

Rectification to Mengual (2020) for misidentification of *Paragus flammeus* Goeldlin de Tiefenau, 1971 and new record of *P. vandergooti* Marcos-García, 1986 from Portugal (Diptera, Syrphidae)

Rectificación a Mengual (2020) por identificación incorrecta de *Paragus flammeus* Goeldlin de Tiefenau, 1971 y nuevo registro de *P. vandergooti* Marcos-García, 1986 para Portugal (Diptera, Syrphidae)

MENGUAL (2020; attached as Appendix) reported the first record of the species *Paragus flammeus* Goeldlin de Tiefenau, 1971 (Diptera, Syrphidae) from Portugal. Subsequent consultations with colleagues and comparison with newly available collection material revealed that the Portuguese specimen reported by MENGUAL (2020) from Amarante (specimen code ZFMK-DIP-00070589) belongs to *Paragus (Paragus) vandergooti* Marcos-García, 1986.

Therefore as the specimen of MENGUAL (2020) belongs to *P. vandergooti*, there is no valid record of *P. flammeus* from Portugal at the present time. This correction is important for the species distribution and the checklist of the syrphid fauna from Portugal. Thus, the citation of *P. flammeus* from Portugal based on MENGUAL (2020) by other authors (i.e., VAN ECK *et al.*, 2020) should be avoided.

The distributional range of *Paragus vandergooti* is restricted to the southwest Palaearctic, with records from southern France, Spain, Portugal, and Morocco (SPEIGHT, 2020). In the original description of *P. vandergooti*, MARCOS-GARCÍA (1986) already mentioned the great similarity of the male genitalia between *P. flammeus* and *P. vandergooti*, but there are some differences: the lingula is expanded ventrally in *P. vandergooti* (*P. flammeus* has a straight ventral margin of the lingula, which expands dorsally); the surstylus is elongated in *P. vandergooti* (*P. flammeus* has the surstylus shorter and slightly broader basally); lateral lobes of the aedeagus have each two blunt processes pointed ventrally, with a broad ridge apically (in *P. flammeus* the lateral lobes of the aedeagus have each two sharp-pointed processes pointed ventrally, without an apical ridge); and the profile (in lateral view) of the posterior margin of hypandrium is different, with a

marked protuberance in *P. flammeus* (absent in *P. vandergooti*) (see Fig. 1C in MENGUAL (2020); attached as Appendix). A detailed illustration of the male genitalia of *P. vandergooti* is provided by CLAUBEN (1989) and GOELDLIN DE TIEFENAU (1971) figures the male genitalia of *P. flammeus*.

In Portugal, *Paragus vandergooti* has only been collected from two different districts: in the very south (near Loulé, Faro District) by LUCAS (1996) and from the northeast, close to the border with Spain (Sendím, Bragança District) by VAN ECK (2011). The specimen ZFMK-DIP-00070589 was collected in Amarante, District of Porto, and represents the first record from this District in Northern Portugal and the third specimen ever published of this species for the country.

The second specimen reported by MENGUAL (2020, attached as Appendix) from Sierra de Ancares (specimen code ZFMK-DIP-00067278) belongs to *P. flammeus* as stated by MENGUAL (2020), and represents the first record of this species from the province of Lugo, Spain (RICARTE & MARCOS-GARCÍA, 2017).

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XIMO MENGUAL

Zoologisches Forschungsmuseum Alexander Koenig, Leibniz-Institut für Biodiversität der Tiere, Adenauerallee 160, D-53113 Bonn, Germany. x.mengual@leibniz-zfmk.de

APPENDIX

First record of *Paragus flammeus* Goeldlin de Tiefenau, 1971 (Diptera, Syrphidae) from Portugal**Primera cita de *Paragus flammeus* Goeldlin de Tiefenau, 1971 (Diptera, Syrphidae) para Portugal**

The fauna of Syrphidae from Portugal has been studied and reported in several publications (MARCOS-GARCÍA *et al.*, 2002; RICARTE & LYSZKOWSKI, 2009; RICARTE *et al.*, 2009; VAN ECK, 2011, 2016). So far, nine *Paragus* species are known from Portugal, i.e., *P. albifrons* (Fallén, 1817), *P. bicolor* (Fabricius, 1794), *P. bradescui* Stănescu, 1981, *P. haemorrhous* Meigen, 1822, *P. pecchiolii* Rondani, 1857, *P. quadrifasciatus* Meigen, 1822, *P. strigatus* Meigen, 1822, *P. tibialis* (Fallén, 1817), and *P. vanderghooti* Marcos-García, 1986. RICARTE & MARCOS-GARCÍA (2017) state that *Paragus* Latreille, 1804 is the most diverse genus of the subfamily Syrphinae in Spain with 18 species, and they reported four *Paragus* species from Andorra (*P. haemorrhous*, *P. pecchiolii*, *P. quadrifasciatus*, and *P. tibialis*) and another four species from Gibraltar (*P. bicolor*, *P. haemorrhous*, *P. quadrifasciatus*, and *P. tibialis*).

