New distribution records of *Aglossa signicostalis* (Lepidoptera: Pyralidae) in Europe: a new species for the fauna of Croatia

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Abstract. A new species for the Croatian moth fauna was identified in July 2021 when a specimen of *Aglossa signicostalis* Staudinger, 1871, family Pyralidae, was recorded in the country for the first time. The specimen of this myrmecophilous species was collected during a field trip in Zagreb in a meadow close to the Sava riverbank. This record represents a contribution to its general distribution in Europe and an extension of its known distribution range. With this addition, the number of Pyraloidea species recorded from Croatia rises to 397 and the number of Pyralidae to 179.

Samenvatting. Een nieuwe soort voor de Kroatische mottenfauna werd in juli 2021 geïdentificeerd toen voor het eerst een exemplaar van *Aglossa signicostalis* Staudinger, 1871, familie Pyralidae, in het land werd geregistreerd. Het exemplaar van deze myrmecofiele soort werd verzameld tijdens een excursie in Zagreb in een weiland dicht bij de oever van de Sava. Deze waarneming levert een bijdrage aan de algemene verspreiding in Europa en een uitbreiding van het bekende areaal. Met deze toevoeging stijgt het aantal Pyraloidea-soorten dat in Kroatië is waargenomen tot 397 en het aantal Pyralidae tot 179.

Résumé. Une nouvelle espèce pour la faune des papillons croates a été identifiée en juillet 2021 lorsqu'un spécimen d'*Aglossa signicostalis* Staudinger, 1871, de la famille des Pyralidae, a été trouvé dans le pays pour la première fois. Le spécimen de cette espèce myrmécophile a été collecté lors d'une sortie sur le terrain à Zagreb dans une prairie proche de la berge de la Sava. Cette donnée représente une contribution à sa distribution générale en Europe et constitue une extension de son aire de distribution connue. Avec cet ajout, le nombre d'espèces de Pyraloidea enregistrées en Croatie passe à 397 et le nombre de Pyralidae à 179.

Key words: *Aglossa signicostalis* — Croatia – Fauna – Myrmecophily — Pyraloidea.

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Introduction

The superfamily Pyraloidea belongs to one of the most ecologically diverse superfamilies within the order Lepidoptera (Regier *et al*. 2012). Their larvae show very diverse behavioral characteristics. Some live concealed in silken webs, or in rolled or folded leaves, or between leaves spun together to form a shelter. Others are borers in the stems, roots, shoots, buds or fruits of monocotyledonous plants, or in galls (Solis 2007). Some larvae are scavengers, feeding on stored products and causing economic damage, and some have adapted to aquatic environments (Munroe 1972), where they feed on vascular plants or algae. Some are myrmecophilous, and some have been shown to be predators of other insects.

Although the tradition of lepidopterological investigation in Croatia is a long one, micromoths are still poorly known despite their ecological importance in many plant communities. In the past, numerous surveys on butterflies and moths in Croatia have been undertaken, and subsequent publications have sometimes included Pyraloidea (Abafi-Aigner *et al*., 1896, Galvagni 1902, Mann 1857, 1867, 1869, Rebel 1891, 1895, 1903, 1904, Schawerda 1921, Carnelutti 1994, Hafner 1994, and others). On the whole, the Pyraloid fauna has been badly neglected. Recently however, more attention has been paid to the group, now distinguished as families Pyralidae and Crambidae (Habeler 2003, Koren & Črne 2012, Gumhalter *et al*. 2018, Gumhalter 2019a, 2019b, Koren & Kulijer 2020, Gumhalter & Kučinić 2021), and now this superfamily is one of the best-studied in Croatia.

Worldwide, the superfamily includes 15,576 described species (van Nieukerken *et al*. 2011). In Croatia, 396 species are currently known (Gumhalter 2021), with new species being regularly added to the list (Koren 2020, 2021a, 2021b, Gumhalter 2021). Probably, it is still far from complete, more additions can be expected as a result of further studies.

