerged from cocoons of *Pardosa agrestis* (Westring, 1861), collected during both the early and late generation adult peaks of the spider species. *Pardosa agrestis* represents a new host species previously unknown for *Idris flavicornis*, parasitizing both adult generations throughout the yearly phenology, with comparable prevalence. In both adult generations a prominent female bias was observed in the sex ratio of the emerging wasps. With 2 figures.

Key words – Platygastroidea, first record, egg parasitoid, new host, Hungary

INTRODUCTION

Scelionidae (Platygastroidea) is a speciose hymenopteran family, including small-sized parasitic wasps. The peculiarity of the group is that the wasps lay their eggs only in the eggs of other arthropods. Most groups of insects and spiders have scelionid parasites, with a high degree of host group specificity (Iqbal & Austin 2000). Members of the tribe Idrini are obligate spider egg-parasitoids and one of the few known scelionid groups parasitizing exclusively spider eggs (Austin 1985). The genus *Idris* has a worldwide distribution (Margaría *et al.* 2015, Masner & Denis 1996), but only 20 species have been recorded so

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far from the Western Palaearctic by Huggert (1979). Nine species described from Bulgaria, Ukraine, European Russia and Caucasus were added latter by Kononova & Kozlov (2008). One of the European species, *Idris flavicornis* Förster, 1856, was recorded to parasitize eggs of lycosid spiders, including *Arctosa perita* (Latreille, 1799), *Pardosa monticola* (Clerck, 1757), *P. nigriceps* (Thorell, 1856), *P. pullata* (Clerck, 1757), and *P. purbeckensis* (Pickard-Cambridge, 1895) (Huggert 1979).

Here we report the first known record of *I. flavicornis* (Figs 1–2) parasitizing eggs of the wolf spider *Pardosa agrestis* (Westring, 1861), from hosts collected in eastern Hungary. Although there are some specimens of *I. flavicornis* deposited in the Hungarian Natural History Museum (collected by L. Bíró in 1921 from Budapest, by G. Horváth in 1921 from Újfehértó and by J. Szabó in 1959 from an unknown location), to our best knowledge this is the first published record of the species from Hungary.

MATERIALS AND METHODS

Cocoon carrying females of *P. agrestis* were collected at both adult peaks during the yearly phenology, in early May and late July of 2017 (N = 50 and 69, respectively), from an uncultivated plot next to a maize field, between Hajdúszoboszló and Nádudvar, Hungary (47° 26' 57.49" N, 21° 18' 01.96" E). Spiders were collected by suction sampling, and were stored individually in laboratory, in separate plastic cups with a floor area of 25.5 cm^2. The cups contained *ad libitum* water (wet cotton wool) and food (flightless fruit flies) for the spiders. The egg-parasitizing wasps were found emerging from *P. agrestis* cocoons, at the same time as the hatching spiderlings. The wasps were handled separately per cocoons from which they emerged, then were over-anaesthetised at –20 °C and stored in 96% ethanol at –20 °C. Specimens were identified by O. P. using Kruss MSZ54 stereomicroscope. Determination of sexes, and micropterous and macropterous forms of females were done by Z. V. using Nikon SMZ645 stereoscopic microscope.

To test whether the number of emerging wasps from early and late summer cocoons was significantly different, we applied Mann–Whitney U test by using the R statistical software version 3.0.2 (R Core Team 2013).

RESULTS

Out of 50 cocoons from May and 69 from July, *I. flavicornis* wasps emerged from 7 and 12 of them, respectively (*ca* 14% and 17% prevalence in the collected egg sacs). The number of emerging wasps per cocoon ranged from 1 to 16 (*ca* 6

Figs 1–2. *Idris flavicornis* Förster, 1856, micropterous female: 1 = dorsal view, 2 = left lateral view. Scale = 0.5 mm (photo by O. Popovici)

per cocoon on average), counting a total of 45 individuals from the cocoons from May. We were able to examine 37 specimens, out of which 36 were found to be micropterous females, and 1 was male (the rest of the specimens were damaged preventing reliable identification of sexes). In the cocoons collected in July, the number of wasps ranged from 4 to 16 (with *ca* 10 per cocoons on average), with a total of 115 individuals. From the 115 specimens that emerged from July cocoons, we could examine 47, in which 37 were found to be micropterous females, 7 were macropterous females, and 3 were males. The difference in the average number of emerging *I. flavicornis* between May and July cocoons was not significant (Mann–Whitney's $U = 24$, $P = 0.138$).

Most of the emerged wasps are deposited in the Hymenoptera Collection of the Hungarian Natural History Museum (Budapest) and two specimens in the second author's collection at the "Alexandru Ioan Cuza" University of Iaşi.

DISCUSSION

Specimens of the egg-parasitoid *Idris flavicornis* were found emerging from the cocoons of *Pardosa agrestis* females. To our knowledge this is the first affirmed record of this scelionid wasps species from Hungary, and a new host species parasitized by it. The newly recorded spider host *P. agrestis* is a common species in Europe, mainly inhabiting agricultural fields and alkaline grasslands (Kiss 2003). *P. agrestis* was found to be the most dominant species in the Hungarian arable fields, accounting for 40% of the total spider population on average (Samu & Szinetár 2002).

Pardosa agrestis has a unique phenology within the genus. Its congeners have only one adult peak per season, in early summer when the overwintered spiders moult to maturity. Adults quickly reproduce and soon die, while their offspring develop to few-moulted juvenile or subadult stage (Schaefer 1977). However, in *P. agrestis* there is a facultative second adult generation in the second half of the year, comprised of so called rapidly developing individuals, which mature and reproduce before winter (Samu *et al.* 1998). *I. flavicornis* wasps emerged from the cocoons of both early and late summer adults, and the prevalence of parasitized cocoons was quite similar in both. An interesting observation is the strong female bias in the sex ratio of emerging wasps, as less than 3% of them were males in both phenological segments. Also, macropterous females were found only among the wasps of late summer cocoons, in a quite low number. Our observations pose intriguing questions regarding the reproductive behaviour and life history of this species, which are virtually unknown to date (Iqbal & Austin 2000).

We think that our record of *I. flavicornis* is an interesting addition to the vaguely known distribution, host range and phenology of the species. Furthermore, the apparent phenological link (two generations per year) between the host and the wasp is intriguing regarding the ecology and co-evolution of this host-parasitoid pair.

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Acknowledgements – We owe thanks to Gábor Kardos (Medical Microbiology Institute, University of Debrecen), Dávid Nagy (Department of Evolutionary Zoology and Human Biology, University of Debrecen) and Edvárd Mizsei (Department of Ecology, University of Debrecen) for their aid during the samplings. We thank Walter Pfliegler (Department of Biotechnology and Microbiology, University of Debrecen) for his remarks on the manuscript.

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