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## *Exhyalanthrax collarti* (François, 1962), a new species of Bombyliidae for Portugal (Diptera: Brachycera)

*Exhyalanthrax collarti* (François, 1962), una nueva especie de Bombyliidae para Portugal (Diptera: Brachycera)

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**ABSTRACT:** In this paper, the bee fly *Exhyalanthrax collarti* (François, 1962) is recorded as a new species to the fauna of Portugal, along with new records of the species in Spain. A dichotomous key for the Iberian species of the genus *Exhyalanthrax* Becker, 1916 is also published.

**KEY WORDS:** *Exhyalanthrax collarti* (François, 1962), Bombyliidae, Diptera, Portugal, Spain.

**RESUMEN:** El presente artículo da a conocer el bombílido *Exhyalanthrax collarti* (François, 1962), como nueva especie para la fauna de Portugal, así como nuevas citas de la especie en España. Además, se publica una clave dicotómica para las especies ibéricas del género *Exhyalanthrax* Becker, 1916.

**PALABRAS CLAVE:** *Exhyalanthrax collarti* (François, 1962), Bombyliidae, Diptera, Portugal, España.

### Introduction

The family Bombyliidae, also known as bee flies, contains almost 4800 described species and is one of the largest families of Brachyceran Diptera in the world (EVENHUIS & GREATHEAD, 2015). The adults of most species are very fast and nimble fliers (HULL, 1973; EVENHUIS & GREATHEAD, 2015) and pollinators of various wild and cultivated plant species (AGUADO MARTÍN *et al.*, 2015). They are also parasitoids on the immature stage of other insects (EVENHUIS & GREATHEAD, 2015).

The taxonomic position of *Exhyalanthrax* Becker, 1916 has been rather confusing in the past, with numerous species placed in different genera and subgenera throughout history. Formerly they were placed within the genus *Thyridanthrax* Osten Sacken, 1886. BECKER (1916) created *Exhyalanthrax* as a subgenus of *Villa* Lioy, 1864 for species with extensive hyaline wings. BEZZI (1924) recognized four different groups within *Thyridanthrax*, one of them being the clear-winged species that Becker had included in his *Exhyalanthrax* (HULL, 1973). HESSE (1956) restricted *Thyridanthrax* to the shaggy, fenestrate-winged group of species. He also showed that some species have sexually dimorphic wing infuscations, and this provided the basis for acceptance of *Exhyalanthrax* as a valid genus by BOWDEN (1980).

The genus *Exhyalanthrax*, as it is considered nowadays, consists of medium- to small-sized bee flies within the subfamily Anthracinae that exhibit sexual dimorphism, a conical face and extensive, non-fenestrate wing pattern. 72 species are considered valid worldwide, eight of them are found in Europe (including two Canary endemics) and four in Spain (GREATHEAD, 2013; PAPE & THOMPSON, 2013): *Exhyalanthrax afer* (Fabricius, 1794), *Exhyalanthrax melanchlaenus* (Loew, 1869), *Exhyalanthrax muscarius* Pallas in Wiedemann, 1818 and *Exhyalanthrax collarti* (François, 1962). Of these four species, only *E. collarti* still has not been officially recorded for Portugal (CARLES-TOLRÁ & BÁEZ, 2002) and it is recorded as a new species for this country in this paper.

## Material and methods

*E. collarti* (Fig. 1) is a rather poorly known species. The only reference material available to the authors was a single specimen in the collection of the Museo Nacional de Ciencias Naturales de Madrid (MNCN). This specimen, which is very worn (Fig. 2), fits the description of the species by FRANÇOIS (1962) and its identity was confirmed by dissection of genitalia.



**Fig. 1:** *Exhyalanthrax collarti* (François, 1962). Male in its natural habitat, Las Matas, Madrid, 7-V-2015, (ÁLVAREZ, 2016).

