Review of the scolopaceus-group of Rhagio Fabricius, 1775 with the description of a new species from the Iberian Peninsula (Diptera: Rhagionidae)

Theo Zeegers 1, Piluca Álvarez Fidalgo 2

1. Naturalis Honorary Research Associate (Diptera) – Eikenlaan 24, 3768 EV Soest (The Netherlands) – th.zeegers@xs4all.nl
2. Co-coordinator of the Diptera group of Biodiversidad Virtual – Corazón de María 7, 28002 Madrid (Spain) – pilucaaf@gmail.com

ABSTRACT: Continuing with the revision of the Iberian species of the genus Rhagio Fabricius, 1775, Rhagio atlanticus sp. nov. is described as another new species from the Iberian Peninsula. The species has been found in northwestern Spain and the northern half of Portugal. It is closely related to Rhagio scolopaceus (Linnaeus, 1758) and it is compared to all the European species with spotted wings. Rhagio medeae Iacob, 1971 is established as a new synonym of R. scolopaceus. Rhagio maculipennis (Loew, 1854) and Rhagio sardous Szilády, 1934 are recorded for the first time in nearly a century. A key for the identification of all European species of this group is provided.

KEY WORDS: Rhagio, Rhagionidae, Diptera, Spain, Portugal, Iberian Peninsula.

Introduction

The Rhagionidae is a relatively small family of Diptera in the infraorder Tabanomorpha (Wiegmann et al., 2011) with about 17 genera recognized worldwide (Kerr, 2004). When defined in the stricter sense, i.e. without the Athericidae and Vermileonidae, the family is monophyletic (Kerr, 2004). The typical genus is Rhagio Fabricius, 1775, characterized by the presence of two apical ventral spurs on hind tibia, an open anal cell and the antenna, which consists of three segments and a long arista (Majer, 1997). The Palearctic Rhagionidae have been revised by Lindner (1925) and Szilády (1934). Rozkošný & Spitzer (1965)
described the genitalia of the Central European species. Since then, the family got hardly any attention in the western Palearctic, until Zeegers & Álvarez Fidalgo (2016) described a new species of *Rhagio* from the Iberian Peninsula.

The European species of *Rhagio* with spotted wings constitute a set of closely related species. Of these, *Rhagio scolopaceus* (Linnaeus, 1758) is by far the most common and widespread species. It is well known by its behavior. Males sit on vertical elements like tree stems, poles, etc., with the head looking down. The vernacular English name is hence ‘downlooker fly’. The other species are rare or restricted in distribution. The species exhibit quite some variation in colouration, which has caused much confusion and many incorrect identifications in the past. In reviewing the *Rhagio scolopaceus*-group, we encountered a yet undescribed species from northwest Spain and northern Portugal. In this article, we describe this new species as *Rhagio atlanticus* sp. nov. and review the other species with spotted wings.

**Material and methods**

The terminology used for the body parts follows Majer (1997) and Oosterbroek *et al.* (2005), that for the male genitalia follows Rozkošný & Spitzer (1965). The terminology used for the abdominal build, especially the anterior sternites, was explained in Zeegers & Álvarez Fidalgo (2016).

Photos of the habitus and details of the holotype (male) and the habitus of one female paratype of *R. atlanticus*, have been taken using a Nikon D810 camera equipped with a Cnscope 4X Achromatic Microscope Objective Lens with extension tube; focal depth has been enhanced by stacking several images, using the software programs Zerene Stacker 1.04 and Adobe Photoshop CC 2015. Photos of the terminalia of a male paratype of *R. atlanticus* and the head of another female paratype of *R. atlanticus*, a female specimen of *R. scolopaceus* and a female specimen of *Rhagio maculipennis* (Loew, 1854), have been taken using a separate phototube on the stereomicroscope; focal depth has been enhanced by stacking images using the software program CombineZ (Hadley, 2018). All the results have been digitally enhanced. Morphological study of all the pinned specimens from MNCN was performed with a Leica M80 binocular microscope.

The acronyms for collections used follow Evenhuis (2018).

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Location</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOS</td>
<td>Spain, Oviedo, Universidad de Oviedo, Colección de Artrópodos del Departamento de Biología de Organismos y Sistemas.</td>
<td></td>
</tr>
<tr>
<td>CAET</td>
<td>the Netherlands, Tilburg, private collection A. van Eck.</td>
<td></td>
</tr>
<tr>
<td>CTZS</td>
<td>the Netherlands, Soest, private collection T. Zeegers.</td>
<td></td>
</tr>
<tr>
<td>MNCN</td>
<td>Spain, Madrid, Museo Nacional de Ciencias Naturales.</td>
<td></td>
</tr>
<tr>
<td>RMNH</td>
<td>the Netherlands, Leiden, Naturalis Biodiversity Centre.</td>
<td></td>
</tr>
<tr>
<td>UCME</td>
<td>Spain, Madrid, Colección de Artrópodos de la Universidad Complutense.</td>
<td></td>
</tr>
<tr>
<td>ZMHB</td>
<td>Germany, Berlin, Museum für Naturkunde der Humboldt-Universität.</td>
<td></td>
</tr>
</tbody>
</table>

**Species account**

**Taxonomic accounts:** A new species of *Rhagio* is described. The new species is photographed in high resolution. The taxonomic situation of all the related European species with spotted wings is discussed.

```
Class Insecta Linnaeus, 1758
Order Diptera Linnaeus, 1758
Infraorder Tabanomorpha Hennig, 1948
Family Rhagionidae Samouelle, 1819
Rhagio Fabricius, 1775
```

**Rhagio** Fabricius, 1775: 761
Type species: *Musca scolopacea* Linnaeus, 1758 (design. Latreille 1810: 443)
Note: According to the Code (INTERNATIONAL COMMISSION ON ZOOLOGICAL NOMENCLATURE, 1999), *Rhagio* should be treated as masculine.
**Rhagio atlanticus** sp. nov.

Figs. 1-5, 6a, 6d, 22c

urn:lsid:zoobank.org:act:025D2D43-7A27-4F5D-BF9B-75AA4E324AB9

---

**Fig. 1:** *Rhagio atlanticus* sp. nov. Male in its natural habitat, Vilalba, Lugo, Spain, 17-V-2016, (SANMARTÍN, 2016b).


