The residency status of *Ischiodon* Sack, 1913, in Europe, with new records of *Ischiodon aegyptius* (Wiedemann, 1830) (Diptera, Syrphidae)

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Abstract. – We provide the first records of *Ischiodon aegyptius* (Wiedemann, 1830) from continental France and report the species from four different departments: Alpes-Maritimes, Gard, Hérault, and Var. We also provide a new record from Corsica. We report the observations indicating that larval development of *I. aegyptius* may be occurring in continental France. Based on these and other recent observations for *Ischiodon* species available on iNaturalist and Spipoll websites, we discuss the current European distribution of the genus and conclude that *Ischiodon* should be recognised as resident in continental Europe.

Résumé. – **Le statut de résidence d'*Ischiodon* Sack, 1913, en Europe, avec de nouvelles mentions d'*Ischiodon aegyptius* (Wiedemann, 1830) (Diptera, Syrphidae)**. Nous signalons pour la première fois la présence d'*Ischiodon aegyptius* (Wiedemann, 1830) en France continentale, avec des observations dans quatre départements : Alpes-Maritimes, Gard, Hérault et Var. Une nouvelle mention est également donnée pour la Corse. Nous rapportons les observations indiquant que le développement larvaire d'*I. aegyptius* pourrait avoir lieu en France continentale. En nous appuyant sur ces éléments et sur d'autres données récentes issues des plateformes iNaturalist et Spipoll concernant le genre *Ischiodon*, nous discutons de sa répartition actuelle en Europe et concluons qu'*Ischiodon* devrait être reconnu comme résident en Europe continentale.

Keywords. – New record, resident, geographic distribution, iNaturalist, aphidophagous, DNA barcoding.

Ischiodon Sack, 1913 (Diptera: Syrphidae) is a relatively small genus, widely distributed in the Afrotropical, Australasian and Oriental regions and southern parts of the Palaearctic. It is absent from the New World, central and northern parts of the

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Palaearctic and various remote oceanic islands (MENGUAL, 2018). *Ischiodon* comprises four described species with dissimilar distributions: *I. feae* (Bezzi, 1912) is endemic of the Cape Verde Islands; *I. astales* Mengual, 2018, is known only from Madagascar; *I. scutellaris* (Fabricius, 1805) is distributed mainly in the Indomalayan and Australasian Regions, but reaches Turkey, Georgia, the Near East, southern Ukraine and Greece; and *I. aegyptius* (Wiedemann, 1830), which occurs in continental Africa, the Near East and southern Europe (MENGUAL, 2018; VUJIĆ & PETROVIĆ, 2024). The larvae of *I. aegyptius* and *I. scutellaris* feed mostly on aphids (Hemiptera: Aphididae), but there are a few records on whiteflies (Hemiptera, Aleyrodidae), thrips (Thysanoptera), and caterpillars (Lepidoptera) (GHORPADÉ, 1981; AGARWALA *et al*., 1984; ROJO *et al*., 2003; VUJIĆ & PETROVIĆ, 2024).

In Europe, both *Ischiodon aegyptius* and *I. scutellaris* occur in the Mediterranean Basin, with records along the coasts of most of the Mediterranean countries. This genus has been reported from the Canary and Balearic Islands, Madeira, mainland Spain, Corsica, Italy, Montenegro, Cyprus, Aegean Islands and mainland Greece in Europe. Nevertheless, for *Ischiodon*, European records are much fewer in number (VUJIĆ & PETROVIĆ, 2024) than the records for other aphidophagous genera, such as *Sphaerophoria* Le Peletier & Audinet-Serville, 1828, *Episyrphus* Matsumura & Adachi, 1917, or *Eupeodes* Osten Sacken, 1877. For instance, in France, *Ischiodon aegyptius* has until now been recorded only from Corsica (LEBARD *et al*., 2019; CORNUEL-WILLERMOZ & LEBARD, 2024). However, apart from the unsubstantiated reference to its occurrence in "France" in REVERTÉ *et al*. (2023) (see Supplementary Material 2 of REVERTÉ *et al*., 2023).

