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First occurrence of the mite *Litarachna duboscqi* Walter, 1925 (Acariformes: Pontarachnidae) in the central Mediterranean Sea

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One of the primary goals in assessing marine biodiversity is to measure the degree of species richness in specific geographical areas. We know that biodiversity is declining mainly due to human-induced pressures, but, at the same time, we don't know the extent of abundance and distribution of many species such as the ones ascribable to neglected groups (Schimmenti *et al*. 2016; Lo Brutto & Iaciofano 2020). Under the framework of the National Biodiversity Future Center (NBFC), recently funded in Italy (Cena & Labra 2024), a survey on marine biodiversity was conducted aiming to detect rare or overlooked species in Sicily. The present paper reports the water mite identified as *Litarachna duboscqi* collected in March 2024 from nautical ropes in the harbour of Trapani (Sicily). It is the first record for southern Italy and the central Mediterranean Sea.

Sicily is the largest island (more than 25,000 km^2) in the Mediterranean Sea with approximately 1,400 km of coastline, bounding the Tyrrhenian Sea to the north, the Ionian Sea to the east and the Strait of Sicily to the south. It represents a strategic natural observatory for monitoring Italian marine biodiversity (Lo Brutto *et al*. 2021; Servello *et al*. 2019; Tiralongo *et al*. 2022). It is a seascape inhabited by a huge variety of animal species which, overall, mirror the Mediterranean biodiversity, from jellyfish to mammals (Lo Brutto *et al*. 2021; Servello *et al*. 2019; Tiralongo *et al*. 2022).

Recent surveys have highlighted its role in detecting species which are considered neglected as they are not targeted in sampling designs or taxonomical studies (e.g. Lo Brutto *et al*. 2024). Marine mites belong to such a category; they have never been widely investigated along the Italian coast and their distribution, ecology and role in ecosystems are almost unknown (Pešić *et al*. 2019; Chatterjee & Durucan, 2022).

The only marine families of mites, Halacaridae Murray, 1877 and Pontarachnidae Koenike, 1910, are exclusively meiobenthic, with body size of less than 2 mm (Durucan 2021). The difference in species richness of the two families, more than 1100 species in Halacaridae (Bartsch 2006) and more than fifty in Pontarachnidae (Chatterjee *et al*. 2019), is maintained in the Italian faunal assemblage (Carriglio 2010). The family Pontarachnidae represents an important and, at the same time, a neglected component of the marine meiofauna (Pešić *et al*. 2019); it has an almost worldwide distribution (Smit,

2003) in tropical and subtropical seas. Species of this family have been reported from a depth of 0.5 m to almost 70 m (Pešić *et al*. 2012), occasionally in freshwater or brackish habitats (Smit 2002).

The family Pontarachnidae comprises only two genera, i.e. *Litarachna* Walter, 1925 and *Pontarachna* Philippi, 1840, with 23 and 30 species worldwide respectively (Chatterjee *et al*. 2019). The two genera can easily be separated by the suture line of the third and fourth coxae, which ends in the posteromedial apodemes in *Pontarachna*, but does not extend to these apodemes in *Litarachna*. *Litarachna duboscqi* is the only species in the Mediterranean Sea with a distinct ventral extension of the fourth segment of the palp.

The few Italian reports of this family concern the works carried out by authors which detected equally the two genera; some examples are *Litarachna communis* Walter, 1925, reported in Ischia (Mari & Morselli 1983); *Pontarachna punctulum* Philippi, 1840, described from samples collected in Trieste (Adriatic Sea; Schaub 1889), and more recently collected in *Posidonia oceanica* meadows along Tuscany coast (Tyrrhenian Sea; Bedini *et al*. 2011); *Pontarachna aenariensis* Mari & Morselli, 1983 was described from samples collected at Ischia island (Tyrrhenian Sea; Mari and Morselli 1983). The last checklist of mites in Italian seas dates to 2010 (Carriglio 2010). Eight species belonging to this family were listed, some of which are now considered invalid. : *Litarachna divergens* Walter, 1925 is considered as *species incerta; Litarachna incerta* Walter, 1925 is not valid; *Pontarachna tergestina* Von Schaub, 1889 is considered synonymous of *Pontarachna punctulum* Phillippi, 1840 (Chatterjee *et al*. 2019). Thus a focus on their biodiversity assessment needs. In this paper, we report the first record of *Litarachna duboscqi* Walter, 1925 from southern Italy and improve the knowledge on its habitat.

The sampling site was located in the harbour of Trapani (38° 00' 53.7" N 12° 30' 04.4" E), where a rich fouling community mostly represented by sessile suspension feeders thrives attached to artificial substrates of the infrastructures. The samples were collected in March 2024 from a single nautical rope at depths between 0 and 1m. Sorting was carried out under a stereomicroscope to observe and collect small-sized organisms. Two mites were collected alive and then preserved in absolute ethanol. To be able to identify the species, one of the specimens was treated with KOH. This specimen is lodged in Naturalis Biodiversity Center, Leiden (registration number RMNH.ACA.7792).