[http://www.biodiversidadvirtual.org/insectarium/Exhyalanthrax-collarti-\(Francois-1962\)-img789003.html](http://www.biodiversidadvirtual.org/insectarium/Exhyalanthrax-collarti-(Francois-1962)-img789003.html)



**Fig. 2:** *Exhyalanthrax collarti* (François, 1962). Female, Torrelodones, Madrid, 22-V-1990. (Photo: Píluca Álvarez Fidalgo)



**Fig. 3:** *Exhyalanthrax collarti* (François, 1962). Male in its natural habitat, Faro, Algarve, Portugal, 9-IV-2010, (JACINTO, 2014).

[http://www.biodiversidadvirtual.org/insectarium/Exhyalanthrax-collarti-\(Francois-1962\)-img623140.html](http://www.biodiversidadvirtual.org/insectarium/Exhyalanthrax-collarti-(Francois-1962)-img623140.html)

The species started to be noticed when photos taken in the wild were uploaded to the website BiodiversidadVirtual.org and were identified. Several images are now available at the site. They include the second known record for Portugal (Fig. 3) (JACINTO, 2014). Besides, most of these photos were taken in provinces of Spain where the species had not been previously recorded.

Recently, a new record from Portugal was provided by Fernando Pires (personal communication). The photo was sent to the first author for identification and turned out to be the first record of the species for Portugal, as the image was taken in 2008 (Fig. 4).



**Fig. 4:** *Exhyalanthrax collarti* (François, 1962). Female in its natural habitat, São Miguel do Pinheiro, Mértola, Beja, Portugal, 1-V-2008. (Photo: Fernando Pires)

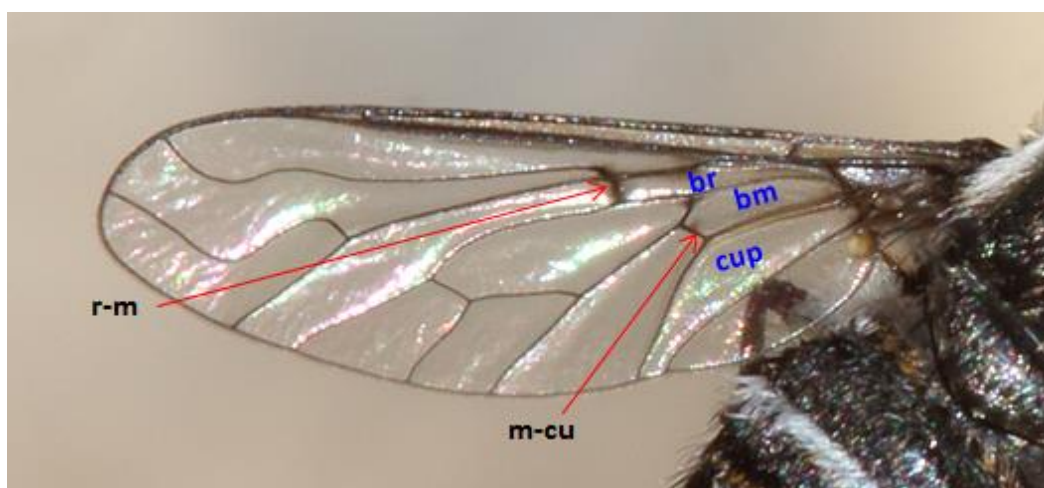
**Recognition:** The genus *Exhyalanthrax* belongs to the subfamily Anthracinae and tribe Villini, which includes the following genera in Europe: *Thyridanthrax*, *Exhyalanthrax*, *Hemipenthes* Loew, 1869 and *Villa*. In Europe and on the Iberian Peninsula, *Thyridanthrax* and *Exhyalanthrax* are the only genera that might lead to confusion. The main morphological differences between *Thyridanthrax* and *Exhyalanthrax* are shown in Table 1, based on the most important characters discussed by GREATHEAD & EVENHUIS (2001).

