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CULEX TORRENTIUM MARTINI, 1924: A NEW SPECIES FOR THE MOSQUITO FAUNA (DIPTERA, CULICIDAE) OF FRIULI VENEZIA GIULIA REGION (NORTH-EASTERN ITALY)

CULEX TORRENTIUM MARTINI, 1924: UNA NUOVA SPECIE PER LA FAUNA DI DITTERI CULICIDI DEL FRIULI VENEZIA GIULIA

Riassunto breve - Si segnala il primo reperimento in Friuli Venezia Giulia, il secondo per l'Italia, del dittero culicide *Culex torrentium*, specie gemella di *Culex pipiens*. L'identificazione è stata eseguita sulla base dell'ipopigio maschile, unico criterio morfologico valido per separare le due specie.

Larve delle due specie sono state rinvenute, in associazione, all'interno di un'area boschiva del Monte Lanaro sul Carso triestino: nel 2020 in uno stagno di origine piovana e in un contenitore abbandonato, poi nel 2024 in ovitrappele collocate nella stessa area.

È di 40 il numero totale di specie di culicidi finora censite nella regione Friuli Venezia Giulia.

Parole chiave: *Culex torrentium*, *Culex pipiens*, Italy, Friuli Venezia Giulia, Carso.

Abstract - We report the first finding in Friuli Venezia Giulia region (North-eastern Italy), the second finding for Italy, of the mosquito *Culex torrentium*, a sibling species of *Cx. pipiens*. The two species, morphologically identifiable only by examining the male genitalia, were found, in 2020 and 2024, in sympatry in a wooded area of the Mount Lanaro on the Trieste's Karst. The breeding sites were a semi-temporary rain-fed pond and an abandoned container. Mixed larvae of two species were also sampled in ovitraps subsequently placed in the same area.

The updated checklist of the culicids of the Friuli Venezia Giulia region now includes a total of 40 species.

Key words: *Culex torrentium*, *Culex pipiens*, Italy, Friuli Venezia Giulia, Carso.

Introduction

The two sibling species *Culex pipiens* Linnaeus, 1758 (including its biotypes *molestus* and *pipiens*) and *Cx. torrentium* Martini, 1924 are very similar in terms of ecology and morphology, often sympatric, separable with certainty only by the morphological examination of the male adult genitalia or by molecular analysis (URBANELLI et al. 1981; BEKER et al. 2010; DI LUCA et al. 2016).

Culex pipiens is mammophilic/ornithophilic, *Cx. torrentium* is ornithophilic; both species are potential vectors of arbovirus of medical importance (Di Luca et al. 2016; Jansen et al. 2019).

In Europe, *Cx. torrentium*, stenotherme and likely univoltine, prevails in northern and central regions, while *Cx. pipiens*, euritherme and multivoltine, is dominant in southern regions (BEKER et al. 2010; DI LUCA et al. 2016; ROBERT et al. 2019). *Cx. torrentium* is also reported from the countries bordering North-eastern Italy: Austria (ZITTRA et al. 2016), Croatia (MERĐIĆ et al. 2018) and Slovenia (Tomi Trilar, personal communication).

In Italy, the presence of *Cx. torrentium* has been so

far documented only in the Eastern Alps (Trentino Alto Adige region, Bolzano province) by Urbanelli et al. 1981. Recent wide investigations led to no evidence of its occurrence in 14 out of 20 Italian regions (DI LUCA et al. 2016) as well as in the Emilia Romagna region (CALZOLARI et al. 2016).

In Friuli Venezia Giulia (FVG) *Cx. pipiens* is a common species in many habitats (permanent shaded ponds, small containers of eutrophic water, polluted water dishes) (ZAMBURLINI et al. 2019); in this paper we report the first detection of *Cx. torrentium*.

Materials and methods

Study area

In 2019-2024 collections of mosquitoes were performed in their natural and artificial breeding sites in the Trieste's Karst (fig. 1), a calcareous plateau situated along the northern Adriatic Sea coast (Gulf of Trieste, North-eastern Italy).

The climate of this area is sub-Mediterranean next to the coast (average temperature 15.5 °C, precipitation about 1000 mm), becoming progressively more



Fig. 1 - Discovery area of *Culex torrentium* Friuli Venezia Giulia region, Trieste's Karst (red point).
- Area di reperimento di *Culex torrentium*. Friuli Venezia Giulia, Carso triestino (pallino rosso).

continental moving inward up to 400 m a.s.l. (average temperature 12.8 °C, annual rainfall of about 1400 mm) (ARPA-FVG-OSMER 2023).

In May 2024, after the first unexpected identification of some adult males of *Cx. torrentium* within samples collected in 2020 on the Mount Lanaro (municipality of Sgonico – Trieste, 5.5 km far from the Adriatic Sea coast), six ovitraps, consisting in buckets containing three litres of leaves infusion water (fig. 2), were placed next to the previously identified breeding sites.

Sampling

Larvae and pupae of mosquitoes were sampled by using a 500 ml dipper, then preserved in 70% ethanol and identified at the stereo microscope. Some larvae were taken to the laboratory and reared up to the adult stage. Male hypopygia were mounted and identified on slides.

Identification

The identification of the sampled mosquitoes was undertaken by the examination of all the diagnostic larval and adult characters (in particular the male terminalia to distinguish *Cx. pipiens* from *Cx. torrentium*), according to GUTSEVICH et al. 1974, URBANELLI et al. 1981 and BECKER et al. 2010.

