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Coleophoridae in the spotlight II. On some aspects of the biology of *Coleophora magyarica* Baldizzone, 1983 and *Coleophora tyrrhaenica* Amsel, 1952 (Lepidoptera: Coleophoridae)

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Abstract – Adults and larval cases of *Coleophora magyarica* Baldizzone, 1983 and *Coleophora tyrrhaenica* Amsel, 1952 (Lepidoptera: Coleophoridae) are documented. New Hungarian records of the two species are presented, their distribution and bionomy are discussed. *Atriplex oblongifolia* Waldst. et Kit. (Amaranthaceae) is reported for the first time as host plant of *Coleophora tyrrhaenica*.

Key words – Microlepidoptera, *Coleophora*, faunistics, *Kochia prostrata*, *Kochia laniflora*, *Atriplex oblongifolia,* Hungary

INTRODUCTION

Larvae of *Coleophora* Hübner, 1822 (Lepidoptera: Coleophoridae) species prepare species-specific cases from leaves, flowers or seeds of their host plant. The cases primarily serve mimicry but they also protect the larva from physical impacts. The larval cases bear important specific characters; however, these are suitable for species-level identification only for the final instars. Some species prepare new cases at each moult. A trivalved emergence hole of the case is formed by the last instar larva, thus the presence of an opening indicates the final stage. Determination of the host plant is also necessary for identification of the moth species. During the last years, the life histories of several *Coleophora* species have been intensively studied (Szabóky & Takács 2021, Baldizzone *et al.* 2022).

Kochia prostrata L. (Amaranthaceae) is rare in Hungary with aggregated distribution, occurring mainly in steep loess walls and some saline habitats (Király *et al*. 2009). *Kochia laniflora* Borb. is more frequent than the previous species, and is characteristic for sandy grasslands. These species are known to be the host plants of *Coleophora eurasiatica* Baldizzone, 1989, *Coleophora remizella* Baldizzone, 1983 and *Coleophora magyarica* Baldizzone, 1983.

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Atriplex spp. (Amaranthaceae) serve as host plants for altogether 13 *Coleophora* species: *Coleophora adspersella* Benander, 1939, *Coleophora atriplicis* Meyrick, 1928, *Coleophora auroguttella* (Zeller, 1849), *Coleophora binotapennella* (Duponchel, [1843]), *Coleophora clypeiferella* Hofmann, 1871, *Coleophora motacillella* Zeller, 1849, *Coleophora salinella* Stainton, 1859, *Coleophora saxicolella* (Duponchel, [1843]), *Coleophora squalorella* Zeller, 1849, *Coleophora sternipennella* (Zetterstedt, 1839), *Coleophora therinella* Tengström, 1848, *Coleophora versurella* Zeller, 1849, and *Coleophora vestianella* (Linnaeus, 1758) (Rennwald & Rodeland 2023).

Bionomy of *Coleophora* species is special as their larvae prepare mines but live in specific cases, except for one species living in galls. Host plants and cases of several species, such as *Coleophora subula* (Falkovitsh, 1993), *Coleophora narbonensis* Baldizzone, 1990 or *Coleophora nomgona* Falkovitsh, 1975 are still unknown and, prior to this paper, no host plant species for *Coleophora tyrrhaenica* Amsel, 1952 has been reported.

MATERIAL AND METHODS

The Hungarian Natural History Museum, Budapest (HNHM) harbours 13 specimens of *Coleophora magyarica* and 5 specimens of *Coleophora tyrrhaenica* (Buschmann & Richter 2016). Recently, several collecting events were organised in Fülöpháza (Bács-Kiskun County), Tápióság (Pest County), and Tokaj (Borsod-Abaúj-Zemplén County) by the authors; during these, larval cases of *Coleophora* species were collected from *Kochia laniflora* and *Kochia prostrata* in the two former localities, and from *Atriplex oblongifolia* Waldst. et Kit. in the surroundings of Tokaj (Kopasz Hill). After successful overwintering, adults of *Coleophora magyarica* emerged from the larval cases found on *Kochia* spp., and those of *Coleophora tyrrhaenica* from cases found on *Atriplex oblongifolia*; the specimens were identified by Ignác Richter and Giorgio Baldizzone. Voucher specimens are deposited in the private collections of the authors, and three specimens of *Coleophora magyarica* are deposited in the HNHM.

Images of adults and cases were taken with a Canon 450 D camera set on a Carl Zeiss Stemi-2000 binocular stereomicroscope. Genitalia slides were prepared by Giorgio Baldizzone (Asti, Italy) and Ignác Richter (Malá Čausa, Slovakia) via the traditional method.