*E. collarti* can be distinguished easily from other species of the genus by the absence of intense dark colouration in the basal and costal areas of the wings, combined with a mainly glossy black abdomen, which can show bold white pollinose bands on the 1<sup>st</sup> and 3<sup>rd</sup> abdominal segments and two brownish marks on the 7<sup>th</sup> segment (FRANÇOIS, 1962). The white pollinose bands are easily lost but still no other Iberian species of *Exhyalanthrax* has such glossy black areas in the abdomen. The brownish marks are usually hard to see and can be hidden by the pile in fresh specimens.

As many others of the genus *Exhyalanthrax*, this species exhibits sexual dimorphism. In this case it is shown in the wings: males have entirely hyaline wings (except for the most basal area, which can show a slight infuscation and yellowish colouration), whereas females have slightly grayish wings with a variable amount of infuscation in the veins of the basal area (usually more intense on veins r-m and m-cu) and a faint darkish coloration that extends variably into cells br and bm (Fig. 2, Fig. 4 and Fig. 5).

<i>Thyridanthrax</i>	<i>Exhyalanthrax</i>
Flagellum elongate conical with a terminal bristle-like style	Flagellum elongate conical with a well-developed second flagellomere
Face weakly developed	Face strongly developed, conical, often forming an acute angle when viewed in profile
Extensive fenestrated wing pattern	Wing pattern usually reduced (wings even completely hyaline), consisting of a more or less well-developed dark basicostal infuscation, tending to be more extensively developed in females
Apex of epiphallus curled dorsally at apex	Apex of epiphallus flat, usually with a pair of dorsal spines

**Table 1:** Main morphological differences between the genera *Thyridanthrax* Osten Sacken, 1886 and *Exhyalanthrax* Becker, 1916.



**Fig. 5:** Veins and cells of the wing of *Exhyalanthrax* Becker, 1916 mentioned in this work. Red arrows point to the relevant veins, and important cells are named in blue characters.

**Ecology:** *E. collarti* seems to be restricted to open scrubland with a good coverage of short-stemmed flowers where the imagoes are easily spotted (Fig. 6), feeding mainly on Compositae. Larvae are unknown but probably have the same biology as other species of *Exhyalanthrax*, which are known to consume pods of locust eggs and also parasitize Diptera (such as *Glossina* Wiedemann, 1830 and *Calliphora* Robineau-Desvoidy, 1830) and Hymenoptera (DU MERLE, 1975; GREATHEAD, 1980; YEATES & GREATHEAD, 1997).

The flight period for adults starts in April and lasts until June, reaching the peak by mid-May.

## Discussion and results

*E. collarti* is a typical Mediterranean species previously recorded for Spain, Italy and Greece (PAPE & THOMPSON, 2013). The distribution now extends to Portugal, which is not surprising. As there is no information available on the exact distribution of the species on the Iberian Peninsula, the authors collated all known records for the area into one map (Fig. 7), providing a clearer picture of the species' distribution on the Iberian Peninsula. The resulting map includes the record from El Saler (Valencia) by François, the specimen from MNCN, all the records provided by the website BiodiversidadVirtual.org and the personal communication provided by Fernando Pires. Within Spain, the species has been recorded in the provinces of Almería, Ciudad Real, Granada, Huesca, Madrid, Segovia, Soria, Valencia and Zaragoza. In Portugal, the

species is now known from Beja and Faro, the two locations reported in this paper. The image allows the prediction of a Mediterranean distribution extended towards the central-eastern part and southern Atlantic coast of the Iberian Peninsula.



