

NEW DATA ON THE GENUS *PARHELOPHILUS* GIRSCHNER, 1897 FROM SPAIN, INCLUDING THE FIRST RECORDS OF *P. CROCOCORONATUS* REEMER, 2000 (DIPTERA, SYRPHIDAE)

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ABSTRACT

The hoverfly *Parhelophilus crococroronatus* Reemer, 2000 (Syrphidae: Eristalinae) was recorded from France and Portugal. In this work, it is reported from Spain for the first time. In Murcia province, the species was caught at the hydro dam "Presa de la Risca". The habitat consisted of newly flooded forested meadows with decaying shrubs and dead trees, where the aquatic larvae of *Parhelophilus* live. This habitat has most likely been lost by now, as most of the area has been flooded, and the current presence of *P. crococroronatus* needs to be confirmed. In Granada province, *P. crococroronatus* was collected in a *Phragmites*-rich natural wetland, while in Huelva it was collected in a marshland with trees and low vegetation. The findings show that, even if the habitat of *P. crococroronatus* in Murcia has disappeared, the species is more widespread and has viable populations in Spain. Additional records of *Parhelophilus versicolor* (Fabricius, 1794) and *Parhelophilus frutetorum* (Fabricius, 1775) are provided.

Keywords: *Parhelophilus crococroronatus*; Spain; hydro dam; wetlands.

RESUMEN

Nuevos datos del género *Parhelophilus* Girschner, 1897 de España, incluidos los primeros registros de *P. crococroronatus* Reemer, 2000 (Diptera, Syrphidae)

El sírfido *Parhelophilus crococroronatus* Reemer, 2000 (Syrphidae: Eristalinae) estaba registrado de Francia y Portugal. En este trabajo, se documenta, por primera vez, de España. En la provincia de Murcia, el hábitat donde esta especie se ha capturado es el Embalse de la Risca, constituido por valles forestales arbolados recientemente inundados, con matorrales en descomposición y árboles muertos, donde viven las larvas acuáticas de *Parhelophilus*. Este hábitat ha desaparecido por inundación, por lo que la presencia actual en esta ubicación de *P. crococroronatus* requiere de confirmación. En la provincia de Granada, *P. crococroronatus* se recolectó en un humedal natural dominado por *Phragmites*, mientras que, en Huelva, fue recolectado en un área de marismas con árboles y vegetación baja. Los presentes hallazgos muestran que, aunque el hábitat de *P. crococroronatus* haya desaparecido en Murcia, la especie está más extendida en España. Se proporcionan registros adicionales de *Parhelophilus versicolor* (Fabricius, 1794) y *Parhelophilus frutetorum* (Fabricius, 1775).

Palabras clave: *Parhelophilus crococroronatus*; España; embalse; humedales.

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Introduction

The hoverfly genus *Parhelophilus* Girschner, 1897 in Europe consists of three widespread species, *Parhelophilus consimilis* (Malm, 1863), *Parhelophilus frutetorum* (Fabricius, 1775) and *Parhelophilus versicolor* (Fabricius, 1794), and a fourth species of more restricted range, *Parhelophilus crococroronatus* Reemer, 2000 (Speight 2020). This latter species has only been found in some localities of South-Western Europe, specifically in France and Portugal (Reemer, 2000; van Eck, 2016). Three *Parhelophilus* species are reported from Spain. *Parhelophilus versicolor* is the most commonly collected species, while *P. consimilis* has been reported only from Mallorca island and *P. frutetorum* from Barcelona province (Ricarte & Marcos-García, 2017).

The aim of the present paper is to update the Iberian knowledge of this hoverfly genus which is specifically linked to wetlands and marshlands.