**Diagnosis:** External appearance very similar to *R. scolopaceus*. Third antennal segment not elongated. Eyes of male narrowly dichoptic. Females with frons narrower than in *R. scolopaceus*. Wings transparent, dark spotted as in *R. scolopaceus*, but on average darker. Knob of halteres darker than the stem. Legs yellow, with dark tarsi. Front coxae yellow, with black hairs on the apex. Trochanters yellow, with shiny black apices. Abdomen in male reddish yellow, with black patches on the midline of the tergites and on the sides; in female, black patches united into a transverse band on each tergite. Sternites yellow, the last two or three black. Hairs of the abdominal tergites short and black, on the sternites longer. First sternite in male usually bare, but in some males with a few isolated middle-length pale hairs. Genitalia nearly identical to those of *R. scolopaceus*.

**Type material of Rhagio atlanticus** sp. nov.

Fig. 2: *Rhagio atlanticus* sp. nov. Female in its natural habitat, Vilalba, Lugo, Spain, 30-V-2015, (SANMARTÍN, 2015c).


Description of Rhagio atlanticus sp. nov.

**Male** (Figs. 1, 3, 4, 22c):

- **Size**: Length 10.1-10.5 mm [holotype: 10.3 mm] (excluding antennae), wing length 9.6-9.9 mm [holotype: 9.7 mm].

- **Head**: Eyes narrowly dichoptic, facets of one size. Head (frons, parafacialia, clypeus, gena and occiput) pale grey tomentose. Lower part of parafacialia with either black, white or mixed, bristly hairs [holotype: mainly white hairs with some black ones]. Gena with longer white hairs. Occiput largely covered with white hairs, longer in the lower part of the back of the head; only the short bristles placed in 2-3 rows behind the upper border of the eyes are black. Proboscis about 1/3 longer than palpus, with many hairs on the ventral surface. Palpus yellow, somewhat elongated, about five times as long as broad, bearing long hairs that can be completely pale, intermixed or predominantly black.

  Antenna yellow. First antennal segment longer than broad, covered with pale greyish tomentum and with some short and stiff black bristles dorsally. Second segment shorter (its length distinctly less than its width), also covered with pale greyish tomentum, bearing short black hairs dorsally. Third segment longer than the second and shorter than the first one, more or less triangular in shape, without tomentum, its dorsoapical margin slightly concave and the arista inserted just below middle in lateral view (Fig. 22c). Arista bare and long, nearly twice as long as basal three antennal segments together.

- **Thorax**: Scutum, scutellum and pleuron covered with grey tomentum. Scutum with three broad longitudinal darker grey stripes, of which the middle one has one central even darker vitta and with several short black hairs that turn longer and slightly more bristly all over the margins. Humeral callus bare, covered with yellowish grey tomentum. Scutellum grey with yellow apex, with longish black hairs. Pleurae bare except for a few short black hairs on upper part of anepisternum and the long pale hairs on katatergite. Metanotum bare as well. Halter with yellow stem and much darker knob (browny or darkish grey).

- **Legs**: Femora and tibiae yellow orange, tibiae slightly darkened towards apices, femora and tibiae covered with short black hairs. Coxae largely yellow, usually grey at base, with some pale long hairs, denser and longer on the dorsal surface of fore coxae, but a bunch of black hairs on anterior side near

---

**Other material studied**

**SPAIN**: Lugo, Burela, 43.66°N 7.37°W, 150 masl., 14-IV-1987, 1 ♂, leg. L. Palacios [specimen identified as Rhagio scolopaceus on label] [BOS]; Asturias, Arrión, 43.38°N 5.19°W, 50 masl., 7-VI-1983, 1 ♂, leg. M. C. Fernández López [BOS]; Asturias, Quirós, 43.15°N 5.96°W, 500 masl., 7-VII-1983, 1 ♀, leg. H. Bernardo [BOS]; Asturias, La Braña, 43.47°N 6.85°W, 300 masl., 12-VI-1981, 1 ♂, leg. M. E. Castro [BOS]; Asturias, Somió, 43.53°N 5.62°W, 15 masl., 28-V-1981, 1 ♂, leg. L. Moro [specimen identified as Rhagio scolopaceus on label] [BOS]; Asturias, Pañeda, 43.42°N 5.71°W, 250 masl., 27-V-1980, 1 ♂, leg. A. Aradón Álvarez, [BOS]; Asturias, Somió, 43.53°N 5.72°W, 200 masl., 17-V-1983, 1 ♂, leg. E. Arbesú Suárez [BOS]; Asturias, Serantes, 43.53°N 6.97°W, 40 masl., 28-V-1982, 1 ♂, leg. R. Fernández [specimen identified as Rhagio scolopaceus on label] [BOS]; Asturias, Trubia, 43.34°N 5.97°W, 240 masl., VIII-1976 (day not specified), 1 ♂, leg. I. Álvarez G. [specimen identified as Rhagio scolopaceus on label] [BOS]; Asturias, Tineo, 43.11°N 5.54°W, 600 masl., 8-IX-2007, 1 ♀, leg. P. García [BOS]; León, Busdongo, 42.98°N 5.70°W, 1300 masl., summer 1974 (day and month not specified), 1 ♀, leg. V. Aza Quero [specimen identified as Rhagio scolopaceus on label] [BOS]; Madrid, 1 ♀, location, date and leg. unknown [Col. MNCN reference nr. MNCN_Ent 209931] (The information on the label is incomplete and the locality ‘Madrid’ does not fit in the general distribution. We consider the locality doubtful).
apex, scarcer and mainly black on the second and third ones. Trochanters yellow with shining black apex, strongly contrasting.

Fig. 3: *Rhagio atlanticus* sp. nov. Male, a-e: holotype (MNCN_Ent 209925); a-b: habitus (scale bar = 5 mm), a: dorsal; b: lateral; c-d: head (scale bar = 1 mm), c: frontal; d: lateral; e: first two sternites (scale bar = 1 mm), lateral view. (Photos: Alberto Narro)

- **Wing**: Transparent, of normal build (i.e. three times as long as broad), dark spotted. Stigma blackish, elongated (about six times as long as broad). Veins brown. Cross-veins at apex of discal cell and basal cells darkened; also a spot present at the fork of veins R₄ and R₅, which is usually connected with pterostigma. Apex of wing and hind margin broadly darkened, the dark apex however not reaching the pterostigma; dark hind margin usually connected with dark band along apex of discal cell.

- **Abdomen**: Reddish yellow, with elongated triangular black patches on the midline of the tergites, in length about three-quarters of tergal length, and black patch at lateral margin, completely merging into a lateral dark band over all tergites; the last two segments are darker, the last one entirely dark. First sternite yellow to grey, second to four are pale yellowish, the remaining ones dark with paler margins. Hairs on the tergites black, short and adpressed. First sternite bare, except in some male individuals, which have pale middle-length hairs. Sternite 2a (ZEEGERS & ÁLVAREZ FIDALGO, 2016) entirely bare, sternites 2b-4 covered predominantly with short white and black hairs.
Terminalia: Male genitalia are very similar to those of *R. scolopaceus* (Fig. 4). Dististylus slightly broader than in *R. scolopaceus*.

