

## The Rhagionidae, Athericidae and Vermileonidae of Corsica (Diptera, Brachycera)

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**Abstract.** – Species of the families Rhagionidae, Athericidae and Vermileonidae (Diptera) are reported from Corsica. The family Rhagionidae is represented by six species, including two endemic species of *Rhagio*. Both these species, *R. beckeri* and *R. corsicanus*, are recorded from the island for the first time in a century. Most species of Rhagionidae are associated with forest. The family Athericidae is represented by two species, both characteristic of cold, running waters. Three rhagionid and one athericid species are recorded for the first time from Corsica (*Chrysopilus laetus*, *C. splendidus*, *Ptiolina obscura* and *Atrichops crassipes*). Also, the family Vermileonidae with *Vermileo vermileo* is new to Corsica.

**Résumé.** – Les Rhagionidae, Athericidae et Vermileonidae de Corse (Diptera, Brachycera). Les mouches des familles Rhagionidae, Athericidae et Vermileonidae de Corse sont inventoriées. Les Rhagionidae sont peu représentés, avec seulement six espèces, dont le genre *Rhagio* n'est représenté que par deux espèces endémiques. La plupart des espèces sont associées à la forêt. Les deux espèces endémiques (*R. beckeri* et *R. corsicanus*) sont recensées pour la première fois depuis un siècle. La famille des Athericidae est représentée par deux espèces, toutes deux caractéristiques des eaux froides et courantes. Trois espèces de rhagionidés et une espèce d'athéricide sont signalées pour la première fois en Corse (*Chrysopilus laetus*, *C. splendidus*, *Ptiolina obscura* et *Atrichops crassipes*). La famille des Vermileonidae est signalée pour la première fois en Corse par l'espèce *Vermileo vermileo*.

**Keywords.** – Homeodactyla, endemism, DNA analysis, islands, France.

Historically (LINDNER, 1925; SZILÁDY, 1934), Rhagionidae Latreille, 1802, or snipeflies (Diptera) have been characterized as flies by the presence of three apparent pulvilli on each tarsus (the central one is actually the empodium), an antenna with a distinct arista (although this does not always apply to non-European species) and an elongated discal cell in the wing. STUCKENBERG (1973) was the first to point out that the family in this broad interpretation was polyphyletic. He proposed a new family, Athericidae Stuckenberg, 1973, for a number of species previously considered as Rhagionidae, as sister lineage of Tabanidae rather than Rhagionidae. NAGATOMI (1977) re-erected the family Vermileonidae Williston, 1886, from Rhagionidae for *Vermileo* and related genera. This approach is nowadays generally accepted (JAMES & TURNER, 1987; MAJER, 1988; KERR & SINCLAIR, 2017) and supported by molecular evidence (KERR, 2010). SHIN *et al.* (2017) recover with very high probability Athericidae and Tabanidae as sister groups, as well as Rhagionidae and Vermileonidae, all within the infraorder Tabanomorpha. Since the families Athericidae and Vermileonidae are represented in Europe by only a few species, we add them to this review of the Rhagionidae from Corsica.

In this paper, we present current knowledge on Rhagionidae, Athericidae and Vermileonidae found in Corsica, based on both records from the literature and from recently collected material. Apart from a doubtful record by BIGOT (1887), the oldest records of Rhagionidae originate from a dipterological expedition to Corsica in 1907. As a result, BECKER *et al.* (1910)

recorded three species of Rhagionidae and one of Athericidae. They also described a new *Rhagio* species to science while LINDNER (1923) described a second new species from Corsica. SÉGUY (1926) did not add new records from Corsica. The family of Vermileonidae has not been recorded from Corsica before (KEHLMAIER, 2021).

### MATERIAL AND METHOD

First of all, an internet search for literature on the above-mentioned families using different spellings for ‘Corse’ was carried out. Special attention has hereby been given to the fora [www.diptera.info](http://www.diptera.info) and [www.galerie-insecte.org](http://www.galerie-insecte.org). Further, the collection of Theodor Becker, currently present in the Museum für Naturkunde, Leibniz-Institut für Evolutions- und Biodiversitätsforschung (ZMHB, Berlin, Germany) was studied by the first author in March 2022. In March 2023, a quick scan was made of the material in Naturalis (RMNH, Leiden, the Netherlands).

The majority of the material presented was collected in the frame of the most recent edition of *La Planète Revisitée* (Our Planet Reviewed) program during 2019-2021. Several sites distributed over the island were sampled in a standardized way (see TOUROULT *et al.*, 2023). Pan traps were always placed in triples (white, yellow and blue). In total eighty-nine samples from ten localities contained Rhagionidae, Athericidae and/or Vermileonidae (fig. 1). These were identified by the first author.

