

The first confirmed records of *Riponnensia insignis* (Loew, 1843) (Diptera, Syrphidae) for Europe and an identification key to the European *Riponnensia* species

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The first confirmed records of *Riponnensia insignis* (Loew, 1843) (Diptera, Syrphidae) for Europe and an identification key to the European *Riponnensia* species

Sander Bot¹, Jiří Hadrava² & Gerard Pennards^{3*}

¹ Kerklaan 30E, NL-9751NN Haren, The Netherlands. botsander@gmail.com;

<https://orcid.org/0000-0002-5504-4559>

² Department of Zoology, Faculty of Science, Charles University, Viničná 7, CZ-12800 Praha 2, Czech Republic. hadravajirka@seznam.cz; <https://orcid.org/0000-0003-3247-6399>

³ Zangvogelweg 124, NL-3815DP, Amersfoort, The Netherlands.
gerard_pennards@hotmail.com; <https://orcid.org/0000-0002-6536-4636>

*corresponding author

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Abstract. The genus *Riponnensia* Maibach, Goedlin de Tiefenau & Speight, 1994 currently consists of four European species. *Riponnensia insignis* (Loew, 1843) is a rare species of hover fly that was previously only known from Turkey. There are some published records of this species from Europe, but these are not verified or erroneous. Here we report the first confirmed records of the fifth species of *Riponnensia* from Europe, namely from Lesvos (Aegean archipelago, Greece). A detailed morphological description of *R. insignis* is given and an identification key to all European species of the genus *Riponnensia* is presented.

Keywords. Aegean archipelago, Lesvos, Greece, Turkey, identification key, IUCN Red List status

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Introduction

Greece, Lesvos and the Aegean archipelago in general are known for its diverse and unique fauna. Moreover, this area is considered to be part of one of the world's biodiversity hotspots

for conservation priorities (Myers *et al.* 2000). Lesvos, in particular, hosts an extremely rich fauna of hover flies (Diptera: Syrphidae) (Vujić *et al.* 2007; Ståhls *et al.* 2009; Radenković *et al.* 2011; Ricarte *et al.* 2012; Vujić *et al.* 2020).

The richness of the hover fly fauna on Aegean islands is assumed to be driven mainly by the unique location of the archipelago between the Eastern Mediterranean and the Balkan Peninsula. While islands on the east of the Aegean Sea host mainly Anatolian and South Eastern Mediterranean species, islands on the west of the Aegean Sea host mainly Balkan species (Vujić *et al.* 2016). Another factor enhancing the biodiversity of the Aegean islands is the high variability in climatic conditions shaping the richness and structure of plant and insect communities (Petanidou *et al.* 2018). On the island of Lesvos, with a total area of only 1,633 km², a high diversity of habitats can be found, including maquis shrublands, arid semi-desert areas, marshes, pine forests, alpine rocky shrublands with typical herbaceous vegetation, wet chestnut forests, grasslands with solitary chestnut trees, olive orchards, pasture grasslands, etc.



Figure 1. *Riponnensia insignis* Loew, 1843, ♂, holotype, habitus lateral view and labels.

Lesvos is known for the endemic hover fly species *Psilota aegeae* Vujić, Ståhls & Smit, 2020 and several Anatolian hover fly species reaching only marginally into Europe like *Merodon sapphous* Vujić, Pérez-Bañón & Radenković, 2007; *Merodon papillus* Vujić, Radenković & Pérez-Bañón, 2007; *Merodon puniceus* Vujić, Radenković & Pérez-Bañón, 2011; *Eumerus aurofinis* Grković, Vujić & Radenković, 2015 (Grković *et al.* 2015; Vujić *et al.* 2020). Most of these species are known mainly from the humid hilly central part of the island, from the surroundings of the town of Agiasos, which is surrounded by notable chestnut forests.

The similarity of the fauna of Lesvos with the fauna of Turkey and further South East Mediterranean results from the history of the island. During the last glacial period, Lesvos was directly connected to the mainland of Turkey and nowadays it is separated from the Turkish mainland by only ca. 9 km of sea, resulting in a high similarity between the fauna of Turkey and that of the east Aegean region (Vujić *et al.* 2016). Yet, the Turkish mainland hosts many species of hover flies that are not known from Europe. One of them is the hover fly *Riponnensia insignis*, which is considered to be an endemic species of Turkey (Reemer & Smit 2007). Females of the species remain undescribed.