**Fig. 4:** *Rhagio atlanticus* sp. nov., male genitalia. Left: dorsal view; right: ventral view (scale bar = 0.1 mm). (Photos: Theo Zeegers)

Variation: The main variation involves the colouration and pattern of the abdomen. Spots on tergites are usually triangular but specimens with rhomboid-shaped spots are not unusual. The lateral black band of the tergites is sometimes broken into separated spots. Colour of sternites 4 and 5 vary greatly; both can be dark in darker specimens. Sternite 5 is particularly variable, and it is often pale as sternite 4. Knob of halteres varies from brownish to dark; on occasion, it can be pale brownish but always darker than the stem of the haltere (compare with the usually completely yellow haltere of *R. scolopaceus*). First sternite can be bare or have isolated short- to middle-length hairs; however, they are never long and abundant like in *R. scolopaceus*. Separation between the eyes in males sometimes can be very narrow; in extreme cases the eyes are just touching at one point. Hairs on palpus can be completely pale, largely black or intermediate.

Female (Figs. 2, 5, 6a, 6d):

Very similar to male, except for: eyes widely dichoptic, frons dark in the middle, downwards parallel, only slightly divergent in the most lower part, its length more than 1.5 times its basal width (measured: 1.6 x), so narrower than in female *R. scolopaceus*. Width of vertex half the width of one eye (measured: 0.48 x). Distance between posterior ocelli (ocelli included) more than half of the distance between eyes at vertex (level of posterior ocelli). Overall, hairs on abdomen shorter and more sparsely distributed than in male; pale hairs on coxae absent or strongly reduced.

Scutellum yellow, with or without a small grey spot at base. Abdomen darker than in male; central black spots on tergites triangular, connected with lateral black spots. Sternites black, first three with yellow apical margin, predominantly or completely covered with black hairs. Female genitalia very similar to those of *R. scolopaceus* (see IACOB, 1971)

Etymology: The name of the new species refers to its apparent range. All records to date indicate that it inhabits the northwest of Spain and the northern half of Portugal; therefore it can be considered an Atlantic Iberian endemic.
Fig. 5: *Rhagio atlanticus* sp. nov. Female paratype (MNCN_Ent 209926); a-b: habitus (scale bar = 5 mm), a: dorsal; b: lateral. (Photos: Alberto Narro)

Fig. 6: *Rhagio* Fabricius, 1775 females, close-up of heads (scale bar = 0.2 mm). Above: dorsal; below: frontal. Left (a, d): *Rhagio atlanticus* sp. nov.; centre (b, e): *Rhagio scolopaceus* (Linnaeus, 1758); right (c, f): *Rhagio maculipennis* (Loew, 1854). (Photos: Theo Zeegers)

Habitat and biology

The new species has been intensively observed by Manuel Sanmartín in two different areas in the vicinity of Vilalba, Lugo, Galicia, northwest of Spain:
Urban periphery in the southeastern edge of the town. In this area, multi-story buildings alternate with undeveloped fields (Fig. 7a) where vegetation grows wild: grasses and ferns, brambles (*Rubus* sp.), nettles (*Urtica* sp.), and to a lesser extent, gorses (*Ulex* sp.) and greenweeds (*Genista* sp.). At the peak of its flight season, the species can be found perched on the walls and façades of buildings adjacent to those undeveloped fields, usually about one and two meters above ground level.

Riverine footpath. This refers to the area crossed by the Madalena River, where cultivated lands and some meadows alternate with pine plantations and some uncultivated areas with oaks (*Quercus* sp.), maples (*Acer* sp.) and chestnut trees (*Castanea* sp.). Along the banks of the river there are many alders (*Alnus glutinosa* (L.) Gaertn.) and willows (*Salix* sp.) (Fig. 7b), but there are also some small forests of oaks, birches (*Betula* sp.) and maple trees. Along a stretch of the river there is a pedestrian path, made of concrete in the more open areas (Fig. 7c) and wooden in the areas where trees are abundant (Fig. 7d). On both sides of the pathway, brambles, nettles, ferns, grasses, Compositae, and mint (*Mentha* sp.) grow naturally and this is the area where most observations took place. Unfortunately, this vegetation is regularly cleared.

In both semi-urban and riverine habitats, the species is usually found perched head-downwards on vertical and firm surfaces, such as tree-trunks, lamp-posts, banisters or walls.

Analysis of all available records of the species seems to indicate that it is common in the areas where it appears and versatile in its habitat requirements, as it can be found from rather anthropogenic open areas to dense forests with lush vegetation, including brambles and ferns, and from sea level up to nearly 1500 masl. Unfortunately, it has never been observed hunting, feeding or mating. It has only been observed perched and resting, making short flights to land a little further away when it gets disturbed.
## Distribution and phenology

The locations of all the pinned specimens studied were already shown under the chapters ‘Type material’ and ‘Other material studied’. Table 1 shows information related to all material identified from photographs taken in the wild uploaded to the online database BiodiversidadVirtual.org (BIODIVERSIDAD VIRTUAL, 2018), and the websites Diptera.info (DIPTERA.INFO, 2018) and Flickr (FLICKR, 2018).

