



## Contribution to the knowledge of the Pipunculidae fauna of Corsica, with 25 first species records for the island (Diptera)

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**Abstract.** - As part of the expeditions *Our Planet Reviewed in Corsica 2019-2021*, 29 species of big-headed flies (Diptera, Pipunculidae) were collected with a vast array of sampling methods. Twenty-five species are reported for the first time from the island. The most successful collecting methods proved to be Malaise traps and yellow pan traps with 15 and seven species, respectively. Particularly valuable are the occurrence data of *Chalarus zyginae* Jervis, 1992, *Eudorylas bermeri* Kehlmaier, 2005, *Eudorylas falcifer* De Meyer, 1997, *Eudorylas ibericus* Kehlmaier, 2005 and *Pipunculus dimi* Kuznetsov, 1991.

**Résumé.** - **Contribution à la connaissance de la faune des Pipunculidae de Corse, avec 25 espèces nouvelles pour l'île (Diptera).** Dans le cadre des expéditions *La Planète Revisitée en Corse 2019-2021*, 29 espèces de Pipunculides (Diptera, Pipunculidae) ont été collectées avec un vaste éventail de méthodes d'échantillonnage. Vingt-cinq espèces ont été répertoriées pour la première fois dans l'île. Les piègeages les plus efficaces se sont avérées être les pièges Malaise et les pièges colorés jaune, avec respectivement 15 et sept espèces. Les données d'occurrence les plus remarquables sont celles de *Chalarus zyginae* Jervis, 1992, *Eudorylas bermeri* Kehlmaier, 2005, *Eudorylas falcifer* De Meyer, 1997, *Eudorylas ibericus* Kehlmaier, 2005 et *Pipunculus dimi* Kuznetsov, 1991.

**Keywords.** - Big-headed flies, *Our Planet Reviewed*, first records, Mediterranean region, trap collecting.

The family of big-headed flies or Pipunculidae consists of 1,484 species according to MOTAMEDINIA *et al.* (2022) and its members are parasitoids of various families of Auchenorrhyncha (Hemiptera), including cicadas, leafhoppers, and planthoppers. There is only one known exception, i.e., the genus *Nephrocerus* Zetterstedt, 1838, that is a parasitoid of Tipulidae (KOENIG & YOUNG, 2007). Individuals are difficult to identify since there is a great amount of intraspecific variation and a lack of distinct external diagnostic characters. Therefore, the male genital apparatus of almost all species has to be dissected and studied under large magnification to achieve a reliable identification, while females of many species can be identified by the shape of their terminalia (ovipositor).

The Mediterranean fauna is poorly known with a limited number of publications and a short species list (KEHLMAYER, 2010; KEHLMAYER *et al.*, 2019). Only 13 species were reported from Corsica before the present study (GROOTAERT & DE MEYER, 1986; KEHLMAYER, 2005; KEHLMAYER *et al.*, 2019; PAPE *et al.*, 2015). The main reasons for this status are the particularly difficult species boundaries in this area (genera like *Tomosvaryella* Aczél, 1939, have extraordinary variations in the male genitalia) and the presence of an overlap of different distributional areas, and influences from the Middle East, North Africa, Central and Western Europe.

### MATERIAL AND METHODS

The material treated in the present paper is the result of collecting activities during the *Our Planet Reviewed in Corsica 2019-2021* expeditions led by the Muséum national d'Histoire naturelle (MNHN, Paris, France). TOUROULT *et al.* (2023) describe the general framework, studied areas, sampling methodologies, and preliminary results of this survey. Nineteen sites in the north and southeast of the island were surveyed according to a semi-standardized protocol, and a large-scale trapping scheme was organized in three sites. Sampling efforts mainly focused on forested habitats at higher altitudes (2019) and on coastal dune and marshland habitats (2021). They included a vast array of methods to collect invertebrates, with a special effort on flight-interception traps and pan traps. Two Diptera experts were actively involved in fieldwork activities, i.e., the second author (MP) as Diptera coordinator and taxonomic expert of Dolichopodidae, and Thomas Lebard as taxonomic expert of Syrphidae/Stratiomyidae. During 2019 and 2021 the Diptera coordinator concentrated sampling efforts on the use of pan traps, while both researchers also used sweep nets for collecting. In each of these years (23-30.VI.2019, 18-26.V.2021), a total of 16 sampling sites at four different locations were selected for pan trapping. In each site, five trap units were operational for 3-4 days. A trap unit is composed of one blue, one yellow and one white plastic bowl (inner diameter 15 cm, depth 4 cm), that are installed close together at soil surface level. Traps are fixed to the soil with metal pins and filled for two thirds with a mild formalin solution and detergent. In 2019, this approach was applied in the mountainous region of Alta Rocca (south) whereas lowland marshes and dune habitats were investigated in this way in the coastal area of southeast Corsica in 2021. Pipunculid samples were disseminated by the Diptera coordinator of the expedition (MP) to the taxonomic expert (MF). The identification of the specimens was carried out by the first author (MF), using the following identification keys: GROOTAERT & DE MEYER (1986), DE MEYER (1989), ALBRECHT (1990), DE MEYER (1997), FÖLDVARI & DE MEYER (2000), KEHLMAYER (2005, 2006, 2008), KEHLMAYER & ASSMANN (2008) and KEHLMAYER & ANDRADE (2016). The nomenclature follows MOTAMEDINIA *et al.* (2022). After identification, the pipunculid specimens will be deposited in the collections of the Muséum national d'Histoire naturelle in Paris, France (cfr. agreement between taxonomic experts and the MNHN, see TOUROULT *et al.*, 2023).