Material and methods

Syrphidae adults were collected using hand nets. In 2002 the area around the bird hides close to the

La Rocina Visitors Centre, El Rocío, in the Coto de Doñana area were visited. In 2003, on the way to the Sierra de Alcaraz, a new dam construction site was visited, which had a flooded forested area with a large pool with decaying shrubs and dead trees (Figs 1–2). This was part of the newly built “Presa de la Risca”, in the Murcia province (Segura Hydrographic Confederation, 2020). In 2021, the *Phragmites*-rich natural wetland ‘Lagunas de Padul’, in Granada province, was shortly visited in the framework of the ‘Fauna Ibérica’ project of Eristalinae (see acknowledgements). The species were identified with Van der Goot (1981) and Reemer (2000).

The material is deposited in the following collections: JSA - private collection of Jeroen van Steenis, Amersfoort, the Netherlands; CEUA-CIBIO - collection, University of Alicante, Spain; WSB - private collection of Wouter van Steenis, Breukelen, the Netherlands.

The photos for the adult figures were taken with a Canon EOS D6 camera, Canon MP-E 1-5× macrozoom lens and a Yongnuo YN14EX ring flash placed on a Cognisys Stack-Shot macrorail. Several photos were combined with the stacking software Zerene Stacker 1.04 and processed with the image manipulating programme



Fig. 1.– “Embalse de la Risca”, Collecting site of *Parhelophilus crococroronatus* and *P. versicolor*. Adapted from Segura Hydrographic Confederation, 2020.

Fig. 1.– “Embalse de la Risca”, lugar donde se recolectó *Parhelophilus crococroronatus* and *P. versicolor*. Adaptado a partir de Confederación Hidrográfica del Segura, 2020.



Fig. 2.– The early flooding of the forested meadows at Embalse de la Risca. Photo from Segura Hydrographic Confederation, 2020.

Fig. 2.– Fase temprana de la inundación de los prados boscosos en el Embalse de la Risca. Foto de Confederación Hidrográfica del Segura, 2020.

GIMP 2.8.14. Female photos were produced as stacks of individual images made with a camera (Leica DFC 450) attached to a binocular stereomicroscope (Leica M205 C). Stacks were made in Leica Application Suite X (LAS X)®, ver. 3.0.4.16529. The map was produced in Google Earth Pro 2021.

Results

Key to the European species of the genus *Parhelophilus* Girschner, 1897

- 1. Protibia, at least anteriorly, black on apical 1/3; tergum I partly shiny, medio-lateral part with tomentose vitta; face in lateral view antero-ventrally elongated beyond the frontal tubercle; surstylus slightly longer than epandrium, almost rectangular with slightly curved ventral margin ... ***Parhelophilus consimilis*** (Malm, 1863)
- Protibia yellow; tergum I non-shiny, entirely tomentose; face antero-ventrally less protruding..... 2
- 2. Males; eyes slightly separated, shortest distance between the eyes is medially on the frons; apex of abdomen rounded, with genital capsule 3
- Females; eyes widely separated, closest distance between the eyes is posteriorly at the ocellar triangle; apex of abdomen pointed, without genital capsule 5
- 3. Metafemur basoventral margin smooth; occiput entirely yellow pilose; surstylus slightly shorter than epandrium, almost squarish with strongly concave ventral margin ... ***Parhelophilus versicolor*** (Fabricius, 1794)
- Metafemur basoventrally with rounded tubercle with long black setae-like pile; occiput yellow pilose, with on the dorsal part a row of black pile; surstylus clearly longer than epandrium, rectangular to elongate with concave to strongly concave ventral margin 4
- 4. Frons yellow pilose with medial part black pilose; tubercle on metafemur rather long, as long as the longest setae-like pile; tergum III with three yellowish-white tomentose maculae, well separated from each other; surstylus slightly longer than epandrium, almost rectangular, with concave ventral margin..... ***Parhelophilus frutetorum*** (Fabricius, 1775)
- Frons entirely yellow pilose; tubercle on metafemur rather short, much shorter than the longest setae-like pile; tergum III with three yellowish-white tomentose maculae narrowly connected with each other; surstylus clearly longer than epandrium, elongate, strongly curved with strongly concave ventral margin..... ***Parhelophilus crococronatus*** Reemer, 2000
- 5. Occiput entirely yellow pilose; face in lateral view swollen, clearly convex ***Parhelophilus versicolor*** (Fabricius, 1794)
- Occiput yellow pilose, dorsally with a row of black pile intermixed; face in lateral view flat, weakly convex 6
- 6. Legs yellow, black more extended than next species, profemur black on basal 2/5 to 1/2, metafemur black on medial 1/5, metatibia black on basal 1/4-1/3; tergum III with three yellowish-white tomentose maculae, well separated from each other..... ***Parhelophilus frutetorum*** (Fabricius, 1775)
- Legs yellow, with black colour less extended than previous species, profemur black on basal 1/3, metafemur