Paragus (Paragus) flammeus Goeldlin de Tiefenau, 1971 is a small hover fly species (5 mm long) distributed in the Western Palaearctic (GOELDLIN DE TIEFENAU, 1976; SPEIGHT, 2018). It was described from Les Dévens (Vaud, Switzerland) based on a large series of males and females (GOELDLIN DE TIEFENAU, 1971), and it has been reported from Central Europe south to central Spain, eastward to Ukraine and Greece, Caucasus Region, and into the republics of Kazakhstan and Tajikistan (SPEIGHT, 2018). Additionally, *P. flammeus* has been cited from Morocco (SPEIGHT, 2018). RICARTE & MARCOS-GARCÍA (2017) list *P. flammeus* from three Spanish provinces, i.e., León, Pontevedra, and Salamanca. Here the first record of *P. flammeus* from Portugal is reported. The male specimen (Fig. 1A) is deposited at the Zoologisches Forschungsmuseum Alexander Koenig (ZFMK), Bonn (Germany), with the following data labels: “PORTUGAL // Amarante // 2.5.1990 // leg. A. Roth” “ZFMK-DIP-00070589” (Fig. 1B). Another male is also here reported as the first record for the Spanish province of Lugo. This second male has the following information:



Fig. 1. *Paragus (Paragus) flammeus* Goeldlin de Tiefenau, 1971, male from Portugal: A) habitus, dorsal view. Scale = 1 mm; B) labels; C) male genitalia, lateral view.

Fig. 1. *Paragus (Paragus) flammeus* Goeldlin de Tiefenau, 1971, macho capturado en Portugal: A) *habitus*, vista dorsal. Escala = 1 mm; B) etiquetas; C) genitalia masculina, vista lateral.

“Spain/Galicia // Sierra de Ancares // Portelo, 1100m // 02.06.1996, Stuke leg.” “ZFMK-DIP-00067278”. The Sierra de Ancares is located between the two Spanish provinces of León and Lugo, and the village of O Portelo (Lugo) is situated at the border (42°44’20.65”N 6°58’05.98”W).

All photographs were taken with a Canon EOS 7D camera mounted on a P-51 Cam-Lift (Dun Inc., VA, USA) and with the help of Adobe Lightroom (version 5.6), and then stacked using the Zerene Stacker 1.04 (Richland, Washington, USA) software. The male genitalia were detached from the pinned specimen after 12 hours in a relaxing chamber. The genitalia were cleared in a 10% KOH solution for 10 minutes at 56 °C, washed with distilled water for 10 minutes, followed for another wash

with 96% ethanol for 10 minutes. Then, male genitalia were preserved in a microvial with glycerin.

Paragus (Paragus) flammeus is very similar to *Paragus (Paragus) bicolor* but they differ by the presence of fasciae of silverfish pollinosity on abdominal tergites 3 and 4 in *P. bicolor* (absent in *P. flammeus*; see Fig. 1A), females with a characteristic annular bulge on tergite 7 in *P. bicolor* (absent in *P. flammeus*), and by the male genitalia (Fig. 1C) (GOELDLIN DE TIEFENAU, 1971, 1976; MARCOS-GARCÍA, 1985; VAN VEEN, 2010). In *P. flammeus* (male genitalia in lateral view), the postgonites are broader in the dorsal part, each lateral lobe of the aedeagus is more than twice as high as long and has two little processes pointed ventrally, the posterior tip of the aedeagus can be seen between these two processes, and the lingula reaches the level of the more basal process. In *P. bicolor*, the postgonites are not broadened dorsally, each lateral lobe of the aedeagus (male genitalia in lateral view) is as high as long, with only a small process pointed ventrally, and the longer lingula does not reach the level of the process.

SPEIGHT (2018) mentions the thermophilous forest fringes and dry/semi-arid, unimproved grasslands as the preferred environs for *P. flammeus*, and he states that the species can be found from end of May to the end of August. The new record from Portugal is from the beginning of May, broadening the known phenology of the species.

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XIMO MENGUAL

Zoologisches Forschungsmuseum Alexander Koenig, Leibniz-Institut für Biodiversität der Tiere, Adenauerallee 160, D-53113 Bonn, Germany. x.mengual@leibniz-zfmk.de