After collection in the field, samples were stored in a 70% alcohol solution, in most cases transferred to the home lab and processed; only a few samples were treated in the field lab. All samples collected by the second author were sorted by him; Malaise trap samples were treated by Thibault Ramage; further processing of Diptera residue samples from the 2019 survey was carried out by Paul Beuk (The Netherlands). Upon receipt of the samples, the first author dried, pinned and identified specimens of the three families Athericidae, Rhagionidae and Vermileonidae. Christian Kehlmaier (Germany) confirmed the identity of Vermileonidae specimens by barcoding. Samples with larger numbers of one species were kept in alcohol solution in the original vials.

All specimens, both pinned and in vials, have been sent to MNHN for conservation, except for some pinned voucher specimens which are kept in CTZS.

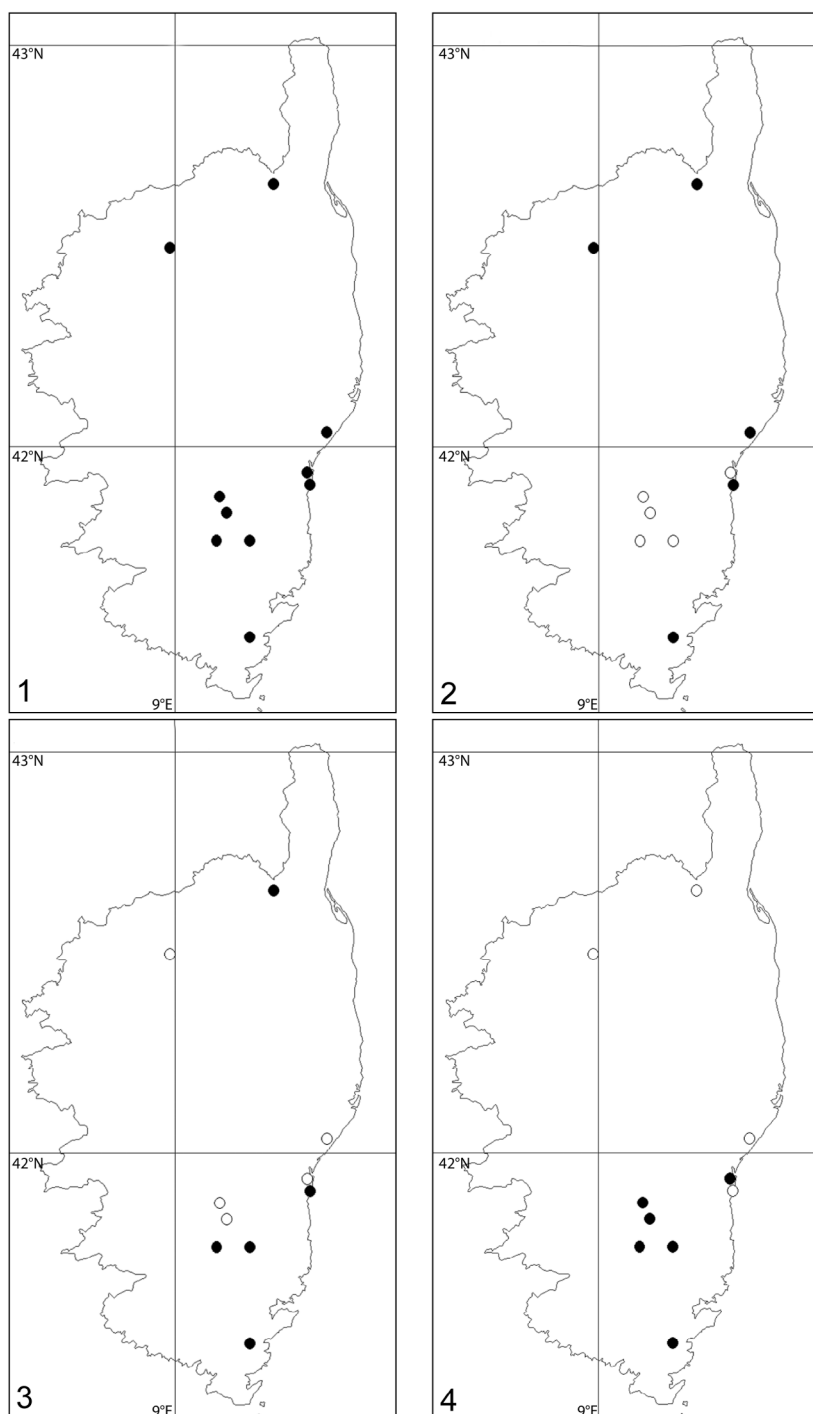
Photographs (see fig. 5-11, 14-22) have been made with an Olympus Tough 5 with automatic stacking, those of close-ups of heads using a phototube on an Olympus stereo-microscope and manually stacking.