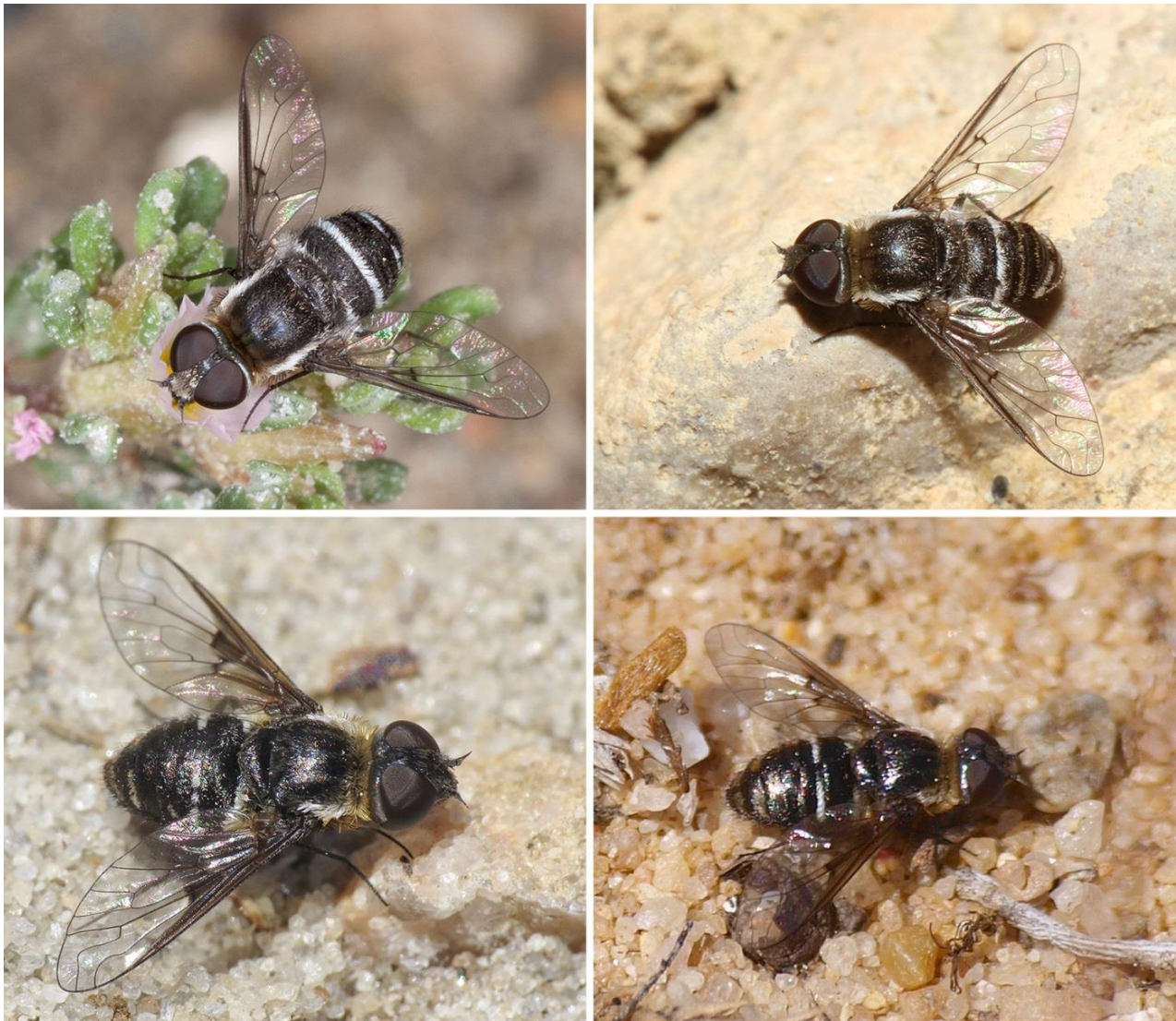
**Fig. 6:** View of a typical habitat where *Exhyalanthrax collarti* (François, 1962) can be found. Mingorrubio, Madrid, Spain. (Foto: Piluca Álvarez Fidalgo)



**Fig. 7:** Updated distribution map for *Exhyalanthrax collarti* (François, 1962) on the Iberian Peninsula, created from literature references and records by nature photographers.