In this paper, we provide data on the occurrence of *Riponnensia insignis* on Lesvos, which are the first confirmed records of the species from Europe. There is an old record of this species from Italy, but that might have been a misidentification (van Steenis *et al.* 2021b). Furthermore, there is an old record of this species from Corsica and also Peck (1988) mentioned the occurrence of this species in central Europe, but these records have not been verified.

Also an identification key is provided for all representatives of the genus *Riponnensia* in Europe and a more detailed description of both sexes of *R. insignis*, which means the female is described here for the first time.



Figure 2. *Riponnensia insignis* Loew, 1843, ♂, habitus dorsal view. Collected on Lesvos, Greece, 15 IX 2019, lgt. and coll. S. Bot. Scale bar = 1 mm.

Material and Methods

In September 2019 and June 2021 field surveys on Lesvos were undertaken. Various sites across the island were visited and hover flies were collected using entomological hand nets. All specimens of the genus *Riponnensia* were identified using a combination of various identification literature (Sack 1932; Maibach *et al.* 1994; van Veen 2004).

The specimens were photographed using a Canon EOS 6D digital camera with a selection of bellows lenses. For stacking, software Helicon Focus (from Kharkiv, Ukraine) was used. The specimens are deposited in private collections of Sander Bot (SB), Gerard Pennards (GP), Jiří Hadrava (JH) and Frank Van de Meutter (FVdM).

The adult terminology used follows Cumming & Wood (2017), except for the genitalia where Hippa (1990) is followed. All measurements are in millimeters. The body length was measured from the anterior oral margin to the posterior end of the abdomen, in lateral view. The wing length was measured from the wing tip to the basicosta.

Results

Riponnensia insignis (Loew, 1843)
Figs 1-3, 4A, 4B, 7A

New Records. Greece, Lesvos, Mytilene env., University of Aegean, 39.084371N 26.564245E: 11.IX.2019, 1♂, G. Pennards lgt. and det. (collection GP); Greece, Lesvos, Agiasos env., Agios Dimitros, 39.1014108N, 26.3542572E, 15.IX.2019, 1♂, S. Bot lgt. and det. (collection SB); 15.IX.2019, 1♂, J. Hadrava lgt. and det. (collection JH); 15.IX.2019, 1♂, G. Pennards lgt. and det. (collection GP); Greece, Lesvos, Polichnitos, GPS 39.1532, 26.2800, 07.VI.2021, 2♀, F. Van de Meutter lgt. and det. (collection FVdM).

Notes. All specimens were collected individually from flowers. A specimen from Mytilene was found on the flowers of *Foeniculum vulgare*, the records of 2021 were from *Foeniculum sp.* and all other specimens were collected on flowers of *Hedera helix* during warm and sunny weather.

Recognition

The separation of *Riponnensia insignis* from the other four species of *Riponnensia* is easy by the bicoloured legs (Fig. 3), whereas the legs are entirely black in the other species. Moreover, the face is narrower, at the level of the antennal socket it is about half the width of an eye, whereas it is over half the width of an eye in the other species (Fig. 4). In the male, the genitalia of *R. insignis* are characteristic with the superior lobe bifurcated and strongly asymmetrical; the upper left branch is short while the upper right branch is very long, bending to the left over the lower left branch (Fig. 7A).

Description

Studied material on which the description is based

Turkey, Mugla, 1 km E of Köyceğiz, 5 m asl, 30.V.2000, 2♂, 1♀, M. Reemer lgt. and det. (coll. Reemer); idem, 3.VI.2000, 1♂, 2♀.

Greece, Lesvos, Agiasos env., Agios Dimitros, 39.1014108N, 26.3542572E, 15.IX.2019, 1♂, S. Bot lgt. and det. (collection SB).



