

First wild capture of the Black Soldier Fly, *Hermetia illucens* (Linnaeus, 1758) (Diptera: Stratiomyidae) in Hungary

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Abstract. The first wild caught Hungarian specimen of the Black Soldier Fly, *Hermetia illucens* (Linnaeus, 1758) is reported from Zala county, close to the Croatian border. Another specimen is reported from the northwestern lowland region of Albania, constituting the second record from the country. The Hungarian specimen may either came as an escape from maggot farming insect factory, or as a natural immigrant due to climate change. A phoretic mite was found on the antenna of the Hungarian specimen.

Keywords. Albania, insect factory, invasive species, phoretic Uropodina, Zala county

INTRODUCTION

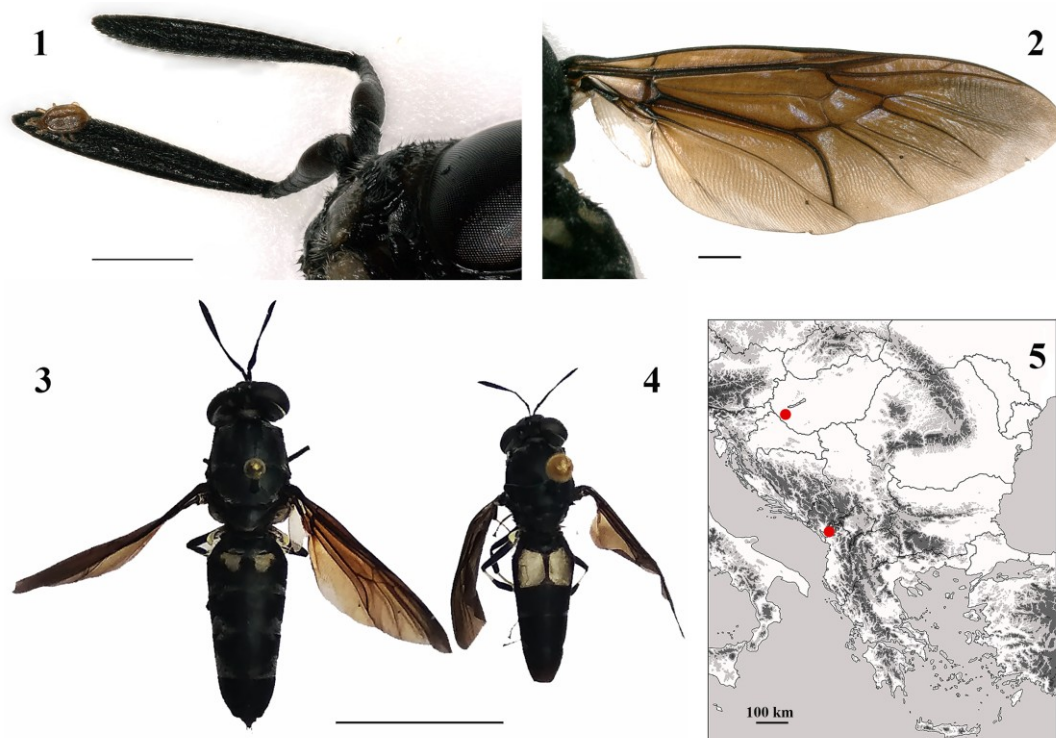
The black soldier fly, *Hermetia illucens* (Linnaeus, 1758) is a large sized fly of American (likely Nearctic) origin that is now introduced to most regions of the World (Ståhls *et al.* 2020). Its first European record dates back nearly a hundred years; it was first collected in Malta in 1926 (Lindner 1936). To date, *H. illucens* is widely distributed in most of the Mediterranean (Üstüner *et al.* 2003, Ssymank & Doczkal 2010, Koutsoukos & Kazilas 2021) and scattered observations are known from most European countries (Demetriou *et al.* 2022), up to Sweden (Jonsell 2017). Its northernmost Central European record is from the Czech Republic, where adults were reared from manure used for earthworm farming in 2010, but probably the population was not established since neither maggots nor adult flies were found in subsequent years (Roháček & Hora 2013).