### Key to the identification of the species of *Exhyalanthrax* reported on the Iberian Peninsula

The original description of *E. collarti* requires commenting on. From what is gathered from it, the abdomen hardly has any markings. In François's words, "the abdomen is glossy, without characteristic transverse bands and without yellow and ocher scales except for some scales and some yellowish hairs on the 7th tergite, bearing white scales forming a band only on the sides of tergites 1 and 3. The circumference of the abdomen adorned with black scales, and numerous black, shaggy, rather long hairs". Most of this fits the species shown in the photographs on the website BiodiversidadVirtual.org but for one consideration: wear. The authors have not been able to see the holotype but considering how easily the species of *Exhyalanthrax* lose their scales and hairs, most likely the specimens François described were very worn. In fact, the specimens that have been photographed in the wild range from very worn specimens (Fig. 1, showing only the remaining of the white scales on the side of tergite 3) to specimens with different graduation of bands present on tergites 1 and 3 (sometimes these bands are complete), and even a broken band on the 6<sup>th</sup> tergite, although these are only shown in very fresh specimens. More examples of this variation, depending on the degree of wear, are shown in Fig. 8. The ocher scales on tergite 7 are also easily lost but two dark brownish marks remain, although they are often hard to see. All the rest of the description of *E. collarti* by François fits nicely with the specimens shown on the website BiodiversidadVirtual.org, and so does the flight period.