Figure 3. *Riponnensia insignis* Loew, 1843, habitus lateral view. **A.** ♂, collected on Lesvos, Greece, 15 IX 2019, lgt. and coll. S. Bot. **B.** ♀, habitus lateral view. Collected in Turkey, Muğla, 1 km E of Köyceğiz, 03 VI 2000, lgt. and coll. M. Reemer. Scale bar = 1 mm.

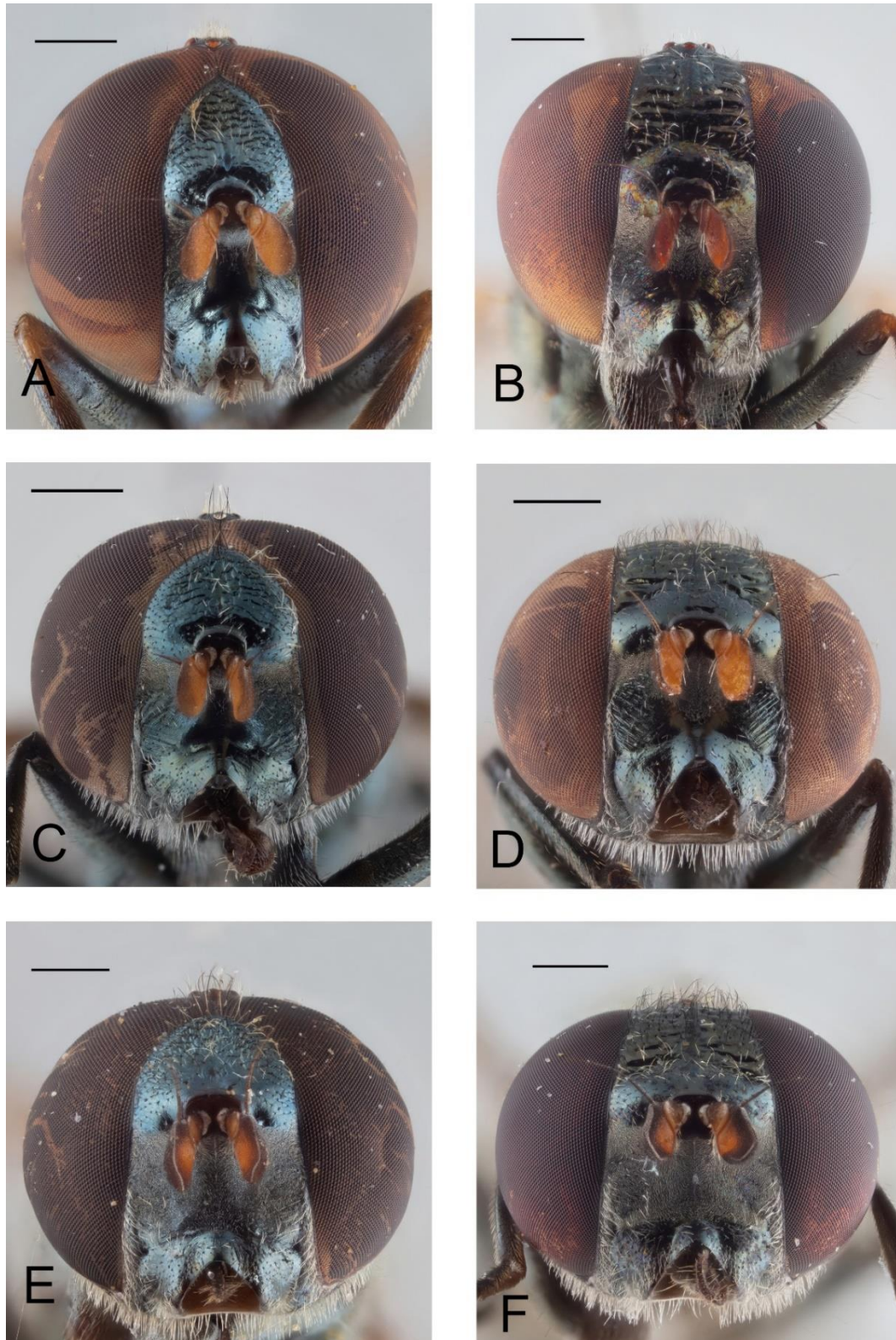


Figure 4. *Riponnensia*: head frontal view. **A.** ♂ *R. insignis* Loew, 1843 (Lesvos, Greece). **B.** ♀ *R. insignis* Loew, 1843 (Muğla, Turkey). **C.** ♂ *R. morini* Vujić, 1999 (Cyprus). **D.** ♀ *R. morini* Vujić, 1999 (Cyprus). **E.** ♂ *R. splendens* Meigen, 1822 (Netherlands). **F.** ♀ *R. splendens* Meigen, 1822 (Netherlands). Scale bar = 0,5 mm.