<table>
<thead>
<tr>
<th>Observer</th>
<th>Record date</th>
<th>Location</th>
<th>Province/District</th>
<th>UTM</th>
<th>Altitude (masl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SANMARTÍN, M. (2013b)</td>
<td>16-VI-2013</td>
<td>Vilalba</td>
<td>Lugo</td>
<td>29TPH09</td>
<td>434</td>
</tr>
<tr>
<td>SANMARTÍN, M. (2013c)</td>
<td>18-VI-2013</td>
<td>Vilalba</td>
<td>Lugo</td>
<td>29TPH09</td>
<td>462</td>
</tr>
<tr>
<td>SANMARTÍN, M. (2013d)</td>
<td>18-VI-2013</td>
<td>Vilalba</td>
<td>Lugo</td>
<td>29TPH09</td>
<td>462</td>
</tr>
<tr>
<td>SANMARTÍN, M. (2015a)</td>
<td>8-V-2015</td>
<td>Vilalba</td>
<td>Lugo</td>
<td>29TPH09</td>
<td>422</td>
</tr>
<tr>
<td>SANMARTÍN, M. (2015c)</td>
<td>30-V-2015</td>
<td>Vilalba</td>
<td>Lugo</td>
<td>29TPH09</td>
<td>462</td>
</tr>
<tr>
<td>SANMARTÍN, M. (2016a)</td>
<td>3-V-2016</td>
<td>Vilalba</td>
<td>Lugo</td>
<td>29TPH09</td>
<td>425</td>
</tr>
<tr>
<td>SANMARTÍN, M. (2016b)</td>
<td>17-V-2016</td>
<td>Vilalba</td>
<td>Lugo</td>
<td>29TPH09</td>
<td>471</td>
</tr>
<tr>
<td>SANMARTÍN, P. A. (2012)</td>
<td>6-VI-2012</td>
<td>Pontevedra</td>
<td>Pontevedra</td>
<td>29THH30</td>
<td>166</td>
</tr>
<tr>
<td>SANMARTÍN, P. A. (2013)</td>
<td>4-IV-2013</td>
<td>Campañó</td>
<td>Pontevedra</td>
<td>29TNH20</td>
<td>69</td>
</tr>
<tr>
<td>ÁLVAREZ, M. (2014a)</td>
<td>2-V-2011</td>
<td>Oviedo</td>
<td>Asturias</td>
<td>30TP60</td>
<td>308</td>
</tr>
<tr>
<td>ÁLVAREZ, M. (2014b)</td>
<td>11-V-2014</td>
<td>Monasterio de Hermo</td>
<td>Asturias</td>
<td>29TPH26</td>
<td>829</td>
</tr>
<tr>
<td>LAFUENTE, L. (2007)</td>
<td>7-VI-2006</td>
<td>Tineo</td>
<td>Asturias</td>
<td>29TQJ00</td>
<td>743</td>
</tr>
<tr>
<td>VALELLA, J. (2014)</td>
<td>18-VI-2014</td>
<td>Taborneda</td>
<td>Asturias</td>
<td>30TP62</td>
<td>90</td>
</tr>
</tbody>
</table>
Table 1: Data compilation of live specimens of *Rhagio atlanticus* sp. nov., identified from photographs available in public websites (BiodiversidadVirtual.org, Diptera.info and Flickr). The symbol (*) refers to records from Diptera.info website and (**) from Flickr website.

To provide a clear view of the species' distribution, all available records of the taxon were located in a 10 km × 10 km grid map of the Iberian Peninsula (Fig. 8) (map adapted from BIODIVERSIDAD VIRTUAL, 2018). The known data of *R. scolopaceus* were included to see the gap in their respective distributions. As can be seen on Fig. 8, *R. atlanticus* seems to be concentrated in the northwestern quadrant of the Iberian Peninsula, an area very separated from the closest records of *R. scolopaceus*, known only from the Iberian Pyrenees within the territory.

![Distribution map of Rhagio atlanticus sp. nov. and Rhagio scolopaceus](image)

Fig. 8: Distribution map of *Rhagio atlanticus* sp. nov. (blue and red dots) and *Rhagio scolopaceus* (Linnaeus, 1758) (black dots) on the Iberian Peninsula, created from all available data, both collected specimens and published photographs.

As can be seen from the available records, both from collected specimens and records from photographs, it is a mainly spring species, the first adults being seen in late March in years with mild winters. Normally it is seen in good numbers in April with the peak of abundance in May and early June. Numbers decline rapidly by mid June and the species is rarely seen from July onwards. On average, females are active later in the year than males. The latest recorded male is from an undetermined date in August, female from September 8. Fig. 9 shows the phenology of the species (based on the available records) in a graphic.
Fig. 9: Graphic showing the flight period of *Rhagio atlanticus* sp. nov., based on the 80 records gathered from collections and photographs.

**Diagnostics of the other species of the *Rhagio scolopaceus*-group from Europe**

We define the *Rhagio scolopaceus*-group as those species of *Rhagio* showing a strongly dark spotted wing, especially on most transverse veins. For reasons of convenience, we have included *Rhagio vitripennis* (Meigen, 1820) as well, since, especially in the female, the wing is spotted as well. However, we don’t think this species is closely related. The wing pattern is different and the metanotum is hairy, whereas it is bare in all true members of the *scolopaceus*-group.

Traditionally, identification keys (LINDNER, 1925; SZILÁDY, 1934) depend heavily on colouration of thorax and legs. These features are, however, unreliable and have a tendency to be sexually dimorphic as well. To illustrate this, LINDNER (1925) entered *Rhagio strigosus* Meigen, 1804 twice in his key with different colourations (the female, as *Rhagio mellinus* Becker, 1921).

We could study *R. sardous* from pictures only, and we have not seen *Rhagio cavannae* (Bezzi, 1898) (which should be easily recognizable though, based on the original description). We have included those species tentatively based on the limited information available.

**Rhagio cavannae** (Bezzi, 1898)

No material seen.

**Diagnosis:** Antenna black, second and third segment yellow at base. Palpus yellow, black-haired. Coxae black. Knob of halter dark. Wing broad [similar to *Rhagio latipennis* (Loew, 1856)]. Dark spots on wing more intense than in *R. scolopaceus*. Male: eyes dichoptic.

**Distribution and flight period:** Central Italy: Bolognola, Acquasanta, Valle del Tennacola, Serravalle del Chiento [sic, currently: Chienti], Vallombrosa, altitudes between 700-1400 masl. June-July.
Rhagio latipennis (Loew, 1856)

Figs. 10-11, 12a

Fig. 10: Rhagio latipennis (Loew, 1856). Male, Germany, Nordrhein-Westfalen: Borgholzhausen (some 15 km SE Osnabrück), 20-VII-2014. Above: close-up of head showing the distinctly dichoptic eyes; below: habitus. (Photos: Jürgen Peters)
Fig. 11: *Rhagio latipennis* (Loew, 1856). Female, Slovak Republic, Malá Fatra Terchová Region, 14-VII-2012. Above: habitus in dorsal view; below: habitus in lateral view. (Photos: František Mucha)

The records from Portugal by CARLES-TOLRÁ (2001a; 2002) are most likely *R. atlanticus* sp. nov. These identifications should be revised.

**Material seen:** Some 20 males from Germany and Switzerland.

**Diagnosis:** Only Central European species with broad wings and, in males, dichoptic eyes. First and third antennal segments short. Anterior and posterior margins of wing distinctly divergent between apices of vein A1 and CuA1, then abruptly convergent towards wing apex (Fig. 12a).

Colouration generally more yellow than *R. scolopaceus*: antenna, palpus, coxae, femora, tibiae and halter yellow. Pleurae largely yellow. Coxae with pale hairs only. Trochanters yellow with black apex. Scutum usually partly yellow as well, can be predominantly yellow in female. Spots on wing usually more extensive than in typical *R. scolopaceus*, especially at posterior margin; spot on fork of vein R4 and R5 present, often connected with other spots.