The status of* Ischiodon *as a resident European genus. – The terms resident, transient, vagrant, passage or migrant are used to study the temporal dynamics in ecological communities. IUCN (2024) defines as resident a species which is known or thought very likely to be present throughout the year. Migratory movements of insects are known (for a review on hoverflies, see REYNOLDS *et al*., 2024), but understudied, and they leave an open question regarding the status of species that are not categorised as migrant. The term resident can be confused with native, another term used by the IUCN (2024) that refers to the origin of the taxon and not to its seasonality.

Despite its wide distribution in Europe, the status of *Ischiodon* as a resident European genus has been uncertain. SPEIGHT (2024) says of *I. aegyptius* that "*this species may not be resident, but establishes temporary populations in favourable seasons*", arguing that both species have only been reported in Europe during summer and autumn. The recent European record of a specimen of *I. aegyptius* reared from a larva collected in May in Montenegro (VUJIĆ & PETROVIĆ, 2024) prompted them to suggest that *I. aegyptius* may be present in this country throughout the year, adding that *I. aegyptius* has "*probably become a permanent species in Mediterranean Europe*".

Recognition of* Ischiodon *species. – *Ischiodon* is morphologically similar to *Sphaerophoria* in Europe, as both genera have an elongate parallel-sided abdomen with yellow bands on tergites 2 and 3, a yellow-margined scutum, and males have prominent and globose genitalia. *Ischiodon* differs by having marginal sulcus on the abdominal tergites (absent in *Sphaerophoria*), an entire subscutellar fringe with long hairs (usually not present in *Sphaerophoria* or absent on the posteromedian fourth of the scutellum), a bare metasternum (in *Sphaerophoria* the metasternum has long hairs) and an elongate postpedicel (more than 1.5 times longer than broad) and apically pointed (in *Sphaerophoria* the postpedicel is oval and apically rounded) (VOCKEROTH, 1969; MENGUAL, 2018). Moreover, *Ischiodon* has the meeting point of the wing veins M_1

and R_{4+5} in line with the meeting point of the vein R_{2+3} with the costal vein, whilst in *Sphaerophoria* the meeting point of veins M_1 and R_{4+5} is located more apically than the meeting point of the vein R_{2+3} with the costal vein. Finally, the males of the two species present in Europe, *I. aegyptius* and *I. scutellaris*, have a slender spina on the metatrochanter, which is absent in *Sphaerophoria* males. Mengual (2018) provides an identification key to distinguish the four species. *Ischiodon* is included in the keys to European syrphid genera provided in Speight (2020) and Sarthou *et al*. (2023).

The aim of the present work is to examine the residency status of the genus *Ischiodon* in Europe, using the available biological and distribution data, including the online observations on iNaturalist and Spipoll, a French citizen science program which means "*Suivi photographique des insectes pollinisateurs*". We also report the first observations of the genus *Ischiodon* from continental France and other new *I. aegyptius* records.

Material and methods

A female *Ischiodon* collected in Provence (France), in the autumn of 2023, was the spur for more field and collection surveys, including the search for records conducted on iNaturalist (https://www.inaturalist.org/) and Spipoll (https://www.spipoll.org/). As mentioned in Mengual (2018), females of *I. aegyptius* and *I. scutellaris* cannot be unequivocally identified using morphological characters. This fact and the lack of conspecific males prompted us to molecularly characterize this female for a proper identification (see DNA Barcoding section below).

Online databases. – We used iNaturalist observations as complementary data to understand the current distribution of *Ischiodon* in Europe. A search was performed on 27 November 2024 on the web portal of iNaturalist with the word "*Ischiodon*" and the filter "Europe, incl. Canary Islands and Svalbard". Then, we checked each observation individually to verify if the observation was correctly identified as belonging to the genus *Ischiodon*. Additionally, we searched and checked the observations of Syrphidae on the Spipoll website.