Male

Length (n=4): Body: 7–8 mm; wing: 6 mm.

Head. Face shiny black with blue-green reflections except for a wide grey pollinose band below the antennal sockets. This pollinose band covers less than half of the length of the face and the lower border is not clearly defined (Fig. 4A). Face laterally with sparse long white hairs and in lateral profile concave, without facial tubercle. Facial width at the level of the antennal socket about half the width of eye at same level. Frons shiny black with blue-green reflections, with long white hairs and with a large shallow central depression. Ocellar triangle shiny black with blue-green reflections with yellow hairs. Occiput black, grey pollinose, with mixed yellow and black hairs. Scape and pedicel orange, flagellum orange, darkened along anterodorsal edge. Pedicel rounded, one and a half times as long as high. Arista bare, orange at base, becoming dark orange towards apex. Eyes bare, meeting at frons in a sharp angle. Eye contiguity about half as long as the length of the frons. **Thorax.** Scutum, postpronotal lobe and postalar callus shiny black with strong golden-green reflections and with short erect yellow hairs (Fig. 3A). Scutellum shiny black with strong golden-green reflections except posteriorly with blue reflections. Scutellum with short erect yellow hairs, along posterior margin with long yellow hairs. Pleurae shiny black with green reflections and with long white hairs. Halteres yellow. **Wings.** Wings including alula entirely microtrichose except very base of wings and basal half of cell br and anterobasal half of cell bm bare. Veins brown at base of wing, black towards apex. **Legs.** Legs shiny black with blue-green reflections except femora narrowly orange at apex. Furthermore, the tibiae orange at base and apex and the first tarsomeres dorsally and also the first three tarsomeres ventrally orange (Fig. 3A) and with white pile. **Abdomen.** Tergites shiny black with strong golden-green reflections except tergite 2 and 3 centrally and tergite 4 anteriorly in center matt, black and grey pollinose. Centre of tergite 1 slightly pollinose and the hairs on the matt part black, short and adpressed except in anterolateral corner of matt part of tergite 2 where hairs are pale. Hairs on shiny parts of tergites short and pale except in anterolateral corners of tergite 2 where they are long. Sternites shiny black with golden-green and blue reflections and with long erect white pile, the base of sternite 2 centrally with a wart-like prominence. **Genitalia.** Surstyli very long, almost straight. Superior lobe bifurcated and strongly asymmetrical, with upper left branch very short while upper right branch very long, bending to the left over the lower left branch (Fig.7A, see also Maibach *et al.* 1994: Figs. 18 and 19).