black on medial $\frac{1}{3}$, metatibia only vaguely darkened basally; tergum III with three yellowish-white tomentose maculae, narrowly connected or at most very slightly separated from each other (Fig. 5).....
*Parhelophilus crococroronatus* Reemer, 2000

***Parhelophilus crococroronatus* Reemer, 2000, new to Spain**

DISTRIBUTION (Fig. 3). Known from 9 localities in total, namely the type localities in Portugal and France; 3 additional localities from Portugal (Reemer 2000; Van Eck, 2016) and three from Spain (here presented).

NEW RECORDS: Spain, Huelva, Coto de Doñana, La Rocina, 37°07' N, 6°30' W, 10-IV-2002, leg. W. van Steenis & E.S. Bakker, 2 ♂♂ (WSB); Spain, Murcia, Moratalla, Campo de San Juan, Embalse 'Presa de la Risca', 38°11' N, 2°04' W, on tree foliage, 20-VI-2003, leg. J. van Steenis & M.P. van Zuijlen, 3 ♂♂ (JSA); Spain, Granada, Padul, Lagunas de Padul, 25-VI-2021, 726 m, CEUA00109688, leg. A. Ricarte, 1 ♀ (CEUA-CIBIO).

IDENTIFICATION (Figs 4A–B, 5). With all known keys to hoverfly genera (Van der Goot, 1981; Van Veen, 2004; Bot & van de Meutter, 2019) the species runs to the genus *Parhelophilus*. *Parhelophilus crococroronatus* is very similar to *P. frutetorum* in having a pilose tubercle on the ventro-basal part of the metafemur in males, an entirely yellow protibia and an occiput with long yellow and black pile

intermixed. However, *P. crococroronatus* differs from *P. frutetorum* in the almost entirely yellow pilose frons, which in *P. frutetorum* has both yellow and black pile intermixed; in *P. crococroronatus* male, the metafemur tubercle is less developed, placed more antero-ventrally and the tubercle pile is arranged in a narrow row, while in *P. frutetorum* the tubercle is more developed, placed more ventrally and more evenly pilose, not arranged in a well-defined row; in *P. crococroronatus*, the pollinosity on the terga is more extended, especially on tergum III, where the three maculae are clearly connected, but some of the examined females in this work show how the central and posterior maculae can be narrowly separated (Fig. 5); in *P. frutetorum*, the three pollinose maculae on tergum III are clearly separated from each other and on tergum IV there are large non-pollinose areas. Furthermore, the male genitalia of these two similar species are different, as indicated in Reemer (2000), who figures the genitalia of all four European species.

BIOLOGY. The adult habitat consists of brackish to freshwater areas with open ground along pools with decaying organic matter and stands of *Phragmites* spp., in more-or-less open conditions. Adults visit flowers of *Cistus* spp. Collected from the 8th April to the 25th June (Reemer, 2000; Van Eck, 2016; Speight, 2020; present study). Males fly fast on the outer site of the foliage of trees and shrubs, repeatedly resting on leaves for short periods, showing the same behaviour as in *P. frutetorum*.



Fig. 3.– Known distribution of *Parhelophilus crococroronatus*.

Fig. 3.– Distribución conocida de *Parhelophilus crococroronatus*.