**Abbreviations.** – **BPT**, blue pan traps; **COS**, collected on sight; **MSW**, collected by sweep net and full sample stored in collecting jar for sorting; **MT**, Malaise trap; **PT**, pan traps (of various colours); **SW**, collected by and specimens individually retrieved from sweep net; **WPT**, white pan traps; **YPT**, yellow pan traps.

## RESULTS

The entire *Our Planet Reviewed in Corsica 2019-2021* expeditions produced 876 samples that contained Diptera, including 57 samples with 120 Pipunculidae. Most of these samples ( $n = 20$ ) were collected with yellow pan traps, whereas most specimens ( $n = 38$ ) were retrieved from Malaise trap samples. Yellow pan traps ( $n = 33$ ) attracted significantly more Pipunculidae than white ( $n = 7$ ) and blue pan traps ( $n = 5$ ).

The following list includes all species collected during the above-mentioned expedition, with information on their distribution range in the Palaearctic region and beyond (PAPE *et al.*, 2015), and a short description of important diagnostic morphological characters. Species records below are given in the following format: Corsican Department: number of males/females, locality, location, latitude, altitude, collecting date/period, collecting method, collector's name (sample code). Detailed species records will be uploaded to GBIF as part of a Diptera dataset of the expedition.

### *Cephalops vittipes* (Zetterstedt, 1844)

First record for Corsica.

**Material examined. - Corse-du-Sud:** 1 ♂, 3 ♀, Serra-di-Scopamène et Sorbollano, Campu di Bonza, 41.771833°N, 9.123306°E, 893 m, 23-27.VI.2019, YPT, Marc Pollet (FR-COR/2019/080); 1 ♂, same location, 41.771833°N, 9.123306°E, 893 m, 23-27.VI.2019, WPT, Marc Pollet, (FR-COR/2019/081); 1 ♂, same location, 41.772639°N, 9.121056°E, 920 m, 23-27.VI.2019, BPT, Marc Pollet (FR-COR/2019/088); 1 ♀, same location, 41.752178°N, 9.117451°E, 928 m, 23-27.VI.2019, YPT, Claire Villemant (FR-COR/2019/191); 1 ♀, Serra-di-Scopamène, Castellu d'Ornucciu, 41.833279°N, 9.157206°E, 1631 m, 26.VI.2019, SW, Claire Villemant (FR-COR/2019/194); 1 ♀, Sorbollano, 41.770263°N, 9.124917°E, 891 m, 23-27.VI.2019, YPT, Romain Le Divelec (FR-COR/2020/013/MNHN); 2 ♀, same locality, 41.768922°N, 9.125872°E, 875 m, 23-27.VI.2019, YPT, Romain Le Divelec (FR-COR/2020/014/MNHN); 1 ♀, same locality, 41.769093°N, 9.125581°E, 877 m, 23-27.VI.2019, YPT, Romain Le Divelec (FR-COR/2020/015/MNHN); 1 ♀, same locality, 41.768767°N, 9.125758°E, 875 m, 23-27.VI.2019, YPT, Romain Le Divelec (FR-COR/2020/016/MNHN); 2 ♂, Sorbollano, Campu di Bonza, 41.769867°N, 9.124927°E, 890 m, 22.II-6.VI.2020, MT, Eddy Poirier, Rémy Poncet & Julien Touroult (FR-COR/2020/147/MNHN); 1 ♀, same location, 41.769867°N, 9.124927°E, 890 m, 6-16.VI.2020, MT, Eddy Poirier, Rémy Poncet & Julien Touroult (FR-COR/2020/148/MNHN).

**Distribution.** - A widely distributed species thus far recorded from many countries in Europe from Finland through Poland to the French mainland.

**Diagnosis.** - Individuals can be recognised by the r-m vein being close to the base of the discal cell. Males have a dark postpronotum, while the female ovipositor has an equally long base and piercer and latter with a tubercle dorsally.

### *Cephalosphaera furcata* (Egger, 1860)

**Material examined. - Corse-du-Sud:** 1 ♀, Serra-di-Scopamène, Castellu d'Ornucciu, 41.832944°N, 9.15725°E, 1580 m, 26-30.VI.2019, WPT, Marc Pollet (FR-COR/2019/145).

**Distribution.** - A widely distributed species recorded from many countries in Europe from Finland through Poland to Spain and the French mainland, and previously reported from Corsica by KEHLMAYER *et al.* (2019).

**Diagnosis.** - Individuals can be recognised by the dark lateral fan of hairs on the first abdominal segment. Females have an ovipositor that is straight above and features a protuberance.

*Cephalosphaera germanica* Aczél, 1940

First record for Corsica.

**Material examined.** – **Corse-du-Sud:** 1 ♀, Serra-di-Scopamène, Castellu d'Ornucciu, 41.832944°N, 9.15725°E, 1580 m, 26-30.VI.2019, BPT, Marc Pollet (FR-COR/2019/146). **Haute-Corse:** 1 ♂, Ventiseri, littoral zone of the Airbase BA 126, 41.909958°N, 9.408211°E, 2 m, 7-25.V.2021, Eddy Poirier (FR-COR/2021/307/MNHN).

**Distribution.** – A widely distributed species thus far recorded from multiple countries in Europe, from Finland through Hungary to Spain, and the French mainland.

**Diagnosis.** – Individuals can be recognised by the pale lateral hairs on the first abdominal segment. Males have an oval shaped membranous area on the last abdominal segment and long, slender surstyli, while females have an ovipositor that is concave dorsally and lacks a protuberance.

*Chalarus brevicaudis* Jervis, 1992

First record for Corsica.