Abbreviations – BLDZ = genitalia slide by Giorgio Baldizzone; IR = genitalia slide by Ignác Richter.

RESULTS AND DISCUSSION

Coleophora magyarica Baldizzone, 1983
(Figs 1–6)

Distribution – It has so far been found in Europe: Hungary, Romania, Russia (European part up to Manych Lowland), Slovakia, and Ukraine (Rennwald & Rodeland 2023). In Hungary, it has been known from Fülöpháza, Izsák, Bugac, Ágasegyháza and Nagykáta (all from Bács-Kiskun County) based on the specimens found in the HNHM (Buschmann & Richter 2016). The knowledge on its distribution is extended with the following localities by our recent collecting activities (Fig. 1). **Budapest**: District 23, Soroksár, Botanical Garden, 26.VIII.2006, 2 specimens, leg. Cs. Szabóky (gen. prep. 9624 ZT, gen. prep. 20265 IR). **Bács-Kiskun County**: Fülöpháza, Fejes farm, 30.VIII.2022, 9 specimens, leg. A. Takács & Cs. Szabóky (gen. prep. 32765 IR). **Borsod-Abaúj-Zemplén County**: Tokaj, 15.VIII.2022, and 23.VIII. 2023, ex larva, *Kochia prostrata*, 2 specimens, leg. A. Takács. **Pest County**: Nagykáta, Cseh hill, 29.VIII.2004, 1 specimen, leg. Cs. Szabóky; Tápióság, 13.VIII.2021, 1 specimen, leg. A. Takács, ex larva, *Kochia laniflora* (gen. prep. 17176 BLDZ) (Fig. 6); Tatárszentgyörgy, 10.IX.2013, 2 specimen, leg. Cs. Szabóky (gen. prep. 21837, 21838 IR). **Tolna County**: Paks, Ürge hill, 12.IX.2012, 1 specimen, leg. Cs. Szabóky (gen. prep. 20177 IR).

Adult – Wingspan 12–14 mm (Figs 2–3). Head: vertex brown, sides white, labial palp white with sparse brown suffusion, second segment about twice longer than diameter of eye, third segment about as long as diameter of eye. Antenna with white annuli. Ventral side of thorax and abdomen brown. Ground colour of forewing light brown, with many dark brown scales, sometimes fused to patches mainly along veins. Fringe brown.

Identification – *Coleophora remizella* (Fig. 6), a species with a similar size and life history, can be separated from *Coleophora magyarica* by its entirely white antenna, labial palp and ventral side of abdomen, as well as by the much less dark scales on forewing, the presence of pearl white lines along veins and the grey fringe (Baldizzone 1983).

Bionomy – Flight time: August to September (Baldizzone 1983). Habitat: saline or loess grasslands with *Kochia prostrata* or *Kochia laniflora*. Larvae can be found from early October, consuming the seeds of *Kochia* spp. They reach their final stage in early November, when they descend to the base of their host plant and attach their cases there for overwintering. During the second half of next July, they fix their cases to the upper part of the plant, then the larvae pupate within a few days. Falkovitsh (1989) mentions *Kochia* spp. as host plants, consumed in September and October.

Case – Length 5.5–6.0 mm (Fig. 4). Trivalved, dorsal and ventral edges subparallel in side view, rather convex. Reddish in autumn, changing to dark brown after overwintering, and covered by sand grains. Mouth at ca. 35° angle to the longitudinal axis of the case. It is similar in size and shape to the case of *Coleophora remizella* (Fig. 7) but the stripes and the valves of that species remain reddish after winter and the surface is slightly hairy.