Male: eyes distinctly dichoptic (Fig. 11). First sternite bare.

Female [we have seen only one female]: More yellow than other species, also on thoracic dorsum (Fig.11). The frons is broad.

![Wings of Rhagio Fabricius, 1775](image)

**Fig. 12:** Wings of *Rhogio* Fabricius, 1775: a) *Rhogio latipennis* (Loew, 1856); b) *Rhogio scolopaceus* (Linnaeus, 1758). (Drawings: Theo Zeegers)

**Distribution and flight period:** Central Europe, in a broad band from Denmark, Germany and Switzerland towards Romania (Fig. 23), according to MAJER (1988) continuing into Ukraine and southern Russia. Typically, it is a summer species, with records from second half of June into the first half of August.

*Rhogio maculipennis* (Loew, 1854)

Figs. 6c, 6f, 13


**Material seen:** GREECE: Thraki, Evros, Dadia Lefkimi, 41.1°N 26.1°W, 30-IV-2000, 1 ♀, leg. W. van Steenis & E. S. Bakker [CTZS].

**Diagnosis:** This species is easily recognized by the dark femora, palpus and antenna. The male is the darkest of all *Rhogio* species of the *scolopaceus*-group, the female has yellow tibiae and yellow apical bands on tergites.

Antenna black with short third segment. Palpus black and black-haired, in the female from Greece with yellow apex. Halter yellow with dark knob. Abdomen predominantly black, in female with narrow
apical yellow bands on tergites. Legs dark in male, with yellow tibiae in female. Wing as in *R. scolopaceus*. The eyes are holoptic in male. Female: width of vertex half the width of one eye. Distance between posterior ocelli (ocelli included) half of the distance between eyes at vertex (level of posterior ocelli). Apex of vein \(R_1\) (the part beyond the pterostigma), bright yellow.

**Fig. 13:** *Rhagio maculipennis* (Loew, 1854). Above: male, 24-IV-2017; below: female, 1-V-2017, both from Turkey, Karasu, near Sakarya. (Photos: Gökhan Eren)
At first impression, this species might seem nothing more than a melanistic aberration of *R. scolopaceus*. Structural features, like the shape of the third antennal segment, prove otherwise. It differs from *R. cavannae* by the black palpus and, in the male, by the holoptic eyes.

**Distribution and flight period:** Until very recently, only known from the type specimens described by LOEW (1854) from Bursa, Turkey, and Varna, Bulgaria. All other descriptions are derived from the original descriptions (LOEW 1854, 1869) or type specimens (SZILÁDY, 1934). Very recently, both sexes were photographed by Gökhan Eren at Karasu near Sakarya (41.075°N 30.650°E), the male on 24-IV-2017, the female on 1-V-2017. A photo of a female was published from Istanbul on 24-V-2015 (DIPTERA.INFO, 2015). The records for Central Europe by MAJER (2018) are clearly in error: they refer to *Rhagio fuscipennis* (Meigen, 1820) (see ZEEGERS & ÁLVAREZ FIDALGO, 2016).

*Rhagio sardous* Szilády, 1934

Fig. 14

*Fig. 14: Rhagio sardous* Szilády, 1934. Male, Italy, Sardinia, Oschiri S’Ampulla, 2-VI-2015. (Photo: Mauro Doneddu)
No material seen.

**Diagnosis:** As pointed out by SZILÁDY (1934), this species resembles *R. maculipennis*, but can easily be separated by the yellow and elongated third antennal segment. In the male, the eyes are strongly dichoptic.

**Distribution:** Until recently, only known by the holotype from Tempio, Sardinia, which is considered lost. In 2015, Mauro Doneddu photographed a male in the nearby village Oschiri S’Ampulla. Both localities are in the north of Sardinia. Apparently, it is an endemic of northern Sardinia.

*Rhabdo scolopaceus* (Linnaeus, 1758)
Figs. 6b, 6c, 12b, 15, 21c, 21d, 22a, 22b


The record from Spain by CARLES-TOLRÁ (2001b) is most likely *R. atlanticus* sp. nov. This identification should be revised.


**Diagnosis:** Variable species with characteristic antennal shape: third segment yellow, elongate, first segment much larger than second; arista originate from lower margin of third antennal segment in lateral view (Fig. 22a). Palpus yellow. Fore coxa completely or predominantly yellow, with pale hairs only. Femora yellow, with or without black bands, tibiae yellow. Wings not broadened, anterior and posterior margin virtually parallel between apices of veins A₁ and M₁ (Fig. 12b); dark spot at fork of R₁ and R₃ present. Hairs on sternites 2–4 largely or completely pale in male, with more black hairs in female.

Male: eyes holoptic, touching at least on one point. First sternite fully haired.

Female: frons broad, downwards diverging, its length less than 1.5 times its basal width (measured: 1.3 x); vertex 2/3th of width of one eye (measured: 0.69 x), distance between eyes on vertex at level of posterior ocelli at least twice as large as distance between posterior ocelli (ocelli included).

**Variability:** Colouration of many features highly variable, source of many misidentifications. Palpus with or without black hairs, in most males largely or completely pale haired, in most females with many black hairs. First antennal segment in exceptional cases hardly larger than second. Pleurae usually completely grey, however, specimens with orange spots or parts are not uncommon (esp. females). These have been a source of confusion with *R. strigosus*. Trochanter usually predominantly dark, though in some individuals a slightly lighter median band is present. Halter usually yellow, sometimes with knob partly darkened. Middle and hind coxae with or without yellow. Trochanter usually dark; in some specimens however (females) yellow or brown with black apex. Colouration of scutum, scutellum, femora, tergites and sternites highly variable.

The elongated shape of the third antennal segment tends to be less extreme in females (Fig. 22b).

*R. medae* is based on female specimens well within the range of variability of *R. scolopaceus*. In describing this species, IACOB (1971) was misled by the traditional colour features of LINDNER (1925), hence underestimating the variability of females *R. scolopaceus*. In some females, the wing is slightly broadened.

BVnPC, 7 (96): 91-123 (2018)
Without proper references, such females could be taken for *R. latipennis*, but the antenna is different and the wing is less broad.

**Distribution and flight period:** Europe, but relatively rare in the south; reaching far north into Scandinavia; Siberia. This species is not recorded from the Iberian Peninsula south of the Pyrenees. A species with a long period of flight with a distinct peak in spring (May in Central Europe). Though numbers strongly decline in July and August, in most parts of Europe, *R. scolopaceus* is still more common than rare summer species such as *R. strigosus*.