For species with less than 10 records below are given in the following format: Corsican Department: number of specimens, locality - location (specimens deposited in the first author's private collection) and date. Specimens not present in first author's collection have been deposited in MNHN. For species with more records, information has been summarized. Detailed records will be incorporated into a dataset that will be published to GBIF.

**Abbreviations for collections.** – CTZS, private collection of the first author; MNHN, Muséum national d'Histoire naturelle, Paris, France; RMNH, Naturalis Biodiversity Center, Leiden, the Netherlands; ZMHB, Museum für Naturkunde, Leibniz-Institut für Evolutions- und Biodiversitätsforschung, Berlin, Germany.

### RESULTS

In total, six species of Rhagionidae, two of Athericidae and one of Vermileonidae have been found in this study. Three Rhagionidae, one Athericidae and one Vermileonidae are recorded here from Corsica for the first time.



**Fig. 1-4.** – 1, Map of Corsica showing localities which delivered records of one or more Rhagionidae, Athericidae or Vermileonidae. – 2-4, Distribution of Rhagionidae in Corsica. Black circle: species present; open circle: locality investigated, but species not found; 2, *Chrysopilus asiliformis* (Preyssler); 3, *Chrysopilus laetus* Zetterstedt; 4, *Ptiolina obscura* (Fallén).

Family **Rhagionidae** Latreille, 1802***Chrysopilus asiliformis*** (Preyssler, 1791) (fig. 2)

First recorded by BECKER *et al.* (1910) [as *C. aurea*]: common at Vizzavona. Also, the record of *C. palparis* Loew, 1869, by BECKER *et al.* (1910) concerns this species (see below).

**New records for Corsica.** – CORSE-DU-SUD: 1 ex., Serra-di-Scopamène, Campu di Bonza (CTZS); 4 ex., Sotta, Paglaggiolo (1 ex. in CTZS); 4 ex., Sotta, Valavo. – HAUTE-CORSE: 1 ex., Ghisonaccia, secteur de Pinia; 1 ex., Mausoléo, Tartagine; 13 ex., Olmi-Cappella, Tartagine; 2 ex., Oletta; 1 ex., Santo-Pietro-di-Tenda; 9 ex., Solenzara, Ventiseri, Airbase BA 126 and adjacent areas (2 ex. in CTZS).

**Remarks.** – The species seems to be widespread (fig. 2), especially at lower altitudes. In pan traps, the species shows a preference for yellow (table I). A few specimens have predominantly darkened femora (normally yellow). Such specimens are similar to *C. splendidus* (Meigen, 1820), which differs by a longer palp and long hairs on parafacial in males, and in living specimens by the coloration of the eye (ZEEGERS & SCHULTEN, 2021).

***Chrysopilus laetus*** Zetterstedt, 1842 (fig. 3)

**New records for Corsica.** – CORSE-DU-SUD: 3 ex., Serra-di-Scopamène et Sorbollano, Campu di Bonza (1 ex. in CTZS); 1 ex., Serra-di-Scopamène, Campu di Bonza; 1 ex., Sorbollano, Punta di I Vaccili; 6 ex., Sotta, Valavo; 1 ex., Zonza, Samulaghia (CTZS). HAUTE-CORSE: 1 ex., Oletta; 10 ex., Solenzara, Ventiseri, Airbase BA 126 and adjacent areas (1 ex. in CTZS). Recorded for the first time from Corsica.

**Remarks.** – The species thus seems rather widespread (fig. 3), both at lower and higher altitudes. In pan traps, no significant preference for a colour was observed (table I).

***Chrysopilus splendidus*** (Meigen, 1820)

**New records for Corsica.** – HAUTE-CORSE: 1 ♂, Oletta, 18-26.VI.2020, *leg. J. Touroult* (CTZS); 1 ♂, Solenzara, mouth of river Travo, 25.V.2021, *leg. A. de Braekeleer* (MNHN). Recorded for the first time from Corsica.

**Remarks.** – Both records are from low altitudes. Also in central Europe, the species is mainly recorded from low altitudes, often coastal areas.