Males of the two *Ischiodon* species occurring in Europe can only be separated from each other using the projection of the hind trochanter, the symmetry of the claws of the fore leg and the shape of the male genitalia. These characters are not visible or available in most of the images representing the iNaturalist or Spipoll observations. In the case of the females, as already mentioned by Mengual (2018), outside Europe, the identification should be based on conspecific males, DNA barcodes and/or collecting locality. Genetic data are also lacking for observations of *Ischiodon* species registered on iNaturalist or Spipoll. In Europe, the sampling locality cannot be relied upon to identify female specimens as *Ischiodon aegyptius* and *I. scutellaris* can be conspecific, e.g., on Samos Island (van Steenis *et al*., 2021). Consequently, all observations on iNaturalist are identified to genus level and we did not try to determine the species represented, although in some cases there are grounds for assuming their identity: e.g., we can assume that all iNaturalist *Ischiodon* observations from the Canary Islands and the Iberian Peninsula can be referred to *I. aegyptius*. But making a similar assumption would not be justified in relation to observations from eastern parts of the Mediterranean Basin. Thus, when we mention new records, we distinguish between specimens studied by us and identified to species level (records) and iNaturalist observations identified to genus level (observations). There is only one exception: the observation from mainland France in Spipoll is identified as *I. aegyptius*, as it is the only species known from the western Mediterranean Basin (the most western record of *I. scutellaris* is from Crete, Greece).

Field work. – Reported observations during the field campaigns during 2022, 2023 and 2024 are of two types: collected specimens using an entomological hand-net (reported with a collector or leg.), or photographed specimens (reported with the observer or obs.). All the observations presented here were made either with an entomological net or with a camera. Morphological identifications were carried out using a Perfex zoom pro 10.55 (16–100×) stereoscope and photographs in the field were taken using different digital equipment: a Canon EOS 70D with a Canon EF 100 mm f/2,8 L IS USM Macro lens (by B. Louboutin), a Samsung Galaxy A22 smartphone (by A. Parret), or a Samsung Galaxy A32 smartphone (by F. Falzon). SPEIGHT (2020) was used to identify the genus and MENGUAL (2018) was used to identify the collected specimens to species.

Morphological terminology follows VAN STEENIS *et al*. (2023). The collected specimens are deposited at the private collection of Thomas Lebard (TLPC, Breil-sur-Roya, France), Bastien Louboutin (BLPC, Montferrier-sur-Lez, France), Alexis Parret (APPC, Montpellier, France), and Josua Savary (JSPC, Bouvines, France). A map (fig. 7) with the French records of *I. aegyptius* was drawn with QGIS 3.22.5-Białowieża (https://qgis.org/) using a background map from www.naturalearthdata.com.

DNA barcoding. – DNA barcoding (HEBERT *et al*., 2003a, 2003b) was performed to identify a female specimen collected in September 2023. One leg from the dry pinned specimens was used for DNA extraction. DNA extraction, purification, sequencing protocols, and editing were carried out as described in ROZO-LOPEZ & MENGUAL (2015) and BOT *et al*. (2022). Public sequences of *Ischiodon* longer than 600 bp available at BOLD (https://www.boldsystems.org/index.php; accessed on 28 November 2024) were downloaded. Together with the newly obtained sequence, an alignment of the COI sequences without gaps or stop codons using Geneious Prime 2022.1.1 (Biomatters Ltd.) was produced. A distance-based Neighbour-Joining (NJ) analysis was done using the Jukes-Cantor Model as implemented in the software Geneious Prime 2022.1.1 (Supplementary material, fig. S1). The DNA barcode of *Scaeva pyrastri* (Linnaeus, 1758) (GenBank accession number MN622054) was constrained as the root for the NJ tree and additional DNA barcodes for *Pseudodoros nigricollis* Becker, 1903 and *Simosyrphus grandicornis* (Macquart, 1842) were also included. Bootstrap support values (BS) were estimated from 1000 replicates directly from Geneious Prime. Pairwise percentage identity, computed as the sum of the identical nucleotides in the alignment divided by the total number of the alignment nucleotides using Geneious Prime, is given in the Supplementary material, table S2.

RESULTS

In this section, we report the results from the DNA barcoding, followed by the *Ischiodon* records from the field campaigns and comments on the biology. Finally, a review of the known distribution of *Ischiodon* species in Europe is given, incorporating the results of our searches in iNaturalist and Spipoll.