**Material examined.** – **Haute-Corse:** 1 ♀, Olmi-Cappella, Tartagine, forest house, 772 m, 42.493393°N, 8.992933°E, 772 m, 2-05.VII.2019, YPT, Claire Villemant (FR-COR/2020/036/MNHN).

**Distribution.** – The species has thus far been reported from Finland through Germany to Spain and Italy, and is present on the French mainland.

**Diagnosis.** – Females have a very characteristic ovipositor with a round base and a very short piercer.

*Chalarus immanis* Kehlmaier, 2008

First record for Corsica.

**Material examined.** – **Haute-Corse:** 1 ♂, Ventiseri, littoral zone of the Airbase BA 126, 2 m, 41.914497°N, 9.411159°E, 126 m, 6-25.V.2021, Eddy Poirier (FR-COR/2021/294/MNHN); 1 ♂, same location, 41.909222°N, 9.409187°E, 1 m, 7-25.V.2021, Eddy Poirier (FR-COR/2021/306/MNHN).

**Distribution.** – The species has thus far been reported from the Western and Eastern Palaearctic (Belgium, Germany, Finland, Japan) as well as from the Oriental region (Singapore).

**Diagnosis.** – This species can best be recognized by the shape of its inner male genitalia with the phallic processes absent and the lower two ejaculatory ducts distinctly set back to the base of the membranous tip of the distiphallus (KEHLMAYER & ASSMANN, 2008).

*Chalarus pughi* Coe, 1966

First record for Corsica.

**Material examined.** – **Corse-du-Sud:** 2 ♀, Zonza, Samulaghia, 41.761617°N, 9.227633°E, 1209 m, 24-28.VI.2019, YPT, Marc Pollet (FR-COR/2019/096).

**Distribution.** – The species has thus far been reported from Finland through Germany to Spain, and is present on the French mainland.

**Diagnosis.** – The females can be identified by the longer tergite 9 of the ovipositor, which is therefore more curved; the eyes have large ommatidial facets making the frons at its narrowest point less than twice the diameter of the largest ommatidial facet.

*Chalarus spurius* (Fallén, 1816)

**Material examined.** – **Corse-du-Sud:** 1 ♀, Zonza, Samulaghia, 41.76865°N, 9.22245°E, 1120 m, 24.VI.2019, PT, Marc Pollet (FR-COR/2019/033); 1 ♂, Serra-di-Scopamène et Sorbollano, Campu di Bonza, 41.771833°N, 9.123306°E, 893 m, 23-27.VI.2019, YPT, Marc Pollet (FR-COR/2019/080); 1 ♂, same location, 41.772611°N, 9.121167°E, 935 m, 23-27.VI.2019, YPT, Marc Pollet (FR-COR/2019/083); 1 ♀, Zicavo, Ponte di Valpine, 41.873917°N, 9.135833°E, 1298 m, 25-29.VI.2019, WPT, Marc Pollet (FR-COR/2019/122).

**Distribution.** – A very widely distributed species, possibly present in nearly all zoogeographical regions, except Antarctica. At present, it is known from most countries in Europe from Russia to Spain, also from the French mainland, and has previously been reported from Corsica by KEHLMAYER *et al.* (2019).

*Chalarus zyginae* Jervis, 1992

First record for Corsica and France.

**Material examined.** – **Corse-du-Sud:** 1 ♀, Sotta, Valavo, 41.534286°N, 9.214574°E, 50 m, 9-26.V.2021, Eddy Poirier (FR-COR/2021/446/MNHN).

**Distribution.** – The species has only been reported from Italy so far.

**Diagnosis.** – Females have greatly enlarged frontal facets, a very narrow frons, at narrowest point as wide as the diameter of the largest frontal facet, a dark brown flagellum and an evenly tapering and curved ovipositor.

*Clistoabdominalis fuscus* (Zetterstedt, 1844)

First record for Corsica.

**Material examined.** – **Haute-Corse:** 2 ♀, Oletta, 42.653435°N, 9.294320°E, 54 m, 18-26.VI.2020, MT, Julien Piolain (FR-COR/2020/084/MNHN); 1 ♂, Solenzara, Airbase BA 126, 41.90948°N, 9.40845°E, 2 m, 21.V.2021, MSW, Marc Pollet (FR-COR/2021/044/MP).

**Distribution.** – A widely distributed species, thus far reported from Russia through Hungary to Spain, including the French mainland.

**Diagnosis.** – Males can be recognised by the lack of membranous area on the last abdominal segment, the incomplete pterostigma, and the flattened and overlapping surstyli.

*Dorylomorpha (Dorylomyza) xanthopus* (Thomson, 1870)

First record for Corsica.

**Material examined.** – **Haute-Corse:** 1 ♀, Portivechju, Lavu Santu, 41.70644°N, 9.39280°E, 13 m, 24.V.2021, MSW, Marc Pollet (FR-COR/2021/100/MP).

**Distribution.** – A Holarctic species thus far reported from northern Russia through Hungary and, recently, also from the French mainland (WITHERS & CLAUDE, 2021).

**Diagnosis.** – Males can be recognised by the smaller body size (wing length: 2.6 to 3.8 mm), the short, yellowish antennal segment 3 and the details of the genitalia (surstyli and phallic guide).

*Eudorylas bermeri* Kehlmaier, 2005

First record for Corsica.

**Material examined.** – **Haute-Corse:** 1 ♂, Ventiseri, littoral zone of the Airbase BA 126, 41.910686°N, 9.409184°E, 2 m, 7-25.V.2021, Eddy Poirier (FR-COR/2021/323/MNHN).

**Distribution.** – The species has only been reported from Germany and Switzerland (KEHLMAYER, 2005), and more recently also from the French mainland (WITHERS & CLAUDE, 2021).