This fly is widely bred both in insect factories and by individual pet keepers, used in composting, waste decontamination, food for animals (Sheppard 1992, Ewusie *et al.* 2019), and recently for human protein source as well (Bessa *et al.* 2021). Such a factory is also operating in Hungary (BSF Systems Kft 2022) and alive black soldier fly larvae are also available for pet food (Bugs-

World.com 2022). The species was not mentioned in the checklist of Hungarian Diptera (Papp 2001), not even as a species that might occur in the country. Hitherto there is no Hungarian wild caught voucher specimen however, there is a note about this species in an enumeration of Hungarian invasive animals (Papp 2017): “A legyek körében nem szoktunk komolyan venni “látott legyet”: a légyfajok azonosítása sokszor még a szakembereknek is komoly feladat. E légygel azonban talán kivételt tehetünk: “Ferihegyen már látták.” (Among flies, we don't usually take "seen flies" seriously: identifying fly species is often a serious task even for specialists. However, we can perhaps make an exception with this fly: "They have already seen it on Ferihegy” – Budapest, Ferenc Liszt International Airport). Herein, the first wild caught specimen is reported from southwest Hungary, as well the second report of the species from Albania.

MATERIAL AND METHODS

The specimens were collected by hand, fixed in 70% ethanol, then pinned and mounted dry. They are deposited in the collection of the Department of Zoology, Eszterházy Károly Catholic University, Eger, Hungary (EKCU).



Figures 1–5. *Hermetia illucens* (Linnaeus, 1758). 1 = antennae of the Hungarian specimen, with an Uropodina mite attached on the last right flagellomere; 2 = right wing of the Hungarian specimen; 3 = habitus of the Hungarian specimen; 4 = habitus of the Albanian specimen; 5 = localities of the specimens. Scales 1 mm for Figs. 1–2, 1 cm for Figs. 3–4.

The flies were identified on the basis of the key in Rozkošný (1997). Illustrations were made with a Keyence LHX5000 digital microscope. All images were adjusted and assembled into figures with Adobe Photoshop CC 2019. Terminology follows Rozkošný (1997).

RESULTS AND DISCUSSION

Hermetia illucens (Linnaeus, 1758)

(Figures 1–5)

Material examined. **Hungary:** Zala county, Nagykanizsa-Miklósfa, Bocskai István street 21, window of a house, 185m, N46.41387° E17.00104°, 6.viii.2022, leg. Dávid Murányi: 1♀. **Albania:** Shkodër county, Malësi e Madhe municipality, Koplik, café terrace along the main road, 60m, N42.21096° E19.43728°, 8.vi.2022, leg. András Hunyadi, Tibor Kovács, Dávid Murányi, Péter Olajos: 1♂.

Diagnosis. Vein CuA1 arising from discal cell. Antenna long, antennal flagellum consisting of 8 flagellomeres, with last flagellomere elongated and flattened. Size up to 20 mm. Body predominantly black, the second abdominal tergite with paired translucent areas; tarsi, usually also the tibiae are whitish.

Remarks. The Hungarian specimen was caught in the window of a private village house with large, park-like garden. There is no manure pile in the immediate vicinity, but there are horse farm and extensive plough lands in more distant areas of the village. Capture of the single female in August is a rather late record, since the species is having a one-year life cycle and most European wild capture records of adults are from June. It may suggest that the specimen is an escape from maggot farming, though no large-scale insect factory known from the county. Alternatively, the individual may be a migrant from the relatively

close (200 kilometres) Croatian coast where the species had long been established. The extremely warm and dry summer of 2022 made it potentially possible.

The Albanian specimen was caught in June, during the main flying season, in a city centre located on the northwestern lowland of the country. The only previous Albanian record is from the seaside 40 kilometres southwards (Beschovski & Manassieva 1996). Probably the fly has an established population in the whole Mediterranean area of the country.

Contrary to its beneficial effects in waste management and foraging, there are cases of myiasis reportedly caused by *H. illucens* both for humans and domestic animals (Adler & Brancato 1995, Mulieri *et al.* 2019), and due to its recent expansion in Europe it must be considered as an invasive species, potentially harmful for populations of other sarcophagous invertebrates or soil community structures (Demetriou *et al.* 2022). The present Hungarian specimen was carrying a phoretic Uropodina mite on its right antenna, emphasise its potential for transporting other invertebrates.

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