Ischiodon aegyptius (Wiedemann, 1830) (fig. 1–7, S1)

DNA barcoding. – The 5′-end of the cytochrome oxidase subunit I (COI) gene was obtained for the female from Le Lavandou (ZFMK-TIS-8028451); GenBank accession number PQ735280. The sequence of 658 bp has an uncorrected pairwise distance of less than 0.014 (= 1.4% difference) with DNA barcodes of *I. aegyptius* from several

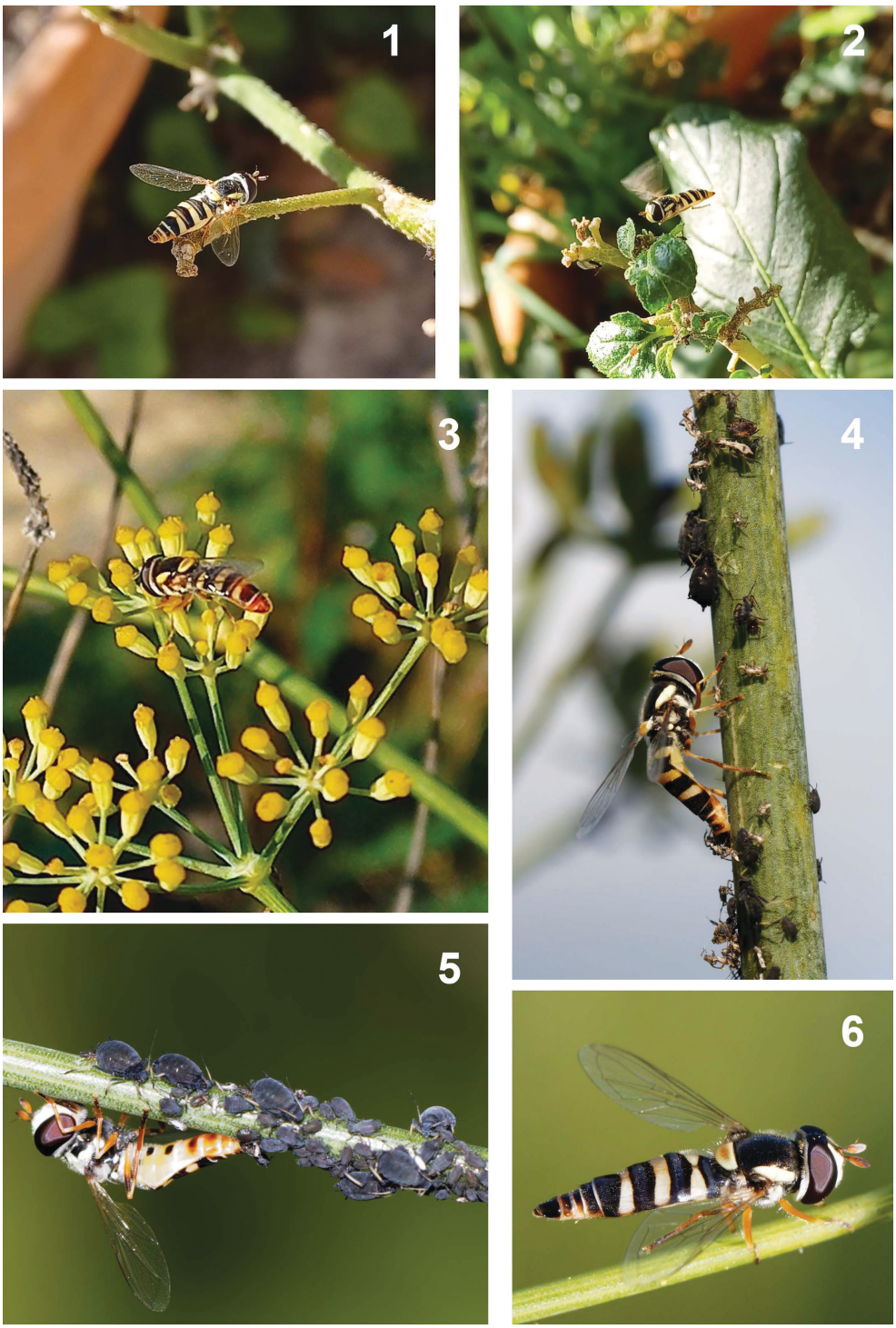

Fig. 1-6. – *Ischiodon aegyptius* (Wiedemann, 1830) recorded in continental France. **– 1-2**, ♀, Alpes-Maritimes, Pégomas, 13.X.2023. *(Photos: F. Falzon)*. **– 3**, ♂, Hérault, Prades-le-Lez, 15.XI.2024. *(Photo: A. Parret)*. **– 4–6**, Female laying eggs, Hérault, Montferrier-sur-Lez, 8.XI.2023. *(Photos: B. Louboutin)*.