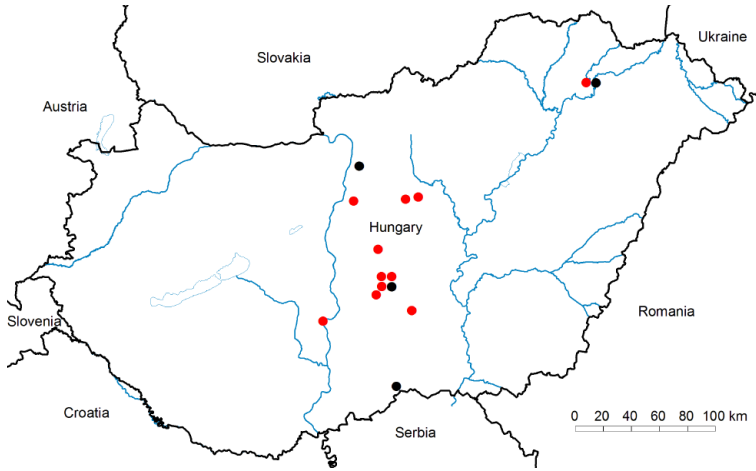
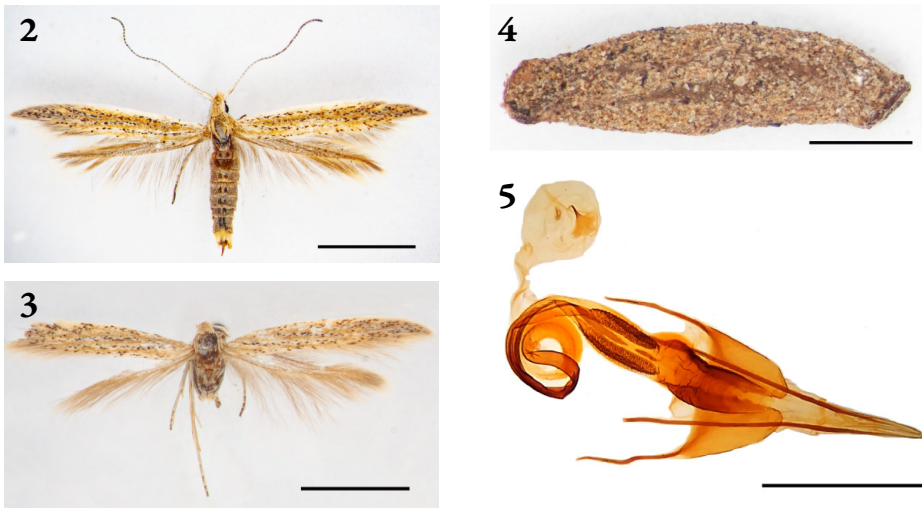


Fig. 1. Known localities of *Coleophora tyrrhaenica* (black dots) and *Coleophora magyarica* Baldizzone, 1983 (red dots) in Hungary (compiled by Kristóf Antal)



Figs 2–5. Male genitalia and different stages of *Coleophora magyarica* Baldizzone, 1983, 2–3 = adult female, scale bars = 2.5 mm, 4 = larval case, scale bar = 1.4 mm, 5 = female genitalia (no. GP 17176 BLDZ) (photos by Attila Takács (Figs 2–4) and János Babics (Fig. 5))

Figs 6–7. Different stages of *Coleophora remizella* Baldizzone, 1983, 6 = adult female, scale bar = 4.5 mm, 7 = larval case, scale bar = 2 mm (photos by Attila Takács)

Coleophora tyrrhaenica Amsel, 1952
(Figs 1, 8–10)

Distribution – It has so far been found in Europe: France (excluding Corsica), Greece (mainland and near-mainland islands), Hungary, Italy (mainland, Sardinia, and small islands near the mainland), North Macedonia, Romania, Russia (European part up to Manych Lowland), Slovakia, Switzerland, and Ukraine (Rennwald & Rodeland 2023, Richter 2017). In Hungary, it was previously found in some localities of the Danube–Tisza Interfluve: in the vicinities of Fót (Pest County), Ágasegyháza, and Tompa (Bács-Kiskun County), represented by altogether five specimens in HNHM (Buschmann & Richter 2016). In the present study, we report the species from **Borsod-Abaúj-Zemplén County**: Tokaj, 10.VIII.2021. ex larva, *Atriplex oblongifolia*, 1 specimen, leg. A. Takács (Fig. 1).

Identification – Adults of *Coleophora tyrrhaenica* can be identified by dissection of genitalia (Fig. 10).

Bionomy – Flight time: late July to early August (Buschmann & Richter 2014). Habitat: where *Atriplex oblongifolia* is present. Larvae consume the seeds from late September. When they reach their final size, they leave the host plant, search for a tree or bush, and attach their cases to the base of this plant. In the second half of next July, they fix their cases to the upper part of the plant, where the larvae pupate within a few days.

Case – Length 7 mm (Fig. 9). Trivalved, longitudinal stripes present only on ventral side. Dorsal side covered with sand grains as well as grey and black patches. Mouth parallel with longitudinal axis of the case. Besides *Coleophora tyrrhaenica*, the larvae of *Coleophora adspersella* and *Coleophora saxicolella* also feed on *Atriplex oblongifolia*. The cases of both of the latter species are different from that of *Coleophora tyrrhaenica* in their shape and pattern as well as the angle of mouth to its longitudinal axis.

Figs 8–10. Different stages of *Coleophora tyrrhaenica* Amsel, 1952, 8 = male, scale bar = 2.5 mm, 9 = larval case, scale bar = 1.9 mm, 10 = male genitalia, scale bar = 0.1 mm (no. GP 31750 IgR) (photos by Attila Takács (Figs 8–9) and Ignác Richter (Fig. 10.))

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