Hitherto, two species of the genus *Aglossa* Latreille, 1796, *A. caprealis* (Hübner, 1809) and *A. pinguinalis* (Linnaeus, 1758), have been recorded in Croatia, but neither has been seen in the country since 2003 (Habeler 2003).

Here, the occurrence of a third species, *A. signicostalis*, is recorded, which represents an extension of its known distribution range (Slamka 2006, Nuss *et al*. 2013).

Fig. 1. *Aglossa signicostalis* (wingspan 16 mm) collected on 19 July, 2021 in Zagreb. © Danijela Gumhalter.

Fig. 2. A small meadow along the road where the specimen of *Aglossa signicostalis* was collected in 2021. © Danijela Gumhalter.

Materials and methods

Since 2016, the author has regularly carried out research on the Pyraloidea of continental parts of Croatia, and is ongoing, among other localities in the city of Zagreb.

During a field trip on 9 July, 2021, a specimen of *A. signicostalis* was collected, which is new to the Croatian pyraloid moth fauna. The specimen (Fig. 1) was taken at UV light and is deposited in the private collection of the author (coll. Gumhalter). It was identified by reference to Slamka (2006).

Results and discussion

Following van Nieukerken *et al*., (2011) the family Pyralidae currently includes 5,921 described species worldwide. The recently published, updated version, of the Croatian Checklist includes 178 species (Gumhalter 2021). The addition of *A. signicostalis* brings the total to 179.

Aglossa Latreille, 1796 is a rather small genus, with only nine taxa distributed in Europe. The larvae live in silken tubes or galleries in vegetal and animal detritus. Some species are pests (Slamka 2006).

According to Fauna Europaea, the species *A. asiatica* Erscholt, 1872 occurs only on Cyprus and Crete, *A. brabanti* Ragonot, 1884 is found on the French, Spanish and Portuguese mainland, and on Gibraltar. *A. exsucealis* Lederer, 1863 endemic on Cyprus and *A. rabatalis* (Joannis, 1923) on the French mainland and Spain (Slamka 2006). *A. dimidiata* (Haworth, 1809) has been recorded on Gibraltar (Nuss *et al*., 2013), and one specimen from the British museum is labelled "London" (Slamka 2006). According to Slamka (2006), *A. ocellalis* Lederer, 1863 was found in Scotland (Glasgow) in cargo from West Africa, and *A. caprealis* and *A. pinguinalis* are both widely distributed in Europe (Nuss *et al*. 2013); both of these occur on the Balkan Peninsula (Plant & Jakšić 2018).

On 9 July, 2021 a specimen of *A. signicostalis*, hitherto unrecorded in Croatia, was collected on a meadow close to the Sava riverbank in Zagreb (Fig. 2, 3), at about 113 m above sea level (45°47'00.3"N 15°54'01.6"E). It is a myrmecophilous species.

Fig. 3. Map with the position of the collecting site Zagreb and the position of Virovitica in Croatia, which is located close to the Hungarian border.

According to the Fauna Europaea database and Slamka (pers. comm. 13.08.2021), *A. signicostalis* is distributed in Slovakia, the Czech Republic, Hungary, the Italian mainland, and from some countries of the Balkan Peninsula: the Greek mainland, Bulgaria (Fig. 4), whence there is a single record from the Black Sea Coast at Balchik, from the year 1911 (Plant 2016); reported from North Macedonia (Klimesch 1968) and Romania, where it was collected in 2012 in Oltenia (Mehedinti, NE Hinova) in the east of the country close to the Serbian border (Péter Schmidt, pers. comm. 31.07.2021). Staudinger's report from Greece (1870) is almost certainly the same as that mentioned by Ragonot (1891) (Colin W. Plant, pers. comm.). Staudinger's data from Greece are also

mentioned by Speidel (1996) and Slamka (2006). Colin W. Plant considers the species to be rare in the southern Balkans, and suspects that it prefers the milder climate of Central Europe.