African countries (Algeria, Angola, Benin, Botswana, Egypt, Kenya, Mozambique, Tanzania, Togo, South Africa), Saudi Arabia and Spain [retrieved from BOLD; https://boldsystems.org/]. Interestingly, all available DNA barcodes of *I. aegyptius* are clustered together with high support (BS = 99.3%; Supplementary material, fig S1), whilst the DNA barcodes of *I. scutellaris* cluster together with a high support (BS = 85.7%).

New records. – **France**. ALPES-MARITIMES. 1 ♀, Pégomas, 43.585026°N 6.920347°E, 13.X.2023, F. Falzon obs., T. Chassagnard det. – CORSE DU SUD. 1 ♀, Propriano, 41.65858°N 8.89446°E, 18.IX.2024, on fennel inflorescence, AEROBIO_PR obs., B. Louboutin det. [https://www.spipoll.org/spipoll/observation/focus/739953]. – GARD. 1 ♂, Aiguèze, 44.298972°N 4.5698869°E, 31.VII.2022, inflight, close to the Ardèche River, J. Savary leg. & det., JSPC. – HÉRAULT. 1 ♀, Lattes, 43.565662°N 3.912086°E, 28.X.2023, hovering in front of nettles infested with aphids, T. Chassagnard obs. & det.; 1 ♂, Montferrier-sur-Lez, 43.680745°N 3.8755133°E, 27.X.2023, on fennel (*Foeniculum vulgare* Mill.) inflorescence, B. Louboutin leg. & det., BLPC; 1 ♀, Montferrier-sur-Lez, 43.680745°N 3.8755133°E, 8.XI.2023, laying eggs on fennel with aphid colonies, B. Louboutin obs. & det.; 1 ♂, Prades-le-Lez, domaine de Restinclières, 43.716747°N 3.858748°E, 25.X.2023, on fennel inflorescence, A. Parret leg. & det., APPC; 1 ♂, Prades-le-Lez, domaine de Restinclières, 43.716747°N 3.858748°E, 27.X.2023, on fennel inflorescence, A. Parret obs. & det.; 1 ♂, 1 ♀, Prades-le-Lez, domaine de Restinclières, 43.716747°N 3.858748°E, 31.X.2023, on fennel inflorescence, A. Parret obs. & det.; 1 ♂, Prades-le-Lez, domaine de Restinclières, 43.716747°N 3.858748°E, 15.XI.2024, A. Parret obs. & det. – VAR. 1 ♀, Le Lavandou, 43.169012°N 6.427117°E, 29.IX.2023, along a road in *Quercus suber* forest/shrub, T. Lebard leg. & det., ZFMK-TIS-8028451, TLPC.

Spain. CANARY ISLANDS. 3 ♂, 1 ♀, Lanzarote, Playa Blanca, Hotel Sandos Atlantic Gardens, 28.862252°N 13.847300°W, 21.VIII.2023, J. Savary leg. & det., JSPC.

Biology. – A female was collected in a forest/shrub of *Quercus suber* L. in Le Lavandou. At Montferrier-sur-Lez, several specimens were observed or collected on fennel (*Foeniculum vulgare* Mill.) inflorescence in an abandoned cultivation, now changed into an herbaceous wasteland colonized by numerous fennel plants. At this locality, a female was observed laying eggs (fig. 4–6) on fennel with colonies of the aphid *Aphis fabae* Scopoli, 1763, or *A. solanella* Theobald, 1914. Both species of aphids were treated until recently as subspecies of *A. fabae*, but our identification is not conclusive. On 2023, November 13th, a couple of syrphid larvae were collected, but not reared into adults. Based on their DNA barcodes, they belong to *Platycheirus scutatus* (Meigen, 1822) [molecular results not shown].

No *Ischiodon* specimen was observed in the Hérault region in spring and summer 2024, but again in November 2024 at Prades-le-Lez, in Domaine de Restinclières, at the same location as in 2023.