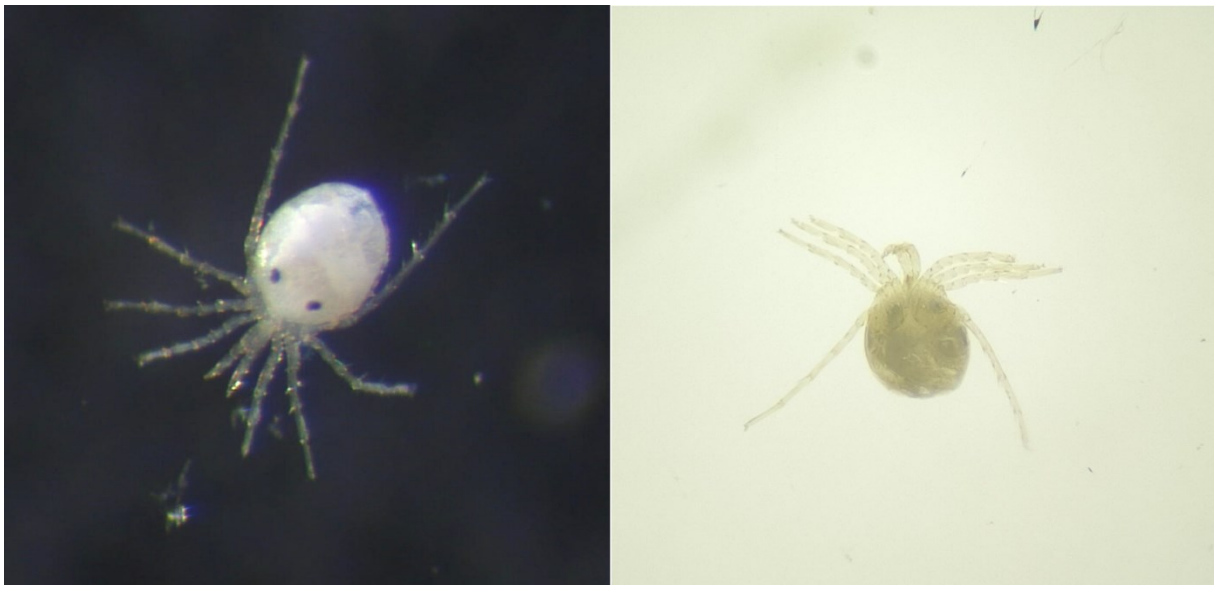

Figure 1. Specimen of *Litarachna duboscqi* Walter, 1925. Left, dorsal view; right, ventral view.

The specimens were identified as *Litarachna duboscqi* (Figure 1). They were found associated with a rich suspension-feeder fauna. The fouling community was composed of sponges, polychaetes, crustacean tanaids and amphipods, ophiuroids, and tunicates, not identified to species level, and a particularly high richness of molluscs, identified as *Aplysia punctata*, *Columbella rustica*, *Diodora graeca*, *Fissurella nubecula*, *Isognomon* sp., *Jujubinus exasperatus*, *Mytilaster minimus*, *Ocenebra edwardsii*, *Pinctada radiata*, *Tricolia pullus*, *Tritia incrassata* (juvenile).

The species was originally described by Walter (1925) based on material from the French Mediterranean coast and from the Adriatic Sea (Rovigno), and later on reported by Fischetti (1928) from the eastern Mediterranean Sea under the name of *Pontarachna rhodia* (syn. of *Litarachna duboscqi*). Viets (1941) reported *Litarachna duboscqi* from Split, Croatia (Adriatic Sea). According to Chatterjee *et al*. 2019 (and references therein), this species is widely distributed in both the western and eastern Mediterranean Sea and Black Sea (see Figure 2 for details), on various substrates. A single record in the eastern Atlantic region demonstrates that the species can disperse outside the Mediterranean (Zawal & Pešić 2015) and highlights a probable Atlanto-Mediterranean range to investigate.