**Diagnosis.** – Males can be recognised by the genitalia with a small membranous area on the last abdominal segment, an upcurving lateral projection on the phallic guide in ventral view, and both surstyli with a short apical projection.

*Eudorylas blascoi* De Meyer, 1997

First record for Corsica.

**Material examined.** – **Haute-Corse:** 1 ♀, Farinole, 42.728681°N, 9.347879°E, 28 m, 16-21.VI.2020, WPT, Romain Le Divelec (FR-COR/2020/044/MNHN); 1 ♂, Palasca, 42.661071°N, 9.067811°E, 64 m, 14.VI.2020, SW, Thomas Lebard & Marie Canut (FR-COR/2020/055/MNHN); 1 ♀, Oletta, 42.653435°N, 9.294320°E, 54 m, 18-26.VI.2020, MT, Julien Piolain (FR-COR/2020/084/MNHN); 1 ♂, Ventiseri, littoral zone of the Airbase BA 126, 41.909222°N, 9.409187°E, 1 m, 7-25.V.2021, Eddy Poirier (FR-COR/2021/306/MNHN).

**Distribution.** – Previously known from the French mainland, Italy, Spain and Uzbekistan.

**Diagnosis.** – The species has a small body size (wing length: 3.3 to 3.3 mm). Males can be identified by the shape of the surstyli and phallic guide, and females by the shape of ovipositor and the entirely pollinose mid and front femora.

*Eudorylas falcifer* De Meyer, 1997

First record for Corsica and France.

**Material examined.** – **Haute-Corse:** 1 ♂, Olmi-Cappella, Tartagine, forest house, 42.493446°N, 8.992310°E, 785 m, 2-5.VII.2019, YPT, Claire Villemant (FR-COR/2020/035/MNHN).

**Distribution.** – Previously only known from Spain.

**Diagnosis.** – Males can be recognised by the following characters: postpronotal lobe and base of hind femur pale, membranous area on the last abdominal segment absent, the special shape of the phallic guide and both surstyli being scythe-shaped.

*Eudorylas furvulus* Collin, 1956

First record for Corsica.

**Material examined.** – **Corse-du-Sud:** 2 ♀, Sorbollano, Campu di Bonza, 41.769867°N, 9.124927°E, 890 m, 22.II-06.VI.2020, MT, Eddy Poirier, Rémy Poncet & Julien Touroult (FR-COR/2020/147/MNHN).

**Distribution.** – The species has thus far been reported from Finland through the Czech Republic to the French mainland and North Korea.

**Diagnosis.** – The females can be recognised by the bristly abdomen, the incomplete pterostigma, the dark tibiae, and the ventrally placed ovipositor that has a triangle shaped base in dorsal view.

*Eudorylas ibericus* Kehlmaier, 2005

First record for Corsica.

**Material examined.** – **Haute-Corse:** 1 ♀, Santo-Pietro-di-Tenda, 42.664851°N, 9.208658°E, 270 m, 13-27.VI.2020, WPT, Romain Le Divelec (FR-COR/2020/132/MNHN).

**Distribution.** – Thus far only known from Spain and the French mainland (KEHLMAYER *et al.*, 2019).

**Diagnosis.** – The females can be recognised by the prescutum, scutum and abdominal tergites being predominantly brown pollinose, the ovipositor in lateral view is stronger bent and tergite 9 not as high as in the similar *E. pannonicus*.

*Eudorylas mediterraneus* De Meyer & Ackland, 1997

**Material examined.** – **Corse-du-Sud:** 1 ♂, Serra-di-Scopamène, Castellu d’Ornucciu, 41.832944°N, 9.15725°E, 1580 m, 26-30.VI.2019, WPT, Marc Pollet (FR-COR/2019/145). **Haute-Corse:** 4 ♂, 1 ♀, Ventiseri, littoral zone of the Airbase BA 126, 41.909222°N, 9.409187°E, 1 m, 7-25.V.2021, Eddy Poirier (FR-COR/2021/306/MNHN).

**Distribution.** – Reported thus far from a few countries in the Mediterranean Basin, like Croatia, Greece, Lybia, Portugal, Spain and the French mainland. Earlier reported from Corsica by KEHLMAYER (2005).

**Diagnosis.** – The male has a small membranous area on the last abdominal segment and is similar to *E. slovacus*, but the phallic guide does not have the hook-like projection in ventral view and the female has an ovipositor with a rather long and slightly bent piercer and a rather small and angular base.

*Eudorylas obliquus* Coe, 1966

First record for Corsica.

**Material examined.** – **Corse-du-Sud:** 2 ♂, 3 ♀, Sotta, Valavo, 41.527225°N, 9.225039°E, 66 m, 10-26.V.2021, Eddy Poirier (FR-COR/2021/296/MNHN); 1 ♀, same location, 41.530144°N, 9.232110°E, 167 m, 9-26.V.2021, Eddy Poirier (FR-COR/2021/447/MNHN); 2 ♀, Porto-Vecchio, 41.575172°N, 9.337360°E, 59 m, 23-26.V.2021, YPT, Bernardo Santos (FR-COR/2021/328/MNHN); 1 ♀, same locality, 41.574786°N, 9.344252°E, 8 m, 23-26.V.2021, YPT, Bernardo Santos (FR-COR/2021/329/MNHN). **Haute-Corse:** 1 ♀, Ventiseri, Airbase BA 126, 41.929914°N, 9.394558°E, 19-27.V.2021, MT, Bernardo Santos (FR-COR/2021/310/MNHN).

**Distribution.** – Widely distributed in Europe and thus far reported from Germany to Spain and Turkey, and the French mainland.