Distribution of* Ischiodon *in Europe. – Our search on iNaturalist resulted in 178 observations of the genus *Ischiodon* (see Supplementary material, Table S1). Most of the observations come from the Canary Islands, Madeira, and southern Spain, but there are records from mainland Portugal, Malta, Italy (Linosa Island), Crete and mainland Greece. Additionally, one observation was from Austria, significantly further north than the previously northernmost record reported (VUJIĆ & PETROVIĆ, 2024) from Montenegro.

Ischiodon aegyptius has been previously reported from the Canary Islands, more precisely from the islands of Fuerteventura, Gran Canaria, Tenerife and La Palma (LECLERCQ, 1975; BÁEZ FUMERO, 1977; RICARTE & MARCOS-GARCÍA, 2017; BURT & MENGUAL, 2018 and references therein). On iNaturalist, there are observations from Lanzarote,

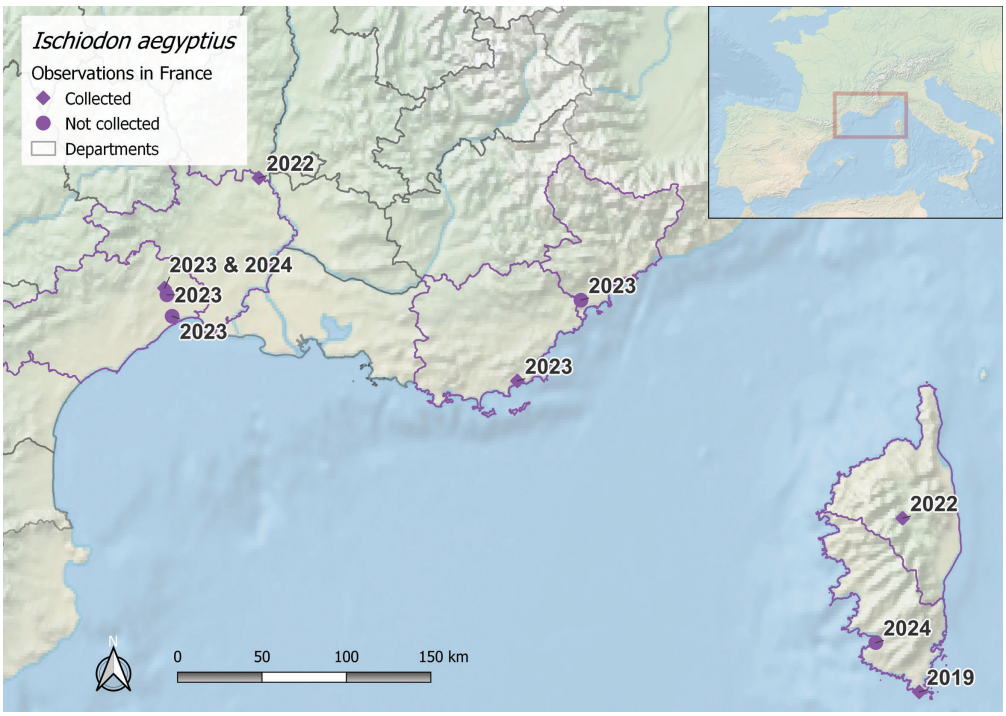

Fig. 7. – Records of *Ischiodon aegyptius* in France, indicating the year of the observation. French departments marked in purple denote departments with records of *I. aegyptius*.

Gomera, and El Hierro (table SI), and our specimens from Playa Blanca are the first records from Lanzarote.

In the Iberian Peninsula, *I. aegyptius* has been reported from Barcelona (Andreu, 1926), Gibraltar, Almería, and Cádiz (Pedersen, 1971; Carles-Tolrá & Aguirre-Segura, 2007; Ricarte & Marcos-García, 2017 and references therein). Recent studies on the hoverfly fauna from Portugal list this species only from the Madeiran Archipelago (Borges *et al*., 2008; van Eck, 2011, 2016; van Eck *et al*. 2020). However, our search in iNaturalist showed several *Ischiodon* observations from mainland Portugal (Algarve Region, Alentejo Region, Setúbal Peninsula, West and Tagus Valley) and from additional Spanish provinces (Cádiz, Sevilla, Málaga, Granada, Almería, Madrid, Murcia, Alicante, Castellón, Tarragona, Barcelona, and Girona) (Table SI). In the Balearic Islands, this species is known from San Agustin, Ibiza. Two females were reported by Gil Collado (1932) collected on 1931, October 1st (Compte-Sart, 1958), indicating that the two females differed in the pattern of the second abdominal tergite: one female presented a yellow band, and the second female two yellow spots. This variation is also noted by Mengual (2018). In iNaturalist, there is an *Ischiodon* observation from Mallorca (see table SI).