![Fig. 15: *Rhagio scolopaceus* (Linnaeus, 1758), habitus. Above: male, the Netherlands, Ter Apel, 16-V-2016, (Photo: Bert Oving); below: female, the Netherlands, Wageningen, 24-V-2017. (Photo: Dick Belgers)](image)
*Rhagio strigosus* Meigen, 1804

Figs. 16-17, 21b

**Fig. 16:** *Rhagio strigosus* Meigen, 1804. Male, Germany, Nordrhein-Westfalen: Borgholzhausen (some 15 km SE Osnabrück), 20-VII-2014. Above: habitus in dorsal view; below: habitus in front-lateral view. (Photos: Jürgen Peters)
Fig. 17: Rhagio strigosus Meigen, 1804. Female. Switzerland, Vevey, 13-IX-2014. Above: habitus; below: close-up of head showing short third antennal segment. (Photos: Pierre Bornand)
Rhagio strigosus Meigen: MEIGEN (1804): 299.
Rhagio mellinus Becker: BECKER (1921): 48; SZILÁDY (1934): 17 [syn. of R. strigosus]

Material seen: From the Netherlands, Belgium, Luxemburg, France (syntypes), Germany, Switzerland, Hungary. Photos of syntypes available provided by VERBECQ (2015).

Diagnosis: This species is well defined by the absence of a dark spot at fork of veins R₄ and Rₛ. This feature dates back to SCHINER (1862). First and third antennal segment, short. Otherwise, the male can be surprisingly similar to the male of R. scolopaceus, although it is generally slightly more slender and lighter. Coxae yellow, with pale hairs only. The antenna yellow, third antennal segment is short and round at apex. The species displays a strong sexual dimorphism, which caused much confusion in the old keys.

Male: Thoracic dorsum is largely gray, as are usually the pleurae (contra most keys). Eyes holoptic. First sternite bare.

Female: Thoracic dorsum and pleurae largely or completely orange, making it rather unmistakable. The frontal stripe is much narrower than in female R. scolopaceus: nearly twice as high as broad at base (STUBBS & DRAKE, 2001). Distance between eyes at vertex at level of posterior ocelli less than twice as large as distance between ocelli (ocelli included).

Note on holotype of mellinus BECKER, 1921: According to BECKER (1921), the holotype of R. mellinus with catalogue number 53.633 is from Spain (‘Spanien’). This is remarkable, since no other genuine material of R. strigosus is known to us from the Iberian Peninsula. BECKER (1921) did not provide any more details on locality or date. BECKER’s catalogue is still available at ZMHB (Fig. 18). The entry at number 53.633 shows that the locality was first written down as ‘Wien’ [= Vienna], however, later corrected to ‘Spanien’ [= Spain], likely due to the supposition (by BECKER) of being collected by Cabrera, who actually lived on Tenerife. Given the distribution of R. strigosus, Wien is likely to be correct and Spain is very doubtful as the locality. Therefore, we do not accept Spain as the locality.

Distribution and flight period: Central Europe, from England and France towards Romania, however, not known from the Iberian Peninsula (see above). Rare in most regions, but sometimes found locally in numbers. Period of flight later than R. scolopaceus, on average, July-August, females into September.

![Fig. 18: Part of BECKER’s catalogue showing entry 53.633 Leptis sp. nov. (later published as Rhagio mellinus BECKER, 1921). (Photo: Joachim Ziegler, courtesy ZMHB)](image_url)

**Rhagio vitripennis** (Meigen, 1820)

Figs. 19-20, 21a

Leptis vitripennis MEIGEN (1820): 91; SCHINER (1862): 173.
Material seen: From the Netherlands, Belgium, Germany, France and Spain.

Fig. 19: Rhagio vitripennis (Meigen, 1820), habitus. Left: male, the Netherlands, Apeldoorn, 28-V-2017, (Photo: James Clark); right: female, the Netherlands, Renkum, 25-V-2015. (Photo: John Bouwmans)

Diagnosis: This species probably does not belong to the scolopaceus-group. The wing pattern differs from the other species (Fig. 21a). Moreover, the metanotum has a bunch of long, white hairs near lower margin, whereas it is bare in all other species (Fig. 20). This feature was never properly understood in Western Europe, since the translation of NARCHUK (1988) is in error, by confusing metanotum with metapleuron; VAN DER GOOT (1985), made the same error in translation.

In many males and most females, the wing is clearly spotted at crossveins, whereas the fork of veins R4 and R5 is clear. Moreover, the anterior margin of wing is outside pterostigma narrowly darkened all the way to the wing tip (Fig. 21a). In all other species, there is a broad dark spot around the wing tip present, which is however isolated (not connected) to pterostigma (Figs. 21b, 21c, 21d). In some males, the wing markings are hardly differentiated.

Variability: Wing pattern is generally more distinct in females (Fig. 19). In some males, the wing markings are hardly differentiated (hence: vitripennis).

Distribution and flight period: Continental Europe, also Spain. Absent from the British Isles and Fennoscandia. Period of flight in central Europe, from May to June, with hardly any specimens later.

Key to the identification of the species of Rhagio scolopaceus-group from Europe

1(a) Dark spot at apex of wing separated from pterostigma (Figs. 21b, 21c, 21d), therefore anterior wing margin not completely darkened. Metanotum bare ………………………………………………………… 2
1(b) Anterior margin of wing completely (though narrowly) darkened between pterostigma and wing apex (Fig. 21a). Metanotum below with a field of long, white hairs present (Fig. 20) ……………………
…………………………………………………………………………………R. vitripennis (Meigen, 1820)
Fig. 20: *Rhagio vitripennis* (Meigen, 1820), thorax in lateral view and slightly from below. The arrow indicates the bunch of hairs present on lower part of metanotum. (Photo: Theo Zeegers)

2(a) Femora dark, often also tibiae dark. Abdomen completely dark or predominantly dark with reddish margins ................................................................. 3
2(b) Femora and tibiae largely or completely yellow. Abdomen yellow with black spots or bands, sometimes, dorsally and/or ventrally, predominantly black ........................................... 4

3(a) Third antennal segment short, dark. Male: Eyes holoptic. [Black Sea area] ................................................................. *R. maculipennis* (Loew, 1854)
3(b) Third antennal segment elongated, yellow. Male: Eyes strongly dichoptic. [Sardinia] ................................................................. *R. sardous* Szilády, 1934

4(a) Wings without dark spot on fork of veins R$_4$ and R$_5$ (Fig. 21b) .......... *R. strigosus* Meigen, 1804
4(b) Wings with dark spot on fork of veins R$_4$ and R$_5$ (Figs. 21c, 21d) ................................................................. 5