In the past, the species has been reported several times from Hungary (Slamka 2006). Imre Fazekas gives records from Debrecen, Bökönу, Békásmegyer near Budapest, and in several localities around Lake Balaton and in Barcs (pers. comm. 31.07.2021). The last locality is close to the Croatian border, near the river Drava, not far from the city of Virovitica (Fig. 3), and the finding of this species in Croatia is no surprise.

Fig. 4. Map showing the distribution of *Agnossa signicostalis* in Europe.

A. signicostalis has recently been recorded in the Czech Republic (Liška *et al*. 2002) and Slovakia (Tokár *et al*. 2002). In Italy, the species is distributed in the North (Bassi *et al*. 1995), as well as in Umbria (Orvieto, San Faustino), where it was collected in 1966, and in Modena (Sestola), where it was recorded in 1919.

The records from the Czech Republic and Slovakia are at the northern limit of distribution, and those from Italy are at the western limit of the known range of this species in Europe, and it is not known east of the Balkans.

*A. signicostalis*is is the third species of *Aglossa* to be recorded in Croatia. The other two species being *A. caprealis* and *A. pinguinalis*, both of which are widespread in Europe, including the Balkans (Plant & Jakšić 2018).

A. caprealis and *A. pinguinalis* are synanthropic species (Slamka 2006). The larvae of *A. caprealis* live in a silken gallery on vegetal detritus, and *A. pinguinalis* also thrives in dung. *A. pinguinalis* is known to be a pest, and *A. caprealis* is recorded as a pest in cheesemaking (Slamka 2006).

The larvae of Pyraloidea have diverse behavioural characteristics which include myrmecophily, association of the larvae with ants. According to Slamka (2006), larvae of *A. signicostalis* live in ant nests in tree cavities, mainly with *Liometopum microcephalum* (Panzer, 1789) and *Lasius (Dendrolasius) fuliginosus* (Latreille, 1798).

According to the Encyclopedia of Biodiversity (DeVries 2000), myrmecophily occurs with particular species of ant. Typically, myrmecophilous larvae form symbioses only with ant species that depend heavily on secretions as food, ants that also form symbioses with Homoptera and plants. Hence, secretion-dependent ants probably played a key role in the evolution of myrmecophily, whereas those that are predators or herbivores did not. An ecological consequence of the evolution and, with secretion-feeding ants is that in any suitable contemporary habitat, a suite of larvae, Homoptera and plant species all depend on the same species of ant symbionts. DeVries (2000) states that there are two main categories of ant associations among myrmecophilous larvae, the most widespread of which consists of an association in which a particular species of larva may be tended by a number of different ant species. The other category is an association in which a larva has an obligate association with a single species of ant; here, the ecology of the particular species of butterfly or moth is wholly dependent on the presence of a particular ant species. In this kind of association, larvae are often adopted by the ants, taken into the nest, and become parasites or predators of their hosts. Although such associations are well-known in butterflies, the relationships of the larvae of Pyraloidea with ants is not well-known, and research is required. Symbiotic interactions between lepidopteran larvae and ants are widespread in two families of butterflies, Lycaenidae and Riodinidae (Kaminski *et al*. 2012). The associations in species of Lycaenidae range from facultative and unspecific to obligate, species-specific interactions with ants (Pierce & Young 1986, Fiedler 1991). According to Kaminski *et al*. (2012), symbiotic interactions between butterfly larvae and ants require a range of behavioral and morphological adaptations (ant organs). The importance of ants is primarily due to their social behaviour combined with complex communication systems (Hölldobler & Wilson 1990).

Species differ markedly in the degree of association with their tending ants, and the extent of myrmecophily in *A. signicostalis* needs to be researched. More information is needed about the immature stages of *A. signicostalis* and their larva-ant association, and the steps that should be taken to further the conservation of the species. Favoured habitats, together with the ant populations therein, need to be studied and their conservation ensured. The maintenance of specific plant species that sustain tending ants should be a priority, as is the case with lycaenids (Kaminski & Freitas 2010).

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