**Diagnosis.** – A species very similar to *E. jenkinsoni* Coe, 1966, but differing among others by a smaller body size, a shorter and narrower epandrium in dorsal view and an outer surstylus that is smaller and normally narrower than long (in strictly dorsal view). Females do not have a broad and deep median longitudinal furrow on the ovipositor’s base as in *E. jenkinsoni*, but rather two asymmetrical basal lobes. If these features are not clear the ovipositor has to be detached from the abdomen and examined with special attention to the shape of sternite 8.

*Eudorylas pannonicus* (Becker, 1897)

First record for Corsica.

**Material examined.** – **Corse-du-Sud:** 1 ♂, Porto-Vecchio, 41.574786°N, 9.344252°E, 8 m, 23-26.V.2021, YPT, Bernardo Santos (FR-COR/2021/329/MNHN).

**Distribution.** – Reported thus far from Bulgaria, Croatia, mainland France, Greece, Hungary, Italy, and Romania.

**Diagnosis.** – Males are variable, but can be recognised by the special shape of the lateral projection on the phallic guide in ventral view, the size of the gonopods,

the shape of the inner surstylus, and the tip of the phallic guide. The species likely represents a species complex.

*Eudorylas ruralis* (Meigen, 1824)

First record for Corsica.

**Material examined.** – **Corse-du-Sud:** 1 ♂, Sorbollano, Campu di Bonza, 41.769867°N, 9.124927°E, 890 m, 6-16.VI.2020, MT, Eddy Poirier, Rémy Poncet & Julien Touroult (FR-COR/2020/148/MNHN).

**Distribution.** – Widely distributed species in Europe, thus far reported from Latvia to the French mainland.

**Diagnosis.** – Males can be recognised by the absence of a membranous area on the last abdominal segment and the special shape of surstyli that look like sharp claspers in lateral view.

*Eudorylas subterminalis* Collin, 1956

First record for Corsica.

**Material examined.** – **Corse-du-Sud:** 1 ♀, Sorbollano, Campu di Bonza, 41.769867°N, 9.124927°E, 890 m, 28.XI-27.XII.2019, MT, Eddy Poirier, Rémy Poncet & Julien Touroult (FR-COR/2020/151/MNHN); 1 ♀, same location, 41.769867°N, 9.124927°E, 890 m, 3-31.X.2019, MT, Eddy Poirier, Rémy Poncet & Julien Touroult (FR-COR/2020/153/MNHN).

**Distribution.** – A widely distributed Palaearctic species thus far reported from Sweden and Latvia to Spain, mainland France, Slovenia and Mongolia.

**Diagnosis.** – Females can be similar to *E. obliquus*, but in lateral view the ovipositor with sternite 8 is slightly swollen and the piercer emerges from the base somewhat underneath the ventral surface of the latter.

*Eudorylas zermattensis* (Becker, 1897)

First record for Corsica.

**Material examined.** – **Corse-du-Sud:** 1 ♀, Sorbollano, 41.769093°N, 9.125581°E, 877 m, 23-27.VI.2019, YPT, Romain Le Divelec (FR-COR/2020/015/MNHN); 1 ♂, Zonza, Bocca di Fumicosa, 41.761429°N, 9.227198°E, 1247 m, 24-28.VI.2019, YPT, Claire Villemant (FR-COR/2020/161/MNHN). **Haute-Corse:** 8 ♂, 5 ♀, Oletta, 42.653435°N, 9.294320°E, 54 m, 18-26.VI.2020, MT, Julien Piolain (FR-COR/2020/084/MNHN).

**Distribution.** – A widely distributed Palaearctic species thus far reported from Sweden and Great Britain through mainland France to Turkey and Uzbekistan.

**Diagnosis.** – Males can be identified by their genitalia (shape of gonopods, no lateral hook-like projection on the phallic guide), whereas females resemble *E. unicolor* (Zetterstedt, 1844), but are characterized by their bent ovipositor and short pulvilli.

*Nephrocerus scutellatus* (Macquart, 1834)

**Material examined.** – **Corse-du-Sud:** 1 ♀, Serra-di-Scopamène, Castellu d'Ornucciu, 41.833279°N, 9.157206°E, 1631 m, 26.VI.2019, SW, Claire Villemant (FR-COR/2019/194); 1 ♂, Serra-di-Scopamène, Campu di Bonza, Punta di i Vaccili, 41.772873°N, 9.121594°E, 930 m, 22.II-6.VI.2020, MT, Julien Touroult (FR-COR/2020/139/MNHN); 1 ♂, same location, 41.772873°N, 9.121594°E, 930 m, 6-16.VI.2020, MT, Julien Touroult (FR-COR/2020/140/MNHN); 1 ♂, Porto-Vecchio, 41.574490°N, 9.241280°E, 14 m, 23.V.2021, COS, Thomas Lebard & Marie Canut (FR-COR/2021/206/MP); 1 ♀, Porto-Vecchio, 41.574786°N, 9.344252°E, 8 m, 23-26.V.2021,



YPT, Bernardo Santos (FR-COR/2021/329/MNHN); 2 ♂, 3 ♀, Sotta, Valavo, 41.530144°N, 9.232110°E, 167 m, 9-26.V.2021, Eddy Poirier (FR-COR/2021/447/MNHN). **Haute-Corse**: 1 ♀, Ghisonaccia, 42.032364°N, 9.459069°E, 0 m, 22.V.2021, Thomas Lebard (FR-COR/2021/178/MP); 2 ♂, Ventiseri, parking lot along D645, 41.921173°N, 9.334383°E, 25.V.2021, COS, Bernardo Santos (FR-COR/2021/226/MP).