5(a) Third antennal segment elongated (clearly longer than second segment), in males, its dorsoapical margin distinctly concave (Fig. 22a), in females, less extreme than in males (Fig. 22b). Arista inserted below middle in lateral view. Male: eyes holoptic, first sternite with abundant long hairs .... ................................................................. *R. scolopaceus* (Linnaeus, 1758)
5(b) Third antennal segment shorter (about same length than second segment). Arista inserted at middle in lateral view (Fig. 22c) [unknown for *R. cavanna*]. Male: eyes dichoptic or just touching, first sternite either bare or with some isolated hairs [last unknown for *R. cavanna*] ................. 6

6(a) Knob of halter yellow. Hairs on fore coxa all pale ....................... *R. latipennis* (Loew, 1856)
6(b) Knob of halter dark brown to black. On fore coxa, at least a bunch of black hairs present anteriorly near apex ......................................................................................... 7

7(a) Coxae and trochanters dark. Antenna predominantly black. Palpus black-haired. Wing broad (similar to *R. latipennis*). Males: eyes clearly dichoptic ...................... *R. cavanna* (Bezzi, 1898)
7(b) Coxae yellow, trochanters yellow with contrasting black apex. Antenna yellow. Palpus partly or completely pale haired. Wing of normal shape (similar to *R. scolopaceus*). Males: eyes narrowly dichoptic or just touching .................................................. *R. atlanticus* sp. nov.

![Wings of Rhagio Fabricius, 1775: a) Rhagio vitripennis (Meigen, 1820) (arrows indicate continuously narrow dark wing border); b) Rhagio strigosus Meigen, 1804 (arrow indicates absent spot at fork of R₄ and R₅); c-d) Rhagio scolopaceus (Linnaeus, 1758), two varieties (spot or band at fork of R₄ and R₅), arrow indicates gap between pterostigma and dark apex spot. (Photos: Theo Zeegers)](image1)

**Fig. 21:** Wings of *Rhagio* Fabricius, 1775: a) *Rhagio vitripennis* (Meigen, 1820) (arrows indicate continuously narrow dark wing border); b) *Rhagio strigosus* Meigen, 1804 (arrow indicates absent spot at fork of R₄ and R₅); c-d) *Rhagio scolopaceus* (Linnaeus, 1758), two varieties (spot or band at fork of R₄ and R₅), arrow indicates gap between pterostigma and dark apex spot. (Photos: Theo Zeegers)

![Antenna of Rhagio Fabricius, 1775 lateral view. a-b) Rhagio scolopaceus (Linnaeus, 1758): a) male, b) female. c) Rhagio atlanticus sp. nov., male. (Drawings: Theo Zeegers)](image2)

**Fig. 22:** Antenna of *Rhagio* Fabricius, 1775 lateral view. a-b) *Rhagio scolopaceus* (Linnaeus, 1758): a) male, b) female. c) *Rhagio atlanticus* sp. nov., male. (Drawings: Theo Zeegers)
Complementarily, and according to the new and updated information available, Table 2 shows the most important features to identify *Rhagio* species of the *scolopaceus*-group. Only species known to be present on the Iberian Peninsula and those with wide distribution in Europe are shown.

<table>
<thead>
<tr>
<th></th>
<th><em>R. scolopaceus</em></th>
<th><em>R. atlanticus</em></th>
<th><em>R. latipennis</em></th>
<th><em>R. strigosus</em></th>
<th><em>R. vitripennis</em></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Eyes (♂)</strong></td>
<td>holoptic</td>
<td>narrowly dichoptic</td>
<td>clearly dichoptic</td>
<td>holoptic</td>
<td>holoptic</td>
</tr>
<tr>
<td><strong>Hairs on 1st sternite (♂)</strong></td>
<td>long and abundant</td>
<td>bare or a few isolated ones</td>
<td>bare</td>
<td>bare</td>
<td>long and abundant</td>
</tr>
<tr>
<td><strong>Dark spot on R₄ and R₅</strong></td>
<td>present</td>
<td>present</td>
<td>present</td>
<td>absent</td>
<td>absent</td>
</tr>
<tr>
<td><strong>Hairs on metanotum</strong></td>
<td>absent</td>
<td>absent</td>
<td>absent</td>
<td>absent</td>
<td>present</td>
</tr>
<tr>
<td><strong>Shape of 3rd antennal segment</strong></td>
<td>elongated</td>
<td>short</td>
<td>short</td>
<td>short</td>
<td>short</td>
</tr>
<tr>
<td><strong>Knob colour of halters</strong></td>
<td>yellowish, rarely partly darkened</td>
<td>darkish to dark</td>
<td>yellow</td>
<td>yellow</td>
<td>yellow</td>
</tr>
<tr>
<td><strong>Frons (♀)</strong></td>
<td>broader (L / W &lt; 1.5)</td>
<td>narrower (L / W &gt; 1.5)</td>
<td>broader (L / W &gt; 1.5)</td>
<td>broader (L / W &lt;= 1.5)</td>
<td></td>
</tr>
<tr>
<td><strong>Wing shape</strong></td>
<td>normal</td>
<td>normal</td>
<td>broad</td>
<td>normal</td>
<td>normal</td>
</tr>
<tr>
<td><strong>Hairs on apex of front coxae</strong></td>
<td>pale</td>
<td>black</td>
<td>pale</td>
<td>pale</td>
<td>pale</td>
</tr>
<tr>
<td><strong>Colour of trochanters</strong></td>
<td>usually entirely dark</td>
<td>yellow with shining black apex</td>
<td>yellow with shining black apex</td>
<td>yellow with shining black apex</td>
<td>black</td>
</tr>
</tbody>
</table>

Table 2: Useful features for the identification of the species of the *scolopaceus*-group of *Rhagio* Fabricius, 1775, present in the Iberian Peninsula or widely distributed in Europe.

**Discussion**

The *Rhagio scolopaceus*-group consists of very closely related species. As a consequence, many incorrect identifications have been made in the past, mainly due to identification keys using unreliable (because of variability) colour features. Many species are rare or restricted in distribution. It should be noted that in most parts of Europe, aberrant specimens of *R. scolopaceus* (especially females) are still more common than the rarer species.

It seems the *scolopaceus*-group has radiated only very recently. The distribution shows four classic ice-age refugia: Iberian, Tyrrenhian, Italian and pontic (De Lattin, 1967), currently inhabited by *R. atlanticus*, *R. sardous*, *R. cavannae* and *R. maculipennis* respectively (Fig. 23). No species is known for the Balkan refugium.