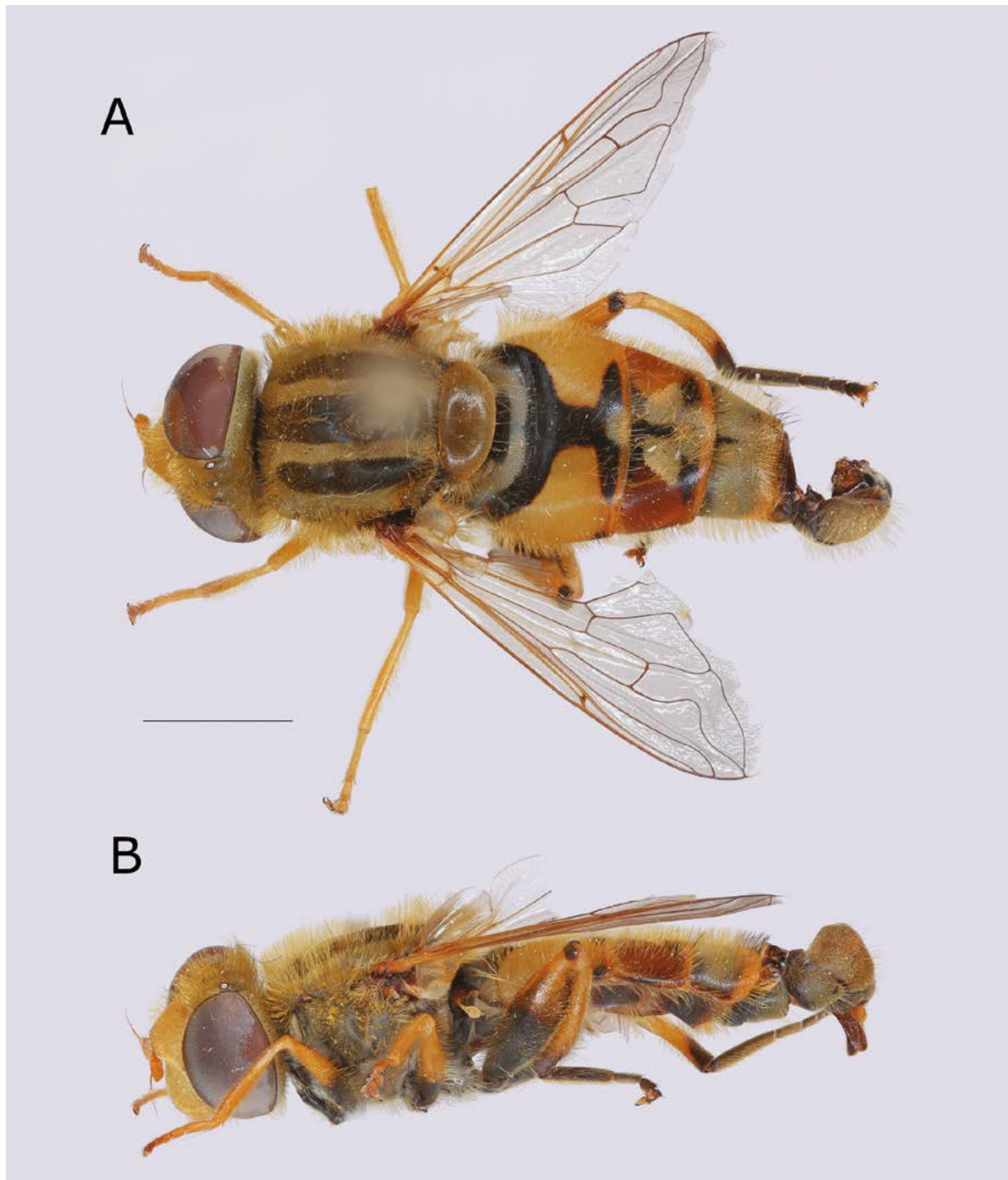


Fig. 4.— Habitus of *Parhelophilus crococroronatus* male, Embalse de la Risca, Spain. (A) dorsal. (B) lateral. Scale bar = 2.5 mm.
 Fig. 4.— Apariencia general del macho de *Parhelophilus crococroronatus*, Embalse de la Risca, España. (A) dorsal. (B) lateral. Escala = 2.5 mm.