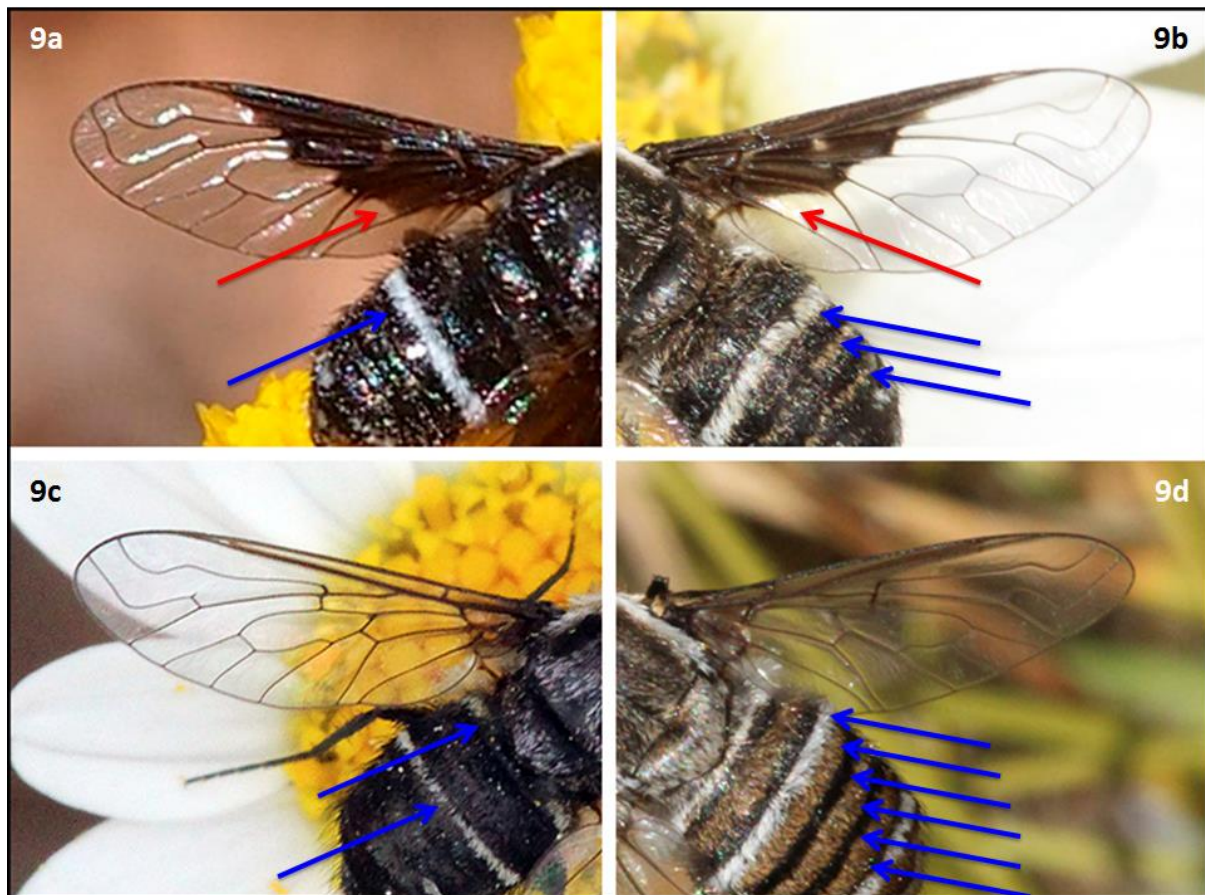


**Fig. 8:** Variation in the degree of wear of the abdominal markings in *Exhyalanthrax collarti* (François, 1962).

The chances of the existence of one or several undescribed species very close to *E. collarti* are extremely low, particularly considering that often it is possible to see specimens with different degrees of

extension of the abdominal bands in the same place and on the same day. After examining the variability in the appearance of the specimens depending on the degree of wear, it seems reasonable to consider the possibility of describing the species again, as the description presented by François does not correspond to a fresh specimen; moreover, the types seem to differ significantly from the real appearance of *E. collarti*. At the same time, examination of specimens under the microscope would be advisable in order to prove that there are no very similar new species, but all these studies are out of the scope of this paper.

To avoid any misunderstanding and while waiting for further studies that rule out the existence of a potential *collarti* complex, the key has been written using characters described by François and also present in the specimens shown in the pictures of the species taken in the wild (Fig. 9).



**Fig. 9:** Wings and abdominal pattern of the four species of *Exhyalanthrax* found on the Iberian Peninsula: a) *Exhyalanthrax melanchlaenus* (Loew, 1869); b) *Exhyalanthrax afer* (Fabricius, 1794); c) *Exhyalanthrax collarti* (François, 1962); d) *Exhyalanthrax muscarius* Pallas in Wiedemann. The red arrows point to the basal part of cup cell and the blue arrows to the diagnostic bands of the abdominal pattern.

- 1(a) At least one third of the basal part of the wing strongly darkened (Fig. 9a and Fig. 9b) ..... 2
- 1(b) Basal part of the wing either entirely hyaline (Fig. 9c and Fig. 9d) or slightly infuscated (Fig. 4) but never strongly darkened ..... 3
- 2(a) Basal half of the cup cell darkened; abdomen with only white transverse bands on black tomentum (Fig. 9a) ..... *E. melanchlaenus* Loew
- 2(b) Cup cell only darkened basally; abdomen with yellow and white transverse bands on black tomentum (Fig. 9b) ..... *E. afer* Fabricius
- 3(a) Abdomen glossy black, with pollinose whitish bands on tergites 1 & 3 and without or very scarce ocher pollinosity (Fig. 9c) ..... *E. collarti* François
- 3(b) Abdomen patterned with ocher, black and white pollinose bands (Fig. 9d) ..... *E. muscarius* Pallas

## Conclusions

*E. collarti* and the other Iberian species in the genus are quite recognizable by external characters once the distinctive features are well established through a dichotomous key. This fact turns out to be an advantage from the point of view of gathering information about the different species, especially about the uncommon ones, as an examination under the microscope is not absolutely necessary and therefore collecting specimens can be avoided. In the particular case of *E. collarti*, the work carried out by nature photographers is remarkable, and has provided very valuable information about unexpected locations where the species is present. These records obtained from photographs taken in the wild have made it possible to get a better idea of the real distribution within the area of study, giving at the same time clues on where the species should be looked for in the future.

Finally, it is worth mentioning that when digital photography and Internet social media platforms are combined, it provides a very powerful way to disseminate photographic records, information and new findings to the wider scientific community. It also allows taxonomists to engage with novices and broaden the appeal of entomology in audiences that might never have considered it interesting.

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