***Ptiolina obscura*** (Fallén, 1814) (fig. 4)

**New records for Corsica.** – CORSE-DU-SUD: 29 ex., Serra-di-Scopamène, Castellu d'Ornucciu (2 ex. in CTZS); 17 ex., Serra-di-Scopamène et Sorbollano, Campu di Bonza; 2 ex., Sotta, Valavo; 46 ex., Zicavo, Ponte di Valpine; 101 ex., Zonza, Samulaghia (3 ex. in CTZS). HAUTE-CORSE: 1 ex., Ventiseri, Airbase BA 126. Recorded for the first time from Corsica.

**Remarks.** – Collected in forests at both lower and higher altitudes (fig. 4). In pan traps, the species clearly prefers blue (table I).

The identity of this species and the many misidentifications associated with it, are discussed by ZEEGERS *et al.* (2021). It is associated with forests, where the larvae live in moss

**Table I.** – Rhagionidae collected with pan traps of different colours during 2019 and 2021 in Corsica, expressed as number of specimens.

Species	White	Yellow	Blue
<i>Chrysopilus asiliformis</i>	1	7	
<i>Chrysopilus laetus</i>	1	6	2
<i>Ptiolina obscura</i>	37	7	132
<i>Rhagio beckeri</i>	5	4	19
<i>Rhagio corsicanus</i>	6	30	4

on tree trunks. It is not often collected by hand, but can be quite numerous in Malaise traps and pan traps as documented in this study.

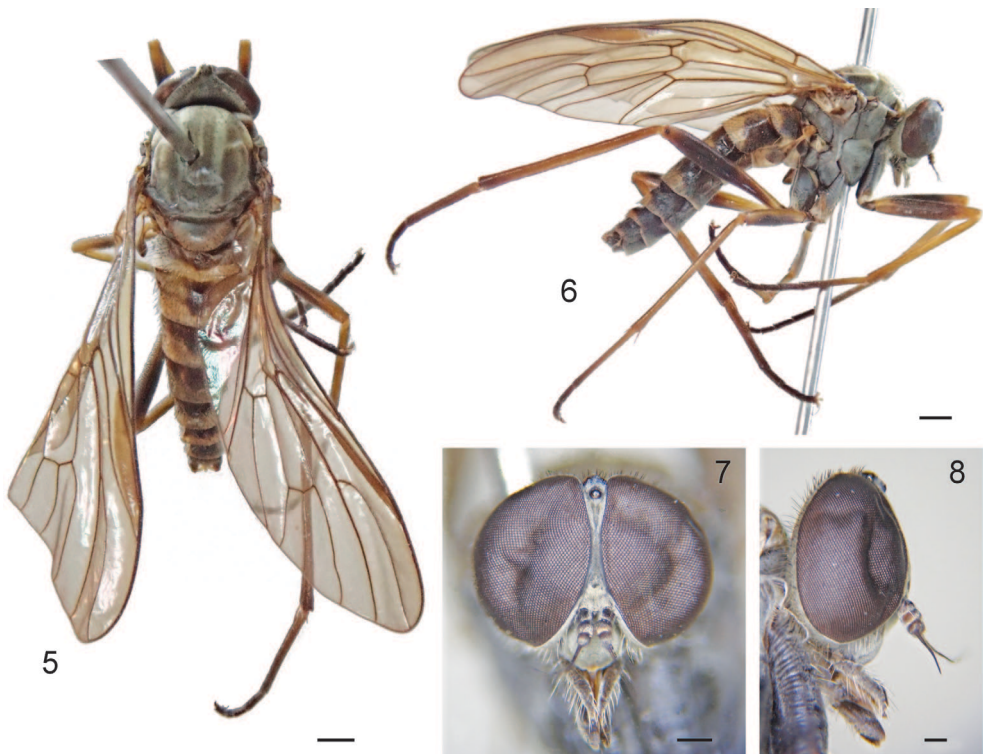
***Rhagio beckeri* Lindner, 1923 (fig. 5-12)**

First recorded by LINDNER (1923): Vizzavona and the nearby Monte d'Oro (types). Types not present in ZMHB.