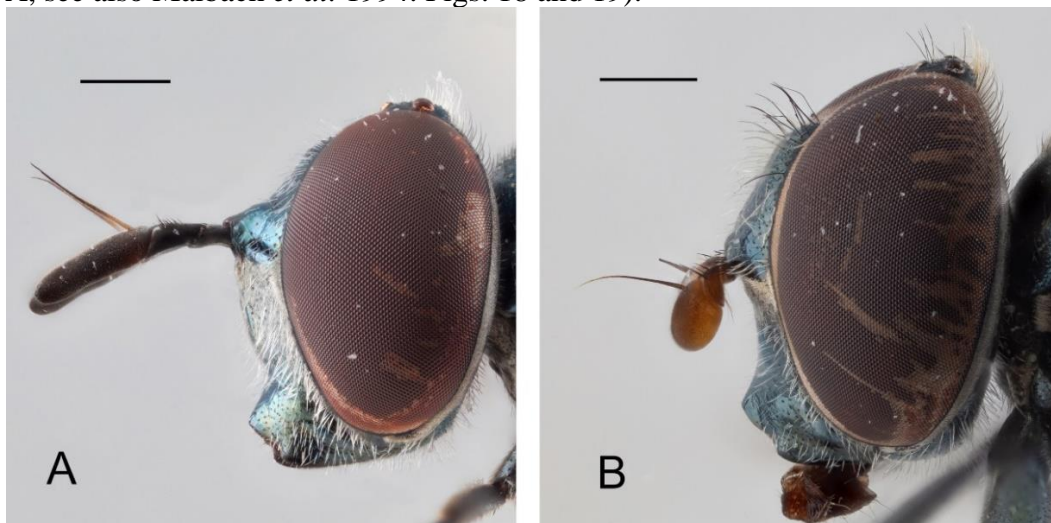


Figure 5. *Riponnensia*: ♂ head lateral view. **A.** *R. longicornis* Loew, 1843 (Crete, Greece). **B.** *R. morini* Vujić, 1999 (Cyprus). Scale bar = 0,5 mm.

Female

Length (n=3): Body: 7–8 mm; wing: 5,5–6 mm.

Similar to male except for normal sexual dimorphism. Differs by the face slightly wider, pollinose band on face wider, covering half of length of face, with a better defined lower border and flagellum larger and only slightly longer than high (Fig. 4B). Frons without large shallow depression, but with lateral furrows. Body hairs shorter and the reflections on mesonotum green instead of golden-green (Fig. 3B).

Identification key

The genus *Riponnensia* was established by Maibach *et al.* (1994), for a group of four Palaearctic species erstwhile consigned to *Orthonevra*. Two of them, *R. insignis* and *R. longicornis* (Loew, 1843) are essentially Mediterranean species, *R. splendens* (Meigen, 1822) is known to occur in most parts of Europe, while the fourth species, *R. daccordii* (Claussen, 1991) is endemic to Corsica. Since then, Vujić (1999) has described a further European species, *R. morini*, from the Balkans (Speight 2020a).

For the generic characteristics of the genus *Riponnensia* see the genus key in Speight (2020a).

- 1 Basoflagellomere less than twice as long as high (Fig. 5B) ... **2**
- Basoflagellomere very long, at least four times as long as high (Fig. 5A) ... **R. longicornis** (Central and Southern Europe, also Asian part of Turkey, Israel, and North Africa (Algeria, Morocco).
- 2 Legs black. Face wide, at the level of the antennal socket over half the width of an eye at the same height (Fig. 4C–F) ... **3**
- Legs bicoloured: black, except for the very apex of femur, the base and apex of tibia and the basal tarsomere dorsally and basal three tarsomeres ventrally orange (Fig. 3). Face narrow, at the level of the antennal socket about half the width of an eye at the same height (Fig. 4A–B) ... **R. insignis** (Turkey and Greece (Lesvos))
- 3 Scutum with short pale hairs (Fig. 6A). Basitarsi with pale hairs dorsally. Male, genitalia: superior lobe symmetric or asymmetric and with two branches (Fig. 7A–C) ... **4**
- Scutum centrally covered with long upstanding black hairs (Fig. 6B). Tarsi with black hairs dorsally. Male, genitalia: superior lobe asymmetric and with three branches (Fig. 7D). ... **R. daccordii** (France: Corsica and an unconfirmed record from Italy: Sardinia (van Steenis *et al.*, 2021a))
- 4 Face with very wide band of dusting below antennal sockets, covering well over half of the face, leaving only lower third to quarter of face shiny; dust band with parallel lower side in anterior view (Fig 4E–F). Male genitalia: superior lobe symmetric (Fig 7B). ... **R. splendens** (Western, Central and Southern Europe, North Africa, Caucasus, European Russia).
- Face with narrow band of dusting below antennal sockets, leaving well over lower half of face shiny; lower part of dust band with a pair of lateral undusted or less dusted areas (Fig 4C–D). Male genitalia: superior lobe asymmetric and with two branches (Fig. 7C). ... **R. morini** (Cyprus, Greece (mainland and Islands), Balkans)