**Distribution.** – A widely distributed species thus far reported from most European countries, including mainland France and Corsica (GROOTAERT & DE MEYER, 1986).

**Diagnosis.** – A large, slender species (9-11.5 mm) with a relatively small black third antennal segment and a completely black abdomen. Hind femora in male with prominent black anteroventral bristles. Tip of hind tibiae not swollen (GROOTAERT & DE MEYER, 1986).

### *Pipunculus campestris* Latreille, 1802

First record for Corsica.

**Material examined.** – **Haute-Corse**: 1 ♀, Oletta, 42.653435°N, 9.294320°E, 54 m, 18-26.VI.2020, MT, Julien Piolain (FR-COR/2020/084/MNHN).

**Distribution.** – A widely distributed species thus far reported from most European countries, including mainland France.

**Diagnosis.** – Males can be recognised by the brownish grey pollinosity of the prescutum, scutum, subscutellum and anepimeron, and the triangular surstyli that are not elongated. Females are identical to those of *P. omissinervis* Becker, 1889, but very distinct in lateral view by the conical base and the slightly downcurved tip of the piercer.

### *Pipunculus dimi* Kuznetzov, 1991

First record for Corsica.

**Material examined.** – **Haute-Corse**: 1 ♂, Olmi-Cappella, Tartagine, 42.493767°N, 8.992314°E, 756 m, 2-5.VII.2019, YPT, Claire Villemant (FR-COR/2020/034/MNHN); 1 ♀, Santo-Pietro-di-Tenda, 42.663017°N, 9.200958°E, 260 m, 14-27.VI.2020, BPT, Romain Le Divelec (FR-COR/2020/126/MNHN).

**Distribution.** – Only reported thus far from Italy, Finland and Latvia.

**Diagnosis.** – Males can be recognised by the hind femur that is ventrally weakly concave in basal half; the hind femur in dorsal view shows five to seven dark bristles at its apex contrasting with the overall yellow colour (KEHLMAYER, 2008). Females have a yellow postpronotal lobe and an ovipositor that has a long triangle shape with a rather straight line on the ventral side in lateral view.

### *Semicephalops varipes* (Meigen, 1824)

First record for Corsica.

**Material examined.** – **Haute-Corse**: 1 ♀, Oletta, 42.653892°N, 9.296076°E, 7 m, 18-21.VI.2020, YPT, Romain Le Divelec (FR-COR/2020/120/MNHN); 1 ♀, Ghisonaccia, Pinia (trail to beach), 42.021834°N, 9.467428°E, 21-22.V.2021, YPT, Bernardo Santos (FR-COR/2021/274/MP).

**Distribution.** – A widely distributed species thus far recorded from many countries in Europe from Finland through Poland to Spain, and the French mainland.

**Diagnosis.** – The females have femora with brown rings and have a piercer that is longer than the base and slightly curved downwards.

*Tomosvaryella coquilletti* (Kertész, 1907)

First record for Corsica.

**Material examined.** – **Corse-du-Sud:** 1 ♂, Zonza, Samulaghia, 41.761617°N, 9.227633°E, 1209 m, 24-28.VI.2019, WPT, Marc Pollet (FR-COR/2019/097).

**Distribution.** – Widespread in the Nearctic, Palaearctic, and Oriental Regions. In Europe mostly found in Central European countries, but also in Latvia and mainland France.

**Diagnosis.** – Males are easily identified by the epandrial groove, which is unique in *Tomosvaryella*. Females are not distinguishable from females of *T. sylvatica* (Meigen, 1824) and *T. estebani* Withers & Claude, 2021.

*Tomosvaryella freidbergi* De Meyer, 1995

First record for Corsica.

**Material examined.** – **Haute-Corse:** 6 m, 1 ♀, Ventiseri, Airbase BA 126, 41.929914°N, 9.394558°E, 19-27.V.2021, MT, Bernardo Santos (FR-COR/2021/310/MNHN).

**Distribution.** – Only reported thus far from mainland France (Withers, 2006), Spain, Canary Islands, Hungary, Egypt and Israel.

**Diagnosis.** – The species is part of the *T. kuthyi* complex. Readily separated from *T. kuthyi* Aczél, 1944, and *T. israelensis* De Meyer, 1995, by its generally smaller size, very slender surstyli, and the shape of the outer surstylus in lateral view which base is not broadened (Földvari & De Meyer, 2000).

*Tomosvaryella kuthyi* Aczél, 1944

First record for Corsica.

**Material examined.** – **Haute-Corse:** 1 ♀, Solenzara, Airbase BA 126, 41.92597°N, 9.39583°E, 25 m, 24-27.V.2021, YPT, Marc Pollet & Anja De Braekeleer (FR-COR/2021/161/MP).

**Distribution.** – A widespread species reported thus far from most countries in Europe including mainland France.

**Diagnosis.** – Females can be identified by the larger body size, the long and downcurved ovipositor and the broad and long pulvilli that are twice as long as the last tarsal segment.

*Verrallia aucta* (Fallén, 1817)

First record for Corsica.

**Material examined.** – **Corse-du-Sud:** 1 ♀, Sotta, Valavo, 41.525368°N, 9.229340°E, 115 m, 12-26.V.2021, Eddy Poirier (FR-COR/2021/295/MNHN); 1 ♀, Porto-Vecchio, 41.574786°N, 9.344252°E, 8 m, 23-26.V.2021, YPT, Bernardo Santos (FR-COR/2021/329/MNHN). **Haute-Corse:** 2 ♀, Ghisonaccia, Pinia (trail to beach), 42.021150°N, 9.470445°E, 21-22.V.2021, YPT, Bernardo Santos (FR-COR/2021/264/MP); 1 ♂, Ghisonaccia, Pinia (trail to beach), 42.021834°N, 9.467428°E, 21-22.V.2021, YPT, Bernardo Santos (FR-COR/2021/274/MP); 1 ♀, Ventiseri, Airbase BA 126, 41.929914°N, 9.394558°E, 19-27.V.2021, MT, Bernardo Santos (FR-COR/2021/310/MNHN).