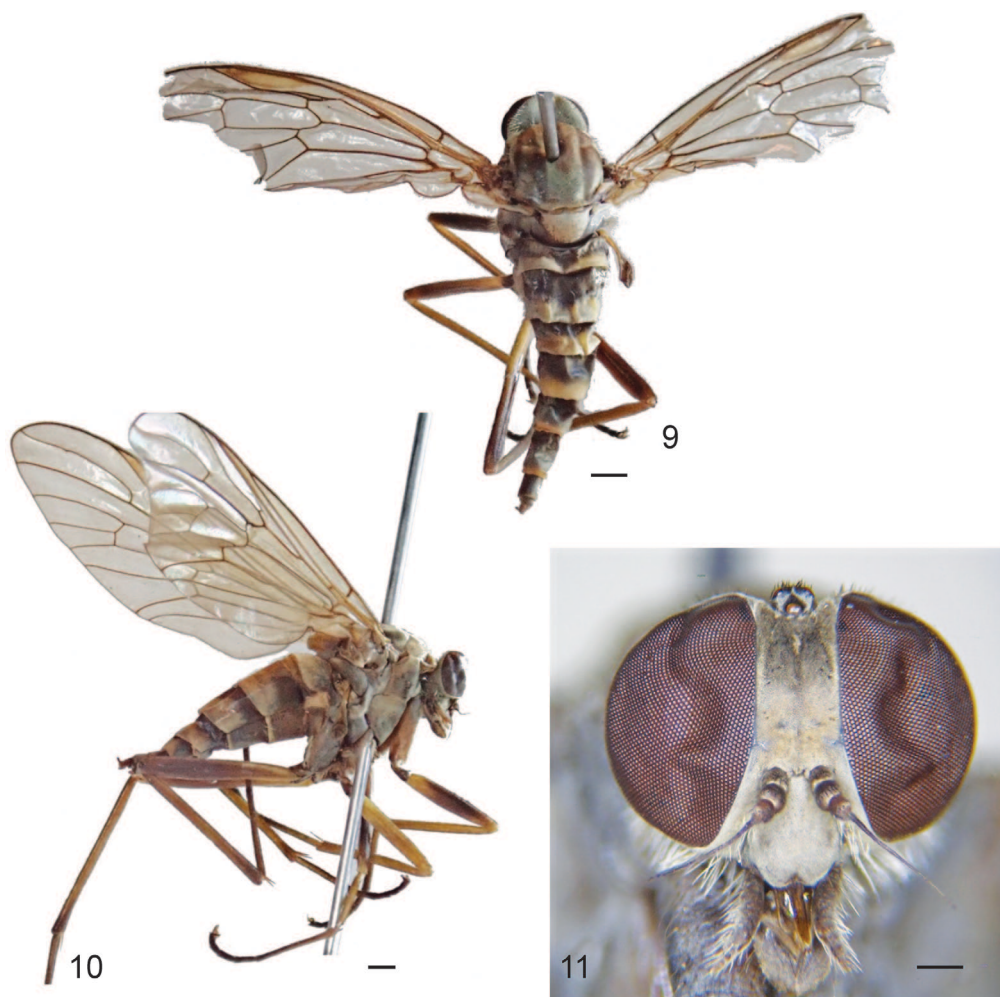
**New records for Corsica.** – CORSE-DU-SUD: 1 ex., Quenza, plateau du Coscione, Castellu d'Ornu; 15 ex., Serra-di-Scopamène, Castellu d'Ornucciu; 251 ex., Serra-di-Scopamène et Sorbollano, Campu di Bonza, incl. Punta di i Vaccili (12 ex. in CTZS); 5 ex., Zicavo, Ponte di Valpine; 10 ex., Zonza, Samulaghia.

**Remarks.** – This species was found only at altitudes above 800 m (fig. 12). During the *La Planète Revisitée* expedition, it was especially numerous in the dry oak forests of Campu di Bonza (89% of the specimens). As *P. obscura*, this species was collected in highest numbers in blue pan traps as compared to yellow and white (table I).

The species is described from Corsica and seems to be endemic. SZILÁDY (1934) considered it to be a synonym of *R. sordidus* (Loew, 1862), which was not accepted by LINDNER (1942). With the new material available, we agree with LINDNER (1942) that *R. beckeri* is a valid species. That being said, LINDNER (1925) himself was the major source of the confusion, by stating that the eyes in the male are holoptic, whereas in his original description (LINDNER, 1923), he called the status nearly holoptic. The latter and original statement is correct (fig. 7). The difference might be subtle, but is very consistent in males of Rhagionidae (ZEEGERS & ÁLVAREZ FIDALGO, 2018). Moreover, *R. beckeri* is much larger than *R. sordidus*, with much longer legs.



**Fig. 5-8.** – *Rhagio beckeri* Lindner, ♂. – 5-6, Habitus: 5, dorsal; 6, lateral (scale bar: 1 mm.). – 7-8, Head: 7, frontal; 8, lateral (scale bar: 0.2 mm).



**Fig. 9-11.** – *Rhagio beckeri* Lindner, ♀. – **9-10**, Habitus: **9**, dorsal; **10**, lateral (scale bar: 1 mm). – **11**, Head, frontal (scale bar: 0.2 mm.).