From continental France, specimens of *I. aegyptius* are now reported from four different departments: Alpes-Maritimes, Gard, Hérault, and Var. These are the first records and observations from mainland France, as the species has only been recorded from Corsica so far. The first record of *I. aegyptius* on this island was a male collected in Pertusato, near Bonifacio (Lebard *et al*., 2019). The second record comes from Corte, around 100 km north of Pertusato (Cornuel-Willermoz & Lebard, 2024). Our new

record from Propriano is near 40 km NW of Pertusato. No observations from France are listed on iNaturalist.

From Italy, there are three published records of *I. aegyptius*, one from Lampedusa Island (Birtele *et al*., 2010), and two from mainland Italy not reported by Vujić & Petrović (2024). The first is dated from 1950 from the surroundings of Rome (Caffarella) (Daccordi & Sommaggio, 2002; Sommaggio, 2005), and the second one is reported by Lorenzato *et al*. (2024) from Veneto, northern Italy. On iNaturalist, there is an *Ischiodon* observation from the island of Linosa (Pelagie Islands), between Sicily and the coast of N. Africa, and another observation from Malta (first record of *Ischiodon* in this country; Ebejer & Gatt, 2021).

In the eastern part of the Mediterranean Basin, *I. aegyptius* has been recently found in Montenegro (Vujić & Petrović, 2024). *Ischiodon aegyptius* has also been reported from Cyprus (van Steenis *et al*., 2019) and from the Greek island of Samos (van Steenis *et al*., 2021).

Ischiodon scutellaris is more broadly distributed in the eastern Mediterranean Basin, with published records from mainland Greece (Rhodope Mountains and Evros) and from the islands of Crete, Chios, Lesvos, Iraklia, and Samos (De Courcy Williams *et al*., 2011; Likov, 2018; Vujić *et al*., 2020; van Steenis *et al*., 2021). In iNaturalist, there are *Ischiodon* observations from Cyprus and Greece (Crete, Peloponnese, Athens, Evia, and Chalkidiki). *Ischiodon scutellaris* has also been reported from Ukraine (Mielczarek *et al*., 2010; Prokhorov, 2024). Vujić & Petrović (2024) provided a map with all the published records in the Mediterranean Basin, including non-European countries.

Discussion

Known distribution. – The observations of *Ischiodon* from iNaturalist present a much broader distribution of this genus in Europe than the records published elsewhere (see Supplementary material, table SI). Almost all European countries bathed by the Mediterranean Sea have records or observations of this genus, except for some of the northern countries of the Balkan Peninsula. With these iNaturalist observations, we were able to corroborate the presence of this genus in mainland Portugal and mainland France that Reverté *et al*. (2023) indicated based on "… *unpublished data and the knowledge from a large set of taxonomists and ecologists*". We guess that the presence of *I. aegyptius* from Sicily listed by Reverté *et al*. (2023) refers to those records from Lampedusa Island (Birtele *et al*., 2010), which belongs to the province of Agrigento in the Sicily Region, and not to the island of Sicily. Our survey adds a new record for the Sicily region from an iNaturalist observation on the island of Linosa.

Residency status of* Ischiodon *in Europe. – The IUCN Red List of Threatened Species is defined as "*the global standard for assessing the risk of extinction that individual species of animal, fungus, and plant face*" (IUCN 2025). The spatial data is a vital component of The IUCN Red List of Threatened Species and the seasonality of a taxon is coded as Resident, Breeding Season, Non-breeding Season, Passage, or Seasonal Occurrence Uncertain (IUCN, 2024). In their standards, a resident species is defined as a taxon that is known or thought very likely to be present throughout the year (IUCN, 2024).