**Distribution.** – A widely distributed Palaearctic species thus far reported from most European countries, Israel, Kazakhstan and mainland France.

**Diagnosis.** – The species is easy to recognise by presence of the  $M_2$  vein in the wing, which is unique within the subfamily Chalarinae (a subfamily characterised by a flat head in lateral view).

***Pipunculus* sp.**

**Material examined.** – **Haute-Corse:** 1 ♀, Farinole, 42.727828°N, 9.349821°E, 36 m, 16-21.VI.2020, BPT, Romain Le Divelec (FR-COR/2020/045/MNHN).

A single female specimen with an atypical ovipositor shape, which could belong to several poorly known species in the Mediterranean or represent a new species to science.

***Tomosvaryella* sp. 1**

**Material examined.** – **Haute-Corse:** 1 ♀, Ventiseri, littoral zone of the Airbase BA 126, 41.909222°N, 9.409187°E, 1 m, 7-25.V.2021, Eddy Poirier (FR-COR/2021/306/MNHN).

A female specimen with unknown identity, due to high variation in ovipositor shape, and we consider it very risky to associate it with a species in the Mediterranean region.

***Tomosvaryella* sp. 2**

**Material examined.** – **Haute-Corse:** 1 ♂, Santo-Pietro-di-Tenda, 42.664851°N, 9.208658°E, 270 m, 13-27.VI.2020, YPT, Romain Le Divelec (FR-COR/2020/135/MNHN).

A male specimen in poor condition; the visible genitalic parts refer to a species close to the *T. kuthyi* group.

***Tomosvaryella* sp. 3**

**Material examined.** – **Haute-Corse:** 2 ♀, Oletta, 42.653435°N, 9.294320°E, 54 m, 18-26.VI.2020, MT, Julien Piolain (FR-COR/2020/084/MNHN); 1 ♀, Portivechju, Lavu Santu, 41.70644°N, 9.39280°E, 13 m, 24.V.2021, MSW, Marc Pollet (FR-COR/2021/100/MP). In addition, one female was retrieved from a sample collected during this expedition (2019-2021) lacking a label (FR-COR/2020/047/MNHN).

Female specimens with unknown identity, due to high variation in ovipositor shape, currently considered very risky to associate it with a species in the Mediterranean region.

***Tomosvaryella* sp. 4**

**Material examined.** – **Haute-Corse:** 1 ♂, Solenzara, Airbase BA 126, 41.90936°N, 9.40951°E, -3 m, 21-25.V.2021, YPT, Marc Pollet & Anja De Braekeleer (FR-COR/2021/113/MP-ADB).

A male specimen in poor condition. Based on the external characters it could belong to *T. sylvatica* / *coquilletti* or the *T. kuthyi* group.

***Tomosvaryella sylvatica* / *coquilletti* / *estebani***

**Material examined.** – **Haute-Corse:** 1 ♀, Solenzara, Airbase BA 126, 41.92597°N, 9.39583°E, 25 m, 24-27.V.2021, BPT, Marc Pollet & Anja De Braekeleer (FR-COR/2021/160/MP).

A female specimen that can be either of the three species, since there are no known characters to distinguish females of these three species. Moreover, *T. sylvatica* is so widely distributed that it should be considered and *T. coquilletti* has been encountered in another sample from the island.

**Table I.** – Distribution of collected Pipunculidae over Corsican departments and sampling years during the *Our Planet Reviewed in Corsica 2019-2021* expeditions, expressed as number of specimens. Species that are recorded from Corsica for the first time are indicated with “\*”.

	Haute-Corse			Corse-du-Sud		
	2019	2020	2021	2019	2020	2021
<i>Cephalops vittipes</i> (Zetterstedt, 1844)*				13	3	
<i>Cephalosphaera furcata</i> (Egger, 1860)				1		
<i>Cephalosphaera germanica</i> Aczél, 1940*			1	1		
<i>Chalarus brevicaudis</i> Jervis, 1992*	1					
<i>Chalarus immanis</i> Kehlmaier, 2008*			2			
<i>Chalarus pughi</i> Coe, 1966*				2		
<i>Chalarus spurius</i> (Fallén, 1816)				4		
<i>Chalarus zyginae</i> Jervis, 1992*						1
<i>Clistoabdominalis fuscus</i> (Zetterstedt, 1844)*		2	1			
<i>Dorylomorpha xanthopus</i> (Thomson, 1870)*			1			
<i>Eudorylas bermeri</i> Kehlmaier, 2005*			1			
<i>Eudorylas blascoi</i> De Meyer, 1997*		3	1			
<i>Eudorylas falcifer</i> De Meyer, 1997*	1					
<i>Eudorylas furvulus</i> Collin, 1956*					2	
<i>Eudorylas ibericus</i> Kehlmaier, 2005*		1				
<i>Eudorylas mediterraneus</i> De Meyer & Ackland, 1997			5	1		
<i>Eudorylas obliquus</i> Coe, 1966*			1			9
<i>Eudorylas pannonicus</i> (Becker, 1897)*						1
<i>Eudorylas ruralis</i> (Meigen, 1824)*					1	
<i>Eudorylas subterminalis</i> Collin, 1956*				2		
<i>Eudorylas zermattensis</i> (Becker, 1897)*		13		2		
<i>Nephrocerus scutellatus</i> (Macquart, 1834)			3	2	2	7
<i>Pipunculus campestris</i> Latreille, 1802*		1				
<i>Pipunculus dimi</i> Kuznetsov, 1991*	1	1				
<i>Semicephalops varipes</i> (Meigen, 1824)*		1	1			
<i>Tomosvaryella coquilletti</i> (Kertész, 1907)*				1		
<i>Tomosvaryella freidbergi</i> De Meyer, 1995*			7			
<i>Tomosvaryella kuthyi</i> Aczél, 1944*			1			
<i>Verrallia aucta</i> (Fallén, 1817)*			4			2
<i>Pipunculus</i> sp.		1				
<i>Tomosvaryella</i> sp. 1			1			
<i>Tomosvaryella</i> sp. 2		1				
<i>Tomosvaryella</i> sp. 3 †		2	1			
<i>Tomosvaryella</i> sp. 4			1			
<i>Tomosvaryella sylvatica</i> / <i>coquilletti</i> / <i>estebani</i>			1			
Total no. specimens	3	26	33	29	8	20
Total no. species	3	10	17	10	4	5