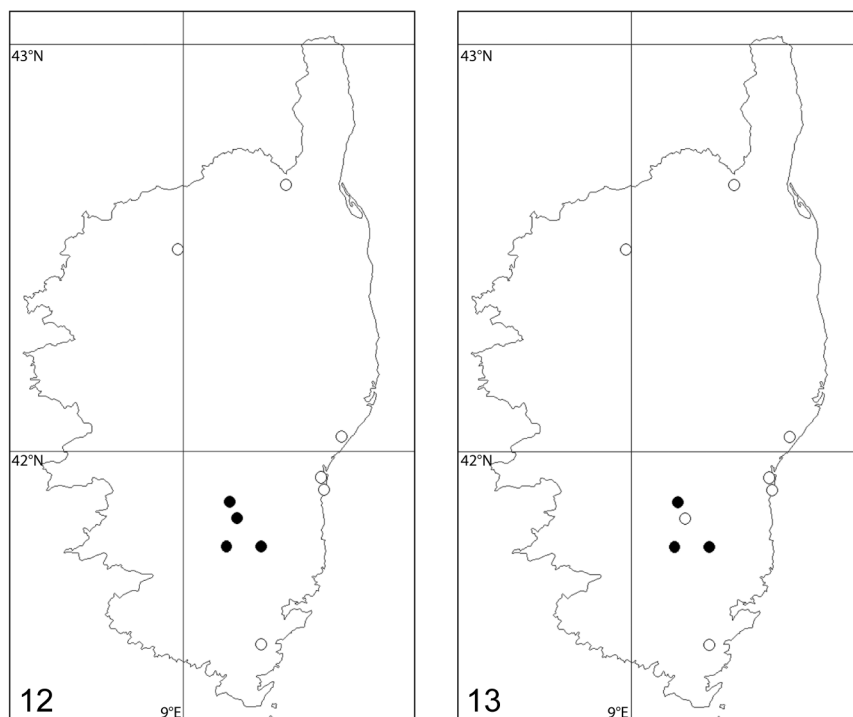
***Rhagio corsicanus* Becker, 1910 (fig. 13-20)**

First recorded by BECKER (1910): Vizzavona (types ZMHB, examined); 1 ♀, col de Vizzavone, 13.VII.1967, leg. V.S. van der Goot (RMNH).

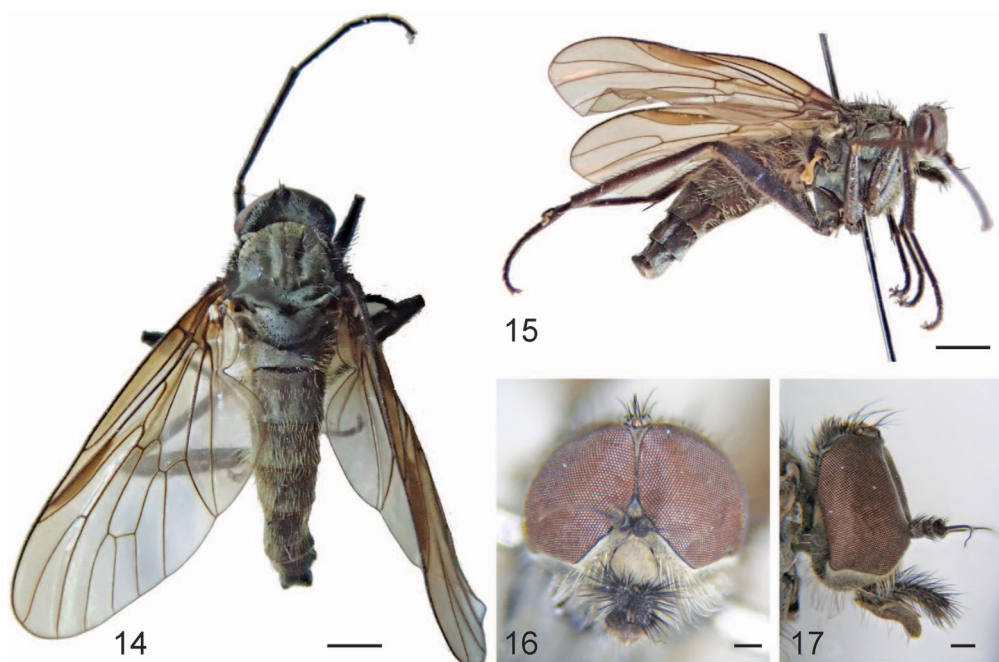
**New records for Corsica.** – CORSE-DU-SUD: 11 ex., Serra-di-Scopamène, Castellu d’Ornucciu; 8 ex., Serra-di-Scopamène, Campu di Bonza, Punta di i Vaccili; 21 ex., Zicavo, Ponte di Valpine (5 ex. in CTZS); 10 ex., Zonza, Samulaghia.