Results

Adult males of *Cx. torrentium* were firstly identified (fig. 3) and separated from those of *Cx. pipiens* (fig. 4) in samples collected on June the 20th 2020 in two different sites located within the Regional Nature Reserve

of Mount Lanaro, a few hundred meters far from the state border with Slovenia.

At site n. 1 (45° 43' 62" N, 13° 46' 33" E, 330 m a.s.l.) (fig. 5) the larval habitat was a temporary pond, about 6 m² broad and 15 cm deep, located within a karstic sinkhole, bordered by a dense wood (*Fraxinus ornus*, *Sorbus torminalis*, *Acer monspessulanum*) and bottomed with dead leaves. The water pH was 6.8, the conductivity 156 µS/cm. A total of 30 fourth instar larvae of *Culex pipiens/torrentium* were sampled, from which three *Cx. torrentium* male adults were identified. The site was shared with larvae of *Aedes japonicus* (Theobald, 1901), *Ae. geminus* Peus, 1970 and *Ae. sticticus* (Meigen, 1838).

The breeding site n. 2 (45° 44' 46" N, 13° 46' 69" E, 445 m a.s.l.) was an abandoned container (fig. 6) from which five larvae of *Cx. pipiens/torrentium* were collected and then one male adult of *Cx. torrentium* was identified. The water pH was 7.2, the conductivity was 480 µS/cm. The site was shared with larvae of *Ae. japonicus*, *Ae. koreicus* (Edwards, 1917), *Ae. geminus*, *Ae. geniculatus* (Olivier, 1791) and *Anopheles plumbeus* Stephens, 1828.

On the dates of June the 19th and July the 4th 2024, at site n. 1 (pond) larvae of *Ae. sticticus* and *Ae. geminus* were sampled, no larvae of *Cx. pipiens/Cx. torrentium* were found. The site n. 2 (abandoned container) was dry. On the same dates, a total of 40 pupae of *Cx. pipiens/torrentium* were collected in the three ovitraps placed around the site n. 1 and a total of nine adult males of *Cx. torrentium* and 22 males of *Cx. pipiens* were identified.



Fig. 2 - Ovitrap placed in the sampling area.
- Ovitrapola collocata nell'area di campionamento.

The ovitraps were shared with larvae of *Ae. albopictus* (Skuse, 1894), *Ae. koreicus* and *An. plumbeus*. The water temperature ranged from 18.7 to 19.8 °C, the pH from 6.9 and 7.6, the conductivity from 108 and 458 µS/cm.

Altogether a total of 13 *Cx. torrentium* specimen were identified.



Fig. 3 - Male hypopygium of *Culex torrentium*. The apex of the dorsal arm (d) of the aedeagus is pointed; the ventral arm (v) of the paraproct is long and curved.
 - Genitali del maschio di *Culex torrentium*. Il braccio dorsale (d) dell'edeago ha forma appuntita; il braccio ventrale (v) del paraprocto è allungato e arricciato.



Fig. 5 - Larval breeding site of *Culex torrentium* (n. 1) in December 2020.
 - Sito n. 1 di sviluppo pre-imaginale di *Culex torrentium* nel dicembre 2020.

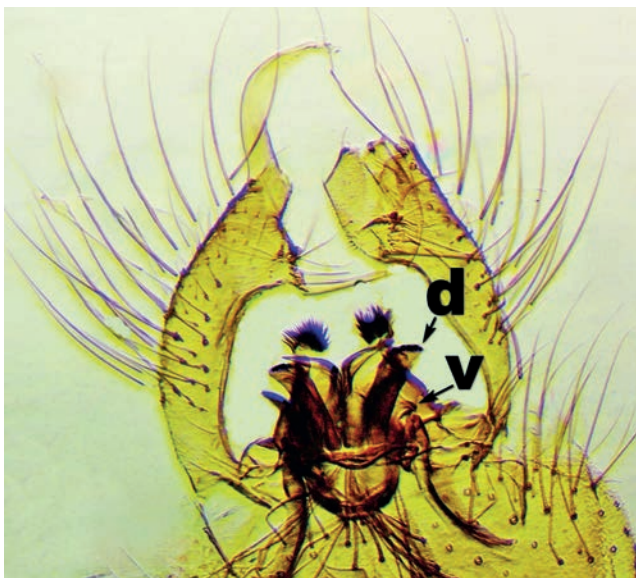


Fig. 4 - Male hypopygium of *Culex pipiens*. The apex of the dorsal arm (d) of the aedeagus is rounded and truncate; the ventral arm (v) of the paraproct is short and straight.
 - Genitali del maschio di *Culex torrentium*. Il braccio dorsale (d) dell'edeago è tronco e cilindrico; il braccio ventrale (v) del paraprocto è breve e diritto.



Fig. 6 - Larval breeding site of *Culex torrentium* (n. 2) in December 2020.
 - Sito n. 2 di sviluppo pre-imaginale di *Culex torrentium* nel dicembre 2020.

Discussion

The present record of *Cx. torrentium* confirm the presence of this species in Italy.

It is a new addition to the FVG's Culicids checklist which is now composed of a total of 40 species (ZAMBURLINI et al. 2019; GREGO & ZAMBURLINI 2020; GREGO & ZAMBURLINI 2021).

The regional bionomics, geographic and seasonal distribution of the species, and its relationships with the common and likely often misidentified *Cx. pipiens*, are still largely unknown and need further investigations.

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