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## ***Liomera rugipes* (Heller, 1861) (Brachyura: Xanthidae: Liomerinae): a new Indo-West Pacific crab in the Mediterranean Sea, Egypt**

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### **Abstract**

A single specimen of the xanthid *Liomera rugipes* was collected in May 2023 in the waters off Alexandria, Egypt, with a trammel net at 15 m of depth. The occurrence of this crab is reported for the first time in the Mediterranean Sea and adds a new Indo-West Pacific crab to the non-indigenous biota of the basin, probably introduced via the Suez Canal. This new finding increases the number of Egyptian non-indigenous brachyurans to 21 species.

**Keywords:** Non-indigenous species; Brachyura; Xanthidae; Mediterranean Sea; Egypt.

### **Introduction**

The Mediterranean Sea is heavily affected by biological invasions, in particular in the eastern sub-region where most of the non-indigenous species (NIS) are native to the Indo-Pacific/Red Sea and enter the basin via the Suez Canal (Galil *et al.*, 2021; Tarkan *et al.*, 2021). More than ninety non-indigenous species of decapod crustaceans have been recorded in the Mediterranean Sea (Galil *et al.*, 2015; Zenetos *et al.*, 2022). Among these non-indigenous decapods, five species belong to the family Xanthidae; four are of Indo-Pacific origin, namely *Atergatis roseus* (Rüppell, 1830) and *Actaea savigny* (H. Milne Edwards, 1834) firstly recorded off Israel (Lewinsohn & Holthuis, 1964; Karhan *et al.*, 2013), *Xanthias lamarckii* (H. Milne Edwards, 1834) and *Actaeodes tomentosus* (H. Milne Edwards, 1834), both recorded from the Rhodes Island region, South-eastern Aegean Sea (Corsini-Foka & Kondylatos, 2015) and one species is of Atlantic origin, *Dyspanopeus sayi* (Smith, 1869), recorded for the first time in the Venice lagoon (Frogliani & Speranza, 1993).

In the present communication, the finding of the Indo-West Pacific crab *Liomera rugipes* (Heller, 1861) in the Mediterranean waters of Egypt is described, thus documenting the first occurrence of this NIS in the basin.

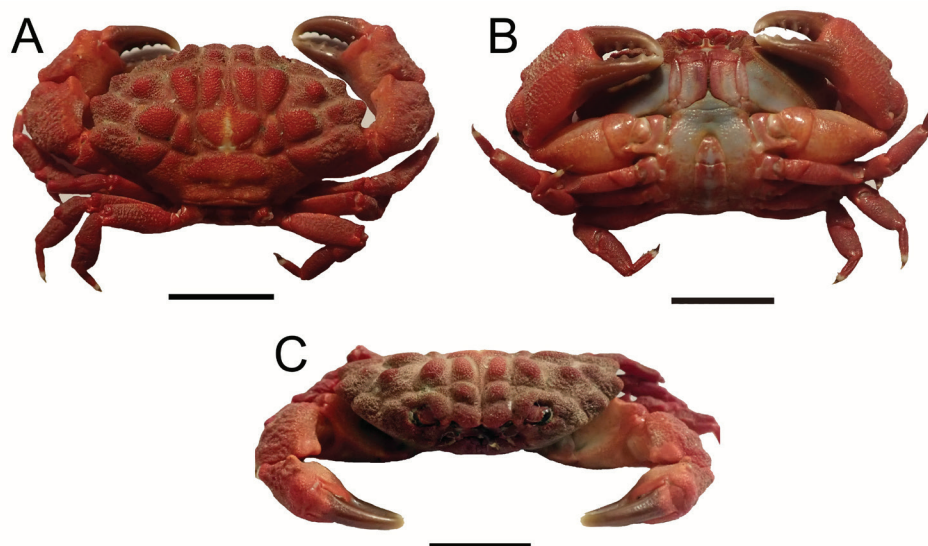
### **Material and Methods**

A small crab was collected on 29 May 2023 at Abu-Qir Bay, Nelson Island, Alexandria, Egypt (31.356578°N, 30.105056°E) by trammel net (locally called Kanar) on a rocky substrate, at approximately 15 m of depth. The crab was unknown to the fisherman who immediately sent a photo to one of the authors (O.M.N.). The specimen was analysed at the laboratory of the Department of Biological and Geological Sciences, Faculty of Education, Alexandria University, and subsequently deposited in the collection of the Hydrobiological Station of Rhodes, Hellenic Centre for Marine Research (Greece), with catalogue number HSR575.