**Remarks.** – An endemic of the mountains of Corsica, where it is found on altitudes above 800 m. At each site it co-occurred with *R. beckeri* (fig. 13), but was not found at sites where the latter species was most abundant (Serra-di-Scopamène et Sorbollano, Campu di Bonza). Contrary to *R. beckeri*, *R. corsicanus* clearly preferred yellow to blue and white pan traps (table I).

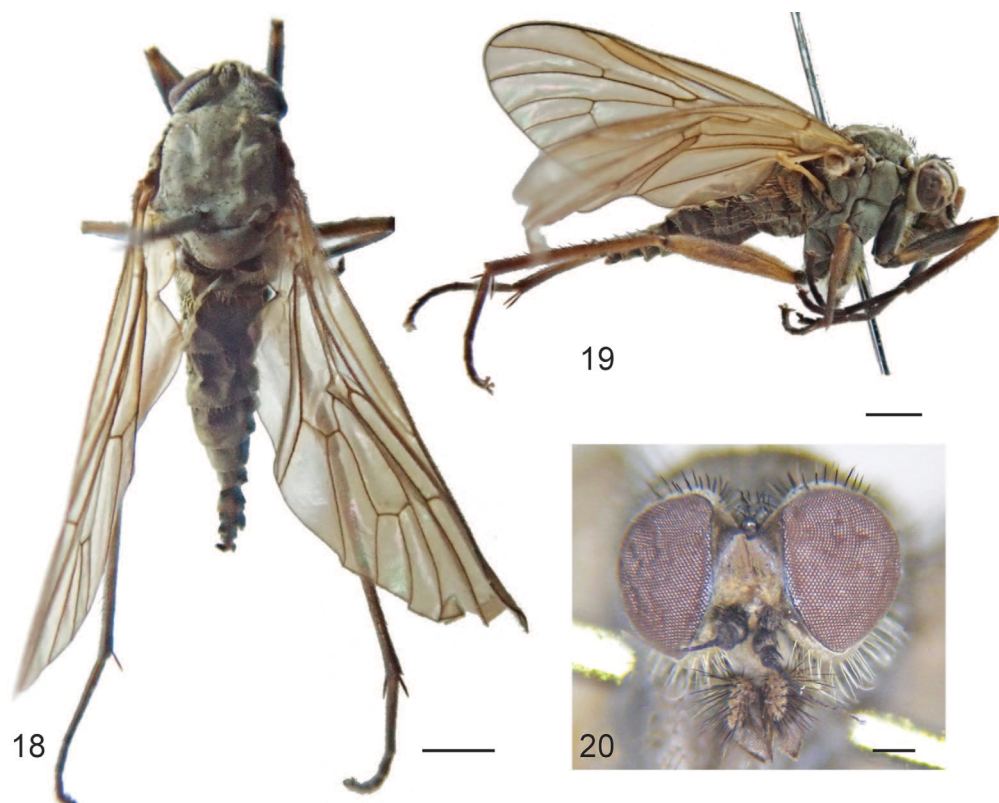
The species is well characterized, but females are quite different from males. It is an overall quite dark species resembling *R. funebris* (Meigen, 1820) to which it runs in the key by



**Fig. 12-13.** – Distribution of Rhagionidae in Corsica. Black circle: species present; open circle: locality investigated, but species not found. – 12, *Rhagio beckeri* Lindner. – 13, *R. corsicanus* Becker.



**Fig. 14-17.** – *Rhagio corsicanus* Becker, ♂. – 14-15, Habitus: 14, dorsal; 15, lateral (scale bar: 1 mm). – 16-17, Head: 16, frontal; 17, lateral (scale bar: 0.2 mm).



**Fig. 18-20.** – *Rhagio corsicanus* Becker, ♀. – 18-19, Habitus: 18, dorsal; 19, lateral (scale bar: 1 mm). – 20, Head, frontal (scale bar: 0.2 mm.).