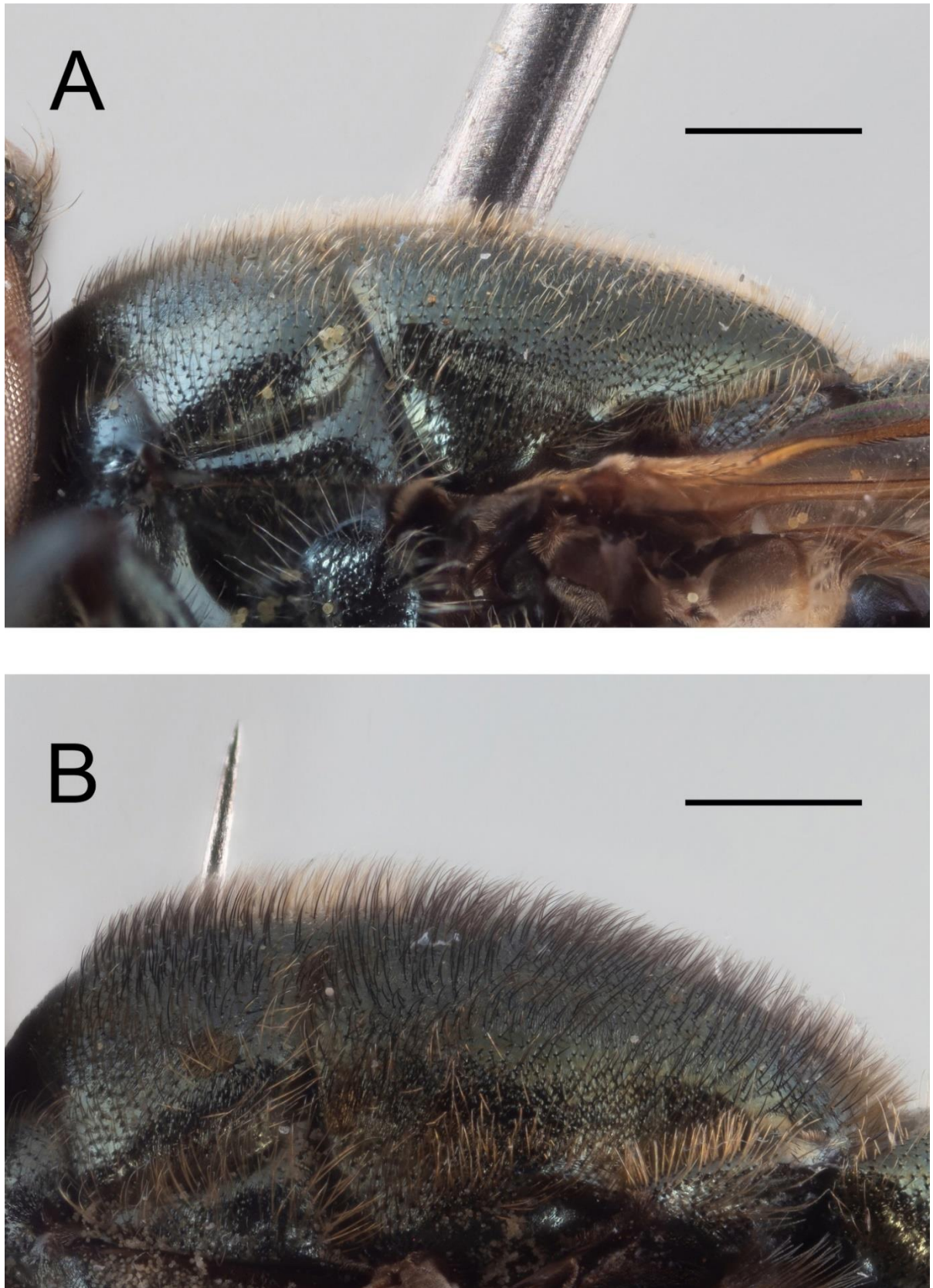


Figure 6. *Riponnensia*: ♂ scutum lateral view. **A.** *R. morini* Vujić, 1999 (Cyprus). **B.** *R. daccordii* Claussen, 1991 (Corsica, France). Scale bar = 0,5 mm.