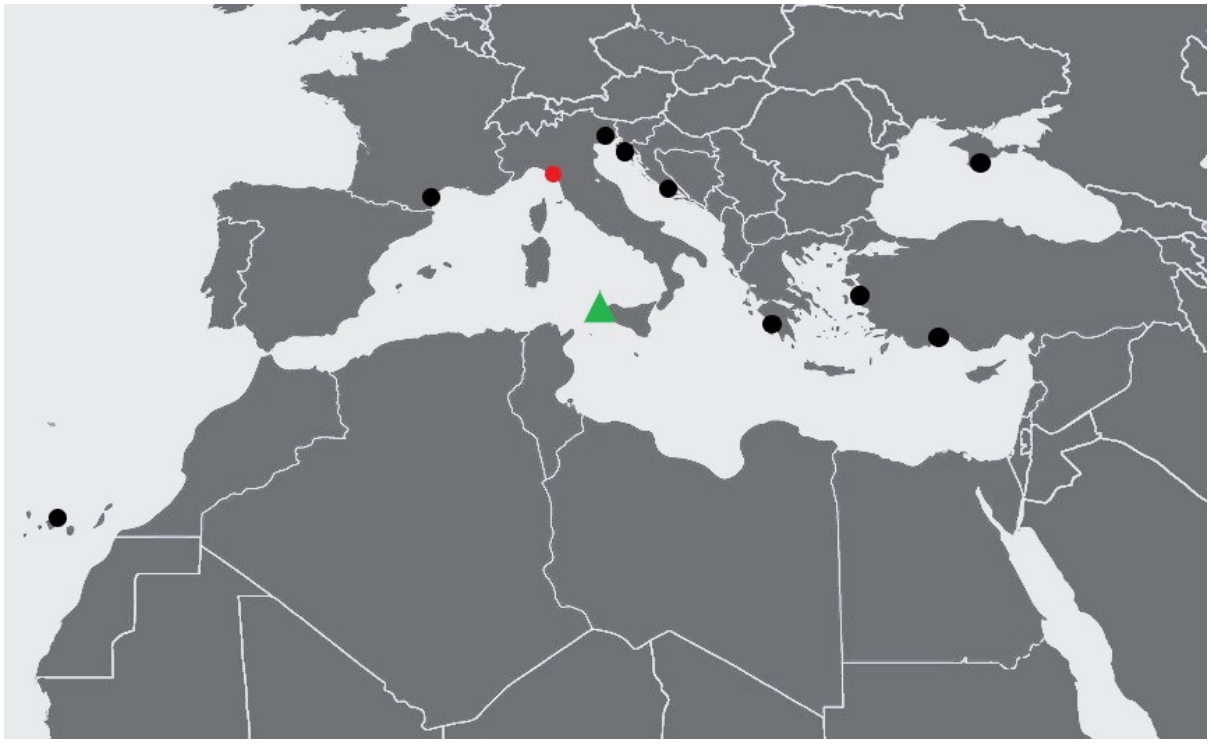

Figure 2. According to the literature, the geographical range of *Litarachna duboscqi* is herein shown on the map. Black circles are the documented records from the Mediterranean Sea (France, Italy, Croatia, Greece, Turkey), from the Black Sea (Russia, Crimea), and the Atlantic Ocean (Spain, Canary Islands). The red circle is the no-documented Mediterranean record from Italy (Ligurian Sea sector). The green triangle indicates the first southern Italy record from Sicily Island.

Chatterjee *et al*. (2019) gave no records from Italy, although the species is included in Italian checklists (Bernini *et al*. 1996). In the online checklist of the Italian fauna (https://www.faunaitalia.it/checklist/introduction.html, viewed May 4, 2024) *Litarachna duboscqi* is included with a reference to Walter (1925). The old record from Rovigno by Walter (1925) was at that time part of Italy but is nowadays part of Croatia. Also Carriglio (2010) included the species in his overview, without giving exact locations. The only record of the present-day Italian territory is from Stammer (1932) who reported the species from Duino in the northern Adriatic Sea.

The Mediterranean littoral environment has been investigated for a long time, especially along the coast of the European Union countries where *L. duboscqi* occurs. A huge literature from these countries regards taxonomic and ecological explorations on a great variety of substrates, and contextually many countries are required to monitor marine ecosystems under the Marine Strategy Framework Directive (Servello *et al*. 2019). Nevertheless, the species has not been detected widely.

Pontarachnidae is a taxon with a globose body shape that can be easily distinguished from the other marine Halacaridae group, however, despite that, it is sporadically detected. Very little is understood about its life cycle and trophic role, and the function of unique morphological features not observed in any other water mite species remains unknown (Smit & Alberti 2009; Kapiris *et al*. 2014; Pešić *et al*. 2019).

Pešić *et al*. (2019) highlighted that pontarachnid mites are overlooked as their bright colour and active behaviour make them one of the groups of marine meiofauna that should be separated directly in the field. The finding of the present samples gave a positive result as the sorting protocol of the sessile communities followed the above suggestion and was performed with the live specimens. It demonstrates that accurate sampling protocols are advisable, particularly in areas, such as Sicily, considered a hotspot for the detection of exotic and rare species or species in the phase of range extension. Further, in light of the local growing pan-oceanic maritime traffic (Lo Brutto *et al*. 2024), neglected species associated with the fouling communities in harbours should be deeply investigated.

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