ZEEGERS & ÁLVAREZ FIDALGO (2016). However, the pterostigma is darker and all veins in the wing are black. It shares with *R. funebris* the asymmetrical placement of the arista. Thoracic dorsum always shows a pair of distinct light grey vittae (variable in *funebris*). Legs are totally dark in male; however, base of femora and large part of tibiae are yellow in female. The male can easily be identified using the key by BECKER (1921), which does not apply to females. LINDNER (1925) translated Becker's description but misinterpreted the colour of pterostigma, which is black in the male and brown in the female. SZILÁDY (1934) was the first to key out both male and female correctly.

#### Family **Athericidae** Stuckenberg, 1973

##### *Atherix marginata* (Fabricius, 1781)

First recorded by BECKER *et al.* (1910).

**New records for Corsica.** – CORSE-DU-SUD: Zonza, Samulaghia, 3 ♀, 24.VI.2019, leg. M. Pollet (MNHN); 1 ♂, 28.VI.2019, leg. C. Villemant (CTZS).

##### *Atrichops crassipes* (Meigen, 1820)

**New records for Corsica.** – CORSE-DU-SUD: Serra-di-Scopamène et Sorbollano, Campu di Bonza, 1 ♂, 27.VI.2019 (MNHN). HAUTE-CORSE: Castellare di Casinca, 1 ♂, 21.V.2020 [www.insecte.org, originally posted as *Chrysopilus* sp., also on www.diptera.info]. Recorded for the first time from Corsica.

Family **Vermileonidae** Williston, 1886***Vermileo vermileo*** (Linnaeus, 1758)

**New records for Corsica.** – 1 ♀, Serra-di-Scopamène et Sorbollano, Campu di Bonza, 14-27. VI.2019 (MNHN); 1 ♀, same site, 27.VI-11.VII.2019 (CTZS); 1 ♀, same site, 11-25.VII.2019 (MNHN). Recorded for the first time from Corsica.

**Remark.** – The European species of genus *Vermileo* Macquart, 1834, were recently revised by CARLES-TOLRÁ & CUESTA-SEGURA (2020). DNA analysis by KEHLMAIER (2021) shows that many more cryptic species are to be expected. Kehlmaier kindly investigated the specimens mentioned above and concluded (pers. comm.) that they belong to *V. vermileo*.

## SPECIES NOT ACCEPTED AS CORSICAN

***Chrysopilus fuscipes*** Bigot, 1887

Described by BIGOT (1887) from ‘Corse’. The collection in which the type specimen is located is unknown to us. The description does not fit any known European species of *Chrysopilus*. Since most species described by BIGOT (1887) are Nearctic, one might wonder whether the type locality is correct. Errors tend to be not exceptional in older literature (ZEEGERS & ÁLVAREZ FIDALGO, 2018). As a result, we consider this species doubtful Corsican or even European.

***Chrysopilus palparis*** Loew, 1869 (fig. 21-22)

Described from Corfu by LOEW (1869). BECKER (1910) mentioned it as “Common at Vizzavona”, however, this proves to be a misidentification of *C. asiliformis*. MAJER (1988) did not list this species for Corsica.



**Fig. 21-22.** – *Chrysopilus* sp., ♂, habitus, lateral view, specimens from ZMHB. – 21, *C. palparis*, syntype from Corfu. – 22, *C. asiliformis* from Corsica, reported by BECKER *et al.* (1910) as *C. palparis*.

We have seen a male syntype from Corfu and a male from Corsica, both in ZMHB. Both share a yellow pterostigma. The male from Corfu has elongated palpus, whereas the male from Corsica has a short palpus. Apparently, BECKER *et al.* (1910) separated their '*C. palparis*' from their '*C. aureus*' (= *C. asiliformis*) by the colour of the pterostigma. This assumption is confirmed by BECKER (1921). However, the pterostigma in *C. asiliformis* is often yellow like in *C. palparis* (ZEEGERS & SCHULTEN, 2021). The short palpus clearly demonstrates that Becker made a misidentification and his material actually belongs to *C. asiliformis*.

## CONCLUSION

Prior to *Our Planet Reviewed in Corsica 2019-2021* expedition, our knowledge of the Rhagionidae of Corsica was nearly completely based on the 1907 expedition by Becker and colleagues. The 2019-2021 expedition produced all species previously recorded from the island, including the two endemic Rhagio species, i.e., *R. beckeri* and *R. corsicanus*, even in large numbers. Moreover, three species of Rhagionidae, one of Athericidae and one of Vermileonidae are recorded for the first time from Corsica. All these newly found species are broadly distributed over Europe. Given these results, we conclude that our expedition has contributed significantly to the knowledge of Rhagionidae, Athericidae and Vermileonidae of Corsica. Still, the discovery of other species from Corsica, e.g., with a limited distribution on the island cannot be excluded at this moment.

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