Discussion

Six specimens (four males, two females) of *Riponnensia insignis* were found on Lesvos, in line with the general biogeographical pattern of high similarity of the fauna on the East Aegean islands with the fauna of Turkey and the Eastern Mediterranean region of Western Asia (Vujić *et al.* 2016). There are now three species of *Riponnensia* known from Lesvos, *R. insignis*, *R. longicornis* and *R. morini*. The last species could eventually have been confused with *R. insignis* before, but it has been confirmed by Ante Vujić who collected it in spring near Agiasos on flowers of *Smyrniium perfoliatum* L. 1753 (pers. comm. A. Vujić 2023).

Riponnensia insignis was described by Loew (1843), but the origin of the type material is unknown (for the Loew labels, see Fig. 1). Loew was known to collect insects in the South East Mediterranean area in 1841–1842 (Ziegler *et al.* 2020), so it is possible that *R. insignis* was collected there, although the publication only mentions the types of *Chrysogaster frontalis*, *C. fumipennis* and *C. longicornis*. Of these the valid name of the latter is now *Riponnensia longicornis*, whereas *C. frontalis* is now *Orthonevra frontalis* (Loew, 1843) and *C. fumipennis* is now *Chrysogaster solstitialis* (Fallén, 1817). There are three earlier claims of *Riponnensia insignis* from Europe of which none could be verified. Peck (1988) assumes the holotype of *R. insignis* originated from Central Europe without any proof or explanation. *R. insignis* is also included in the Italian checklist of Syrphidae (Burgio *et al.* 2015), however, the source of this claim could not be traced. Becker *et al.* (1910) reports it from Corsica, together with *Riponnensia longicornis* and *R. splendens*. However, one or more of these specimens could belong to the later described Corsican endemic *R. daccordii* (van Steenis *et al.* 2021b) and this statement needs confirmation.

The recent European initiatives concerning the protection of European pollinators, including hover flies make our discovery of this rare species on a restricted location (Lesvos) within the territory of the European Union an interesting one. We strongly suggest that measures are taken to protect the habitats of this rare species and are implemented as a matter of priority. The species in the genus *Riponnensia* prefer habitats in forests with fresh water streams and marshy grasslands with flowering plants. The larva of *R. splendens* and *R. morini* are known to live in fresh running water where they are filter feeders close to the shore on decaying organic material or between plants and roots (van Steenis *et al.* 2021d, 2021e). Therefore the threats for this species on a relatively small island are clearly related to water management as the larvae of *R. insignis* probably live in fresh water like other *Riponnensia* species. (van Steenis *et al.* 2021c, 2021d, 2021e). This habitat will be under threat by decreasing water tables caused by water abstraction for agriculture and other anthropogenic activities which can have more impact on islands. Another threat is climate change that can create severe droughts.

In 2022, the IUCN Red list of Hover flies was published (Vujić *et al.* 2022) in which all the European *Riponnensia* species were assessed. Most of the *Riponnensia* species are found in wetlands with small streams or small marshy areas in forest, which are under threat, especially in the Mediterranean area. The threats these habitats and their species face are numerous: Residential and commercial development, pollution, natural systems modifications and climatic changes like droughts (van Steenis *et al.* 2021a, 2021b, 2021c, 2021d, 2021e). *Riponnensia daccordii*, endemic on Corsica and only known from one locality, is considered Critically Endangered; *R. longicornis* (25 locations) and *R. morini* (15 locations) are assessed as Endangered while *Riponnensia splendens*, being relatively widespread in Europe, is assessed as Least Concern.