There are three Central-European counterparts: *R. latipennis*, *R. scolopaceus* and *R. strigosus*. From the west, *R. scolopaceus* is likely to be the sister of *R. atlanticus*, and *R. sardous* might be the sister of this clade, given its antennal shape. *R. cavannae* and *R. latipennis* share a broad wing and a more central distribution and might be sisters as well. There is no obvious sister candidate for *R. strigosus*. 

BvNPC, 7 (96): 91-123 (2018)
**Fig. 23**: Distribution of the European species of the *Rhagio scolopaceus*-group with restricted distribution. Green area: *Rhagio latipennis* (Loew, 1856). Black dots: records for *Rhagio atlanticus* sp. nov. [Iberia], *Rhagio sardous* Szilády, 1934 [Sardinia], *Rhagio cavannae* (Bezzi, 1898) [mainland Italy] and *Rhagio maculipennis* (Loew, 1854) [pontic] respectively. [The map has been produced using DMAP software (MORTON, 2000)]

**Acknowledgements**

We want to thank very sincerely Manuel Sanmartín (Vilalba, Spain) for his work capturing the specimens necessary for the description of the new species and for providing the photos to illustrate the species in its natural habitat. Most material collected in Portugal (many paratypes included) was kindly provided to us by André van Eck (Tilburg, the Netherlands). Wouter van Steenis (Breukelen, the Netherlands) kindly shared his specimen of *R. maculipennis* from Greece. Very special thanks also go to Alberto Narro for photographing the types in excellent high resolution and Marián Álvarez Fidalgo for her help with some technical issues.

We also thank Mercedes París (MNCN), Eduardo Ruiz and Raimundo Outerelo (UCME), Pasquale Ciliberti (RMNH) and Araceli Aradón Álvarez (BOS) for allowing us to study the material in the collections and use the optical equipment of the institutions. Joachim Ziegler (Berlin) kindly inspected Becker’s collection catalogue at our request. Special thanks go to Howard Youth (Washington, D.C., United States), who kindly corrected our non-native English.

Our thanks are further extended to Dick Belgers (Wageningen, the Netherlands), Pierre Bornand (Vevey, Switzerland), John Bouwmans (Veenendaal, the Netherlands), James Clark (Apeldoorn, the Netherlands), Mauro Doneddu (Sardinia, Italy), Gökhan Eren (Turkey), František Mucha (Terchová, Slovak Republic), Bert Oving (Wildervank, the Netherlands)) and Jürgen Peters (Borgholzhausen, Germany, for allowing us to use their images. Special thanks also go to all the photographers who have uploaded their
We also thank the technical staff and editorial committee of BV news Publicaciones Científicas for accepting and publishing this paper.

References


[Accessed on 20-V-2018].


[Accessed on 20-V-2018].

[Accessed on 20-V-2018].

[Accessed on 16-V-2018].

[Accessed on 20-V-2018].

[Accessed on 20-V-2018].

[Accessed on 8-IV-2018].

[Accessed on 20-V-2018].


[Accessed on 20-V-2018].


LOEW, H. (1869). Systematische Beschreibung der bekannten europäischen zweiflügeligen Insekten. Von
Johann Wilhelm Meigen. Achter Theil oder zweiter Supplementband. Beschreibungen europäischer

LÓPEZ, A. (2012). Rhagio atlanticus Zeegers & Álvarez Fidalgo, 2018. Photograph to be found on
BiodiversidadVirtual.org [Online database]. Available from:
http://www.biodiversidadvirtual.org/insectarium/Rhagio-atlanticus-Zeegers-&-Alvarez-Fidalgo-
2018-img422804.html.
[Accessed on 20-V-2018].

Kiadó. 446 pp.

Palearctic Diptera (with special reference to flies of economic importance). Volume 2. Nematocera

https://fauna-eu.org/
[Accessed on 8-IV-2018].

MEIGEN, J. W. (1804). Classification und Beschreibung der europäischen zweyflügeligen Insekten (Diptera


BiodiversidadVirtual.org [Online database]. Available from:
http://www.biodiversidadvirtual.org/insectarium/Rhagio-atlanticus-Zeegers-&-Alvarez-Fidalgo-
2018-img871650.html.
[Accessed on 20-V-2018].

BiodiversidadVirtual.org [Online database]. Available from:
http://www.biodiversidadvirtual.org/insectarium/Rhagio-atlanticus-Zeegers-&-Alvarez-Fidalgo-
2018-img759365.html.
[Accessed on 20-V-2018].


the European Part of the USSR. Volume V. Diptera and Siphonaptera. Part 1. New Dehli. Amerind

NOVAL, N. (2016). Rhagio atlanticus Zeegers & Álvarez Fidalgo, 2018. Photograph to be found on
BiodiversidadVirtual.org [Online database]. Available from:
http://www.biodiversidadvirtual.org/insectarium/Rhagio-atlanticus-Zeegers-&-Alvarez-Fidalgo-
2018-img769567.html.
[Accessed on 20-V-2018].


BiodiversidadVirtual.org [Online database]. Available from:
http://www.biodiversidadvirtual.org/insectarium/Rhagio-atlanticus-Zeegers-&-Alvarez-Fidalgo-
2018-img124956.html.
[Accessed on 20-V-2018].

PATO, S. (2012). Rhagio atlanticus Zeegers & Álvarez Fidalgo, 2018. Photograph to be found on
BiodiversidadVirtual.org [Online database]. Available from:
http://www.biodiversidadvirtual.org/insectarium/Rhagio-atlanticus-Zeegers-&-Alvarez-Fidalgo-
2018-img356160.html.
[Accessed on 20-V-2018].


LSID for this publication in ZooBank: urn:lsid:zoobank.org:pub:371E8A6A-15C0-4E72-B881-4E40EE532040

Comité Editorial
Dirección del Proyecto: Álvaro Izquiza, Fari Martínez, Jordi Clavell, Jordi Manel Besma y Terstian van der Heyden.

Equipo técnico: Terstian van der Heyden y Emilio Herrera.

Asesoría científica: Miguel Carles Tolrà.

Fecha de recepción: 13 de abril de 2018
Fecha de aceptación: 6 de mayo de 2018
Fecha de publicación: 20 de mayo de 2018

Una vez impreso quedará depositado en la sede social de la Asociación Fotografía y Biodiversidad.

Volumen 7, páginas 91-123

Para las textos y fotografías de esta publicación son propiedad de sus autores.

Fotografía y Biodiversidad no se responsabiliza de las opiniones vertidas en los artículos de BV news Publicaciones Científicas.

Si desea enviar un artículo: contacto@biodiversidadvirtual.org


Artículo nº 96

ISSN 1989-7170