Our new records of *I. aegyptius* demonstrate the presence of this species in continental France at least from July to November, and the records from Corsica are

from September and October. In the Canary Islands, *Ischiodon* adults are recorded all year round and, based on iNaturalist observations, there are records of adult flies of *I. aegyptius* from January to November in the Iberian Peninsula (see Supplementary material, Table SI). Following the definition provided by the IUCN (2024), *Ischiodon aegyptius* should be considered resident in Europe, and we recommend it be treated as such in the development of taxonomic tools (see Ståhls *et al*., 2022, 2024) for monitoring insects in Europe (Potts *et al*., 2021) or red lists (e.g., Vujić *et al*., 2022).

Resident status does not imply that *Ischiodon* species cannot "*repeatedly establish temporary populations that may, or may not, survive from one year to the next in Europe*" as argued by Speight (2024). It might be that the real situation is a combination of resident populations and short-lived populations originating from individuals derived from outside Europe.

Migratory movements of hoverflies are well-known but understudied (for a review, see Reynolds *et al*., 2024). One way to "repeatedly establish temporary populations" is migration, but *Ischiodon* has not been reported as a migrant in the published literature up to now (e.g., Fisler & Marcacci, 2022; Hawkes *et al*., 2022; Hawkes *et al*., 2024). The number of European records of this genus is relatively low and this could explain the absence of *Ischiodon* in these migratory reports. Similarly, a lack of studies of the syrphids arriving off the sea along the Mediterranean coast of countries like France limits the data on potential migration from North Africa.

Biological aspects. – Our observation of a female laying eggs indicates that the potential exists for *Ischiodon* larvae to develop in France, although we do not know yet if the eggs become viable adults. Similarly, observations demonstrate the presence of adult insects of *Ischiodon* species in the Iberian Peninsula almost every month of the year, which arguably shows the presence of a permanent population, given that the generation time for both European *Ischiodon* species is only four or five weeks. To explain the perennial presence of *Ischiodon* otherwise would necessitate arguing for migration of the species to the Iberian Peninsula almost every month of the year, although there is apparently a general lack of direct observations of migratory behaviour by *Ischiodon* species.

Immature stages of *I. aegyptius* have been described (Da Silva Barbosa, 1953; Tawfik *et al*., 1974; Láska *et al*., 2006), as well as those of *I. scutellaris* (Lal & Gupta, 1953; Láska *et al*., 2006), and their potential as biocontrol agents has been studied (Singh & Mishra, 1988; Joshi *et al*., 1998; Malik, 2006; Sharanabasappa *et al*., 2007; Ali *et al*., 2009, 2010; Saethre *et al*., 2011; Tepa-Yotto, 2013; Joshi & Ballal, 2013; Faheem *et al*., 2019; Udayakumar *et al*., 2023). Vujić & Petrović (2024) suggested that *Ischiodon* may be a good candidate for biological control in Europe. But insufficient is yet known about the biology of these species in Europe, their interactions with other native species and the survival ratio of their offspring to evaluate their potential in this regard. So far, the study of this genus in Europe has been rather neglected.

Online sources of distribution data like iNaturalist have been available for a little more than 15 years. *Ischiodon* has been included in only a few European keys to syrphid genera, or regional monographs, especially before 25 years ago. So, is the recent increase in records of *Ischiodon* species from Europe due to better recognition of the genus or an expansion of the range of the species? Lack of discovery of European *Ischiodon* specimens in collections from the last century implies that the increase in records recently is due to range expansion. That expansion of the genus *Ischiodon*

in Europe may have multifactorial reasons and it is beyond the aims of this study. Anthropogenic activities such as change in land use and increased production of crops with which *Ischiodon* species are associated elsewhere (e.g., cotton, maize, squashes), where the prey of *Ischiodon* larvae can be found, may help in the establishment of the genus, together with the current climate change (IPPC, 2023). The known distribution of the *Ischiodon* species prompts us to consider at least *I. aegyptius* as a resident species in Europe as defined by the IUCN (2024). The study of the interactions of both *Ischiodon* species with native species, their predation and survival rates in Europe, and monitoring their distribution are future tasks to assess their potential in pest management, pollination and other ecosystem services in Europe.

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Supplementary material. – Supplementary material is available at https://lasef.org/BSEF/2379_Mengual_et_al_SM.zip.

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