Other *Parhelophilus* records from Spain

Parhelophilus frutetorum (Fabricius, 1775)

NEW RECORDS. Prioro (Desf. Conjas), León, 14-VI-1987, sobre *H. spondylium*, CEUA00017659, leg. M.A. Marcos García, 1 ♀ (CEUA-CIBIO) [as *P. versicolor* in Marcos-García (1990)].

Parhelophilus versicolor (Fabricius, 1794)

NEW RECORDS. Spain, Murcia, Moratalla, Campo de San Juan, Embalse 'Presa de la Risca', 38°11' N, 2°04' W, on tree foliage, 20-VI-2003, leg. J. van Steenis & M.P. van Zuijlen, 6 ♂♂, 2 ♀♀ (JSA); Spain, Granada, Padul, Lagunas de Padul, 25-VI-2021, 726 m, CEUA00109683-109687, leg. I. Ballester-



Fig. 5.— Tergum III of a *Parhelophilus crococroronatus* female, Spain, Granada. Scale bar = 1.0 mm.

Fig. 5.— Terguito III de una hembra de *Parhelophilus crococroronatus*, España, Granada. Escala = 1.0 mm.

Torres, 4 ♂♂, 1 ♀ (CEUA-CIBIO); same data as previous, except CEUA00109682, leg. A. Ricarte, 1 ♀ (CEUA-CIBIO).

Discussion

The here presented records of *Parhelophilus crococroronatus* are the first from Spain, although the previous records from Portugal and France made the occurrence in Spain likely. The female reported from Granada is the second known to this species and confirms the variability of certain characters used as diagnostic to separate this from other *Parhelophilus* species.

The reported finding of *Parhelophilus frutetorum* at the CEUA-CIBIO collection confirms the presence of this species in Spain, which was known only from an old record of the nineteenth century (Ricarte & Marcos García, 2017). The new material of *P. versicolor* provides the first evidence of this species to occur in Murcia and Granada provinces, both in the southern half of the Iberian Peninsula. In addition, the re-identification of the specimen of *P. versicolor* from León that turned out to be *P. frutetorum* implied that *P. versicolor* is deleted from the list of species recorded from León province and, in its place, *P. frutetorum* is added to the hoverfly inventory of this province.

The habitat in which *Parhelophilus crococroronatus* was collected in Murcia is most likely destroyed by the flooding of the river valley in which it was collected as most of the drowned vegetation will have been totally decayed by now. The building of a hydro dam in 2002 flooded the area creating a temporary pool with

decaying shrubs and trees formerly found in the river valley. The low water level with plenty of decaying vegetation formed a very suitable habitat for this species larvae. In the course of several years, the valley flooded more and more and the decaying vegetation is likely completely submerged and gone (Segura Hydrographic Confederation, 2020). The building of hydro dams has proven to reduce the quantity and quality of wetland areas (Talukdar & Pal, 2017; Zheng *et al.*, 2019) and in this view the presence of *P. crococroronatus* in the ‘Embalse de la Risca’ is doubtful at present. Nonetheless, the other records (e.g. Granada) suggest that there might be other viable populations of this species throughout Spain, however a better understanding of the current occurrence of the species in Spain is necessary.

The habitat degradation is one of the many threats for the survival of Syrphidae (Ivošević *et al.*, 2021) and hydro dam construction is considered as one of these specific threats for hoverfly biodiversity. Especially in the dry and vulnerable Mediterranean Region, this could lead to the extinction of many species depending on small streams and its specialised flora and fauna (Baffert & Bauer, 2020). Nonetheless, the artificially-generated accumulation of decaying and dead vegetation in the early stage of the dam flooding could have increased the suitable habitat for *Parhelophilus* larvae temporarily, which needs to be confirmed.

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