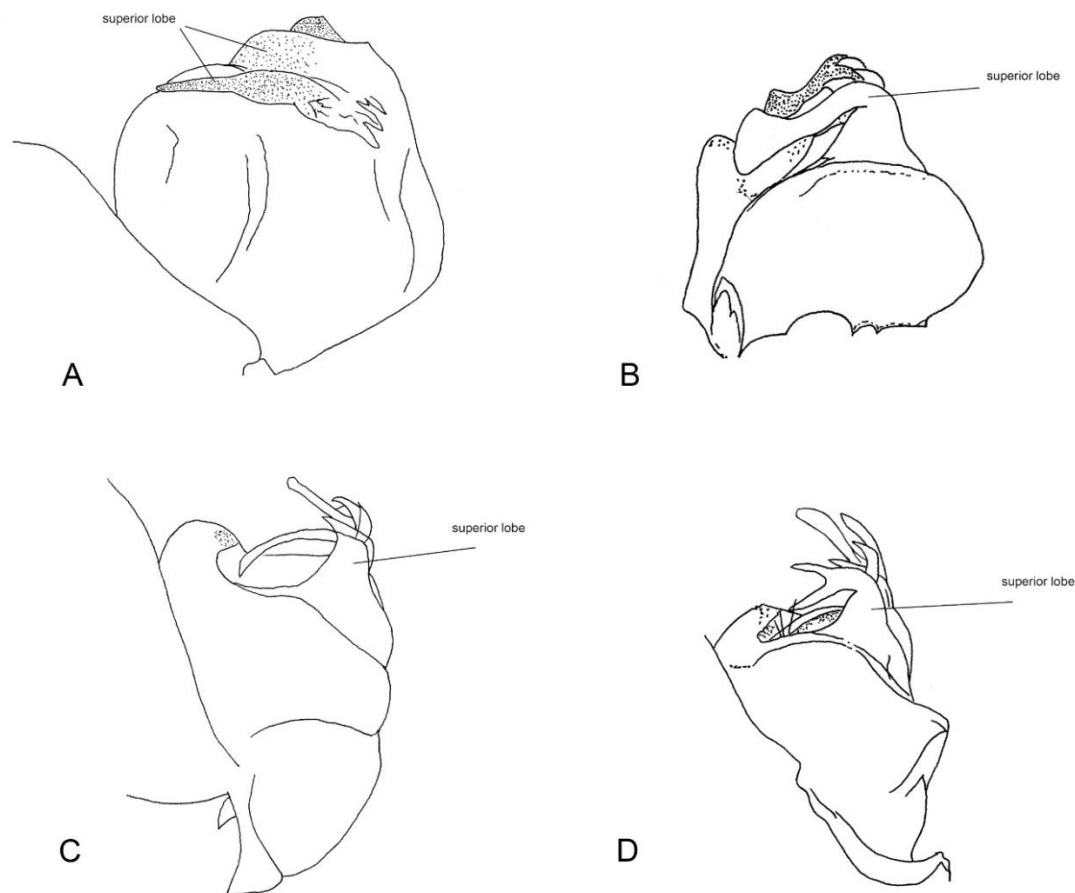


Figure 7. *Riponnensia*: ♂ genitalia, hypandrium, lateral view. **A.** *R. insignis* Loew, 1843 (Lesvos, Greece). **B.** *R. splendens* Meigen, 1822 (Netherlands, redrawn from Claussen 1991). **C.** *R. morini* Vujić, 1999 (Boka Kotorska, Montenegro, redrawn from Vujić 1999). **D.** *R. daccordii* Claussen, 1999 (Corsica, France, redrawn from Claussen 1991).

Riponnensia insignis is assessed as Data Deficient, but that was based on a lack of confirmed records and without the knowledge it was discovered on Lesvos. The populations of this species on Lesvos seems to be isolated and, therefore vulnerable, although there is a possibility of some influx from time to time from nearby Turkey. Based on the new information, the Red List status of *R. insignis* should be re-assessed into a higher category in Europe in the near future considering the discussed threats for the areas it lives in.

Reemer & Smit (2007) reported *R. insignis* from Turkey. They collected good numbers in May, from a marshy grassland with small streams at the edge of a *Liquidamber orientalis* forest, visiting flowers of *Euphorbia* spp. (Reemer & Smit 2007). Here on Lesvos during the field surveys in 2019 and 2021 we found two additional species of plants visited by *R. insignis*, namely *Foeniculum vulgare* and *Hedera helix*, and these two are amongst the most important flowering plants for hover flies in September on Lesvos. In particular, *Hedera helix* appears to be an important source of food for a wide variety of hover flies in late summer and early autumn (van Steenis et al. 2021f). On the site where *R. insignis* was found in the Agiasos environment, *H. helix* was seemingly the only flowering plant with plenty and accessible amounts of nectar.

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