† one specimen without a sample label excluded.

## DISCUSSION

Most productive Corsican Departments and years for specimens and species numbers were Haute-Corse 2020 and 2021, and Corse-du-Sud 2019 (table I). *Cephalops vittipes* and *Cephalosphaera furcata* were only caught in Corse-du-Sud whereas *Pipunculus Latreille*, 1802, and *Tomosvaryella* species (except for one *T. coquilletti* specimen) were only encountered in Haute-Corse.

Overall, Malaise traps and yellow pan traps proved most productive, especially in terms of specimens (table II). In fact, about 16% of the yellow pan trap and 13% of the Malaise trap samples contained Pipunculidae, as compared to about 9% of the samples retrieved from blue and white pan traps. Despite the low overall productivity, it is interesting to note that the seven specimens collected with white pan traps belonged to seven different species, including three species (*Cephalosphaera furcata*; *Eudorylas ibericus*; *Tomosvaryella coquilletti*) that were not gathered by any other collecting method. White pan traps thus seem relevant for pipunculid surveys, in addition to Malaise and yellow pan traps. In comparison, the Malaise trap samples included 38 specimens belonging to 15 species which represents a very different subset of diversity within the collected material. Targeted hand-netting for Pipunculidae can also yield a species-rich result, as demonstrated by KEHLMAYER (2010) in Sardinia, who collected 83 Pipunculidae (37 males and 46 females) in nine collecting days.

The evaluation of the applied collecting methods confirmed that the most successful ones for Pipunculidae were used during the program (Malaise traps, yellow pan traps). Site selection for these traps might be optimized by installing them in more sunny locations, at forest edges or along water bodies (lakes and rivers). However, this is a general observation on e.g., the Malaise trap collection. Indeed, if the primary aim of a survey is to catch as many individuals as possible in the widest array of insect groups, compromises must be made that do not favor every taxonomic group. Another aspect of the difficulty with predictions and recommendations on future collecting is that the current species list is still very limited. There can potentially be special habitats with endemic species that are undiscovered or unexplored thus far, therefore additional sampling could reveal hidden aspects of the fauna of the island.

The widely distributed and common Palaearctic species, *Verrallia aucta*, was caught only in the coastal region and during 2021. A similar pattern can be observed

**Table II.** - Number of samples with Pipunculidae and number of specimens per collecting method applied during the *Our Planet Reviewed in Corsica 2019-2021* expeditions.

Collecting method	no. samples	no. specimens
BPT - blue pan traps	5	5
COS - collection on sight	2	3
MSW - sweep netting with entire yield stored	2	3
MT - Malaise traps	8	38
PT - pan traps	1	1
SW - sweep netting with retrieval of individual specimens	2	3
WPT - white pan traps	6	7
YPT - yellow pan traps	20	33
Method unknown	11	27
Total	57	120

in *Tomosvaryella freidbergi* and *Eudorylas obliquus* where all specimens were caught in the coastal region. Species that were collected in highest numbers in the southern Alta Rocca mountainous region are *Cephalops vittipes*, and *Chalarus spurius*. On the other hand, *Eudorylas blascoi*, *E. furvulus*, *E. zermattensis* and *Clistoabdominalis fuscus* proved most abundant in the coastal dunes, wetlands and maquis in northern Agriate.

The following species deserve special attention as they are only reported from a few countries in Europe at present:

- *Chalarus zyginae*, previously only reported from Italy;
- *Eudorylas bermeri*, previously only reported from Switzerland, Germany, and the French mainland;
- *E. falcifer*, previously only reported from Spain;
- *E. ibericus*, previously only reported from Spain and the French mainland;
- *Pipunculus dimi*, previously only reported from Italy, Finland, and Latvia.

On the other hand, *Chalarus zyginae*, *Eudorylas blascoi*, *E. falcifer*, *E. ibericus*, *E. mediterraneus* and *Tomosvaryella freidbergi* could be considered southern species, with probably a main distribution in the Mediterranean Basin.

In the present paper we reported the occurrence of 29 species of Pipunculidae of Corsica. Its fauna is still considered poorly known; there is, indeed, little collected material and only a few published records. This status is also confirmed by the fact that 25 of the listed species are new for the island. It is very likely that increased sampling efforts – in particular by pipunculid experts – could double the species number of the island or even more, considering the pipunculid diversity in the Mediterranean Basin, and even the presence of endemic species cannot be ruled out.

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