Abbreviations used: CL, carapace length; CW, carapace width; G1: first male pleopod; nomenclature of the different regions of the carapace as in Sèrene (1984, retrieved from Dana, 1852).

### **Results**

The crab was a male with CL 14.6 mm and CW 24.7 mm (CL/CW 0.59) and showed the following characteristics (Fig. 1A, B, C): carapace and legs covered with granules; chelipeds of similar size, quite massive, with irregular and corroded aspect dorsally, rugose ventrally;



**Fig. 1:** *Liomera rugipes* from Abu-Qir, Alexandria, Egypt (A: dorsal view, B: ventral view, C: frontal view. Scale bars: 10 mm).

front not projecting beyond the orbits. On the dorsal surface of the carapace, region 2 M entirely divided longitudinally into two parts; region 1M separated from 2F and 2M. In the antero-lateral margins of the carapace, the first teeth notably reduced, the second, third and fourth teeth triangular with rounded margin. Region 1L not evident, regions 2L and 3L fused and separated from the antero-lateral teeth by a feeble depression, while regions 4L are not separated from the teeth. Postero-lateral margins almost straight. Region 6L entire, 1R and 2R fused. Frontal edge thick. G1 elongated, with a sharp apical lobe projecting outwards, slightly inclined downward and distally equipped with ten long plumose setae (one broken during handling), slightly clavate, distributed in two series, plus a shorter one not clavate; spinules on the hooked part and along the distal portion of G1 (Fig. 2A, B, C).

Colour: carapace reddish; chelipeds reddish, fingers dark brown, pale at their apex; legs reddish, with a white band at the distal end of the carp and dark brown dactylus. Region 3M with a pale longitudinal median strip, region 4M pale medially, notch at posterior margin of region 1P pale.

## Discussion

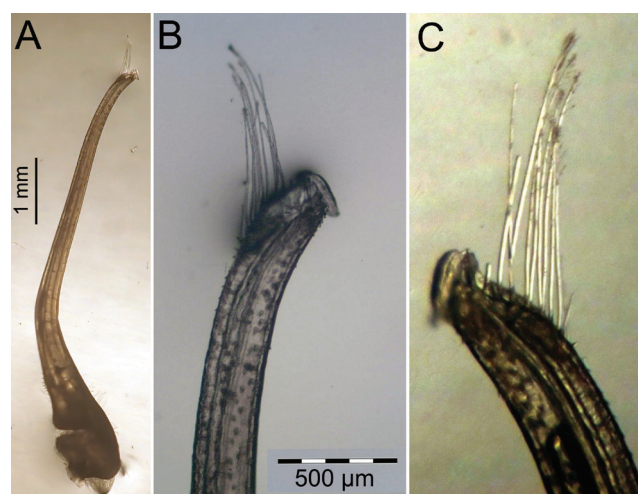
On the basis of the body and G1 morphological features described above, the crab was identified as *L. rugipes*, following Guinot (1958) and Serène (1984).

*Liomera rugipes* is close to *L. rubra* (A. Milne-Edwards, 1865) (cf. <http://decapoda.free.fr/illustration.php?n=7&sp=408>) mainly for the similar distribution of the furrows separating the regions, but the coarsely rough aspect of the antero-lateral regions of the carapace, chelipeds and walking legs separates the first from the second (Serène, 1984). In addition, the last three antero-lateral teeth are triangular and acute in *L. rubra*, rounded in *L. rugipes* (Nobili, 1906). Furthermore, G1 of *L. rugipes* shows ten long plumose setae slightly clavate at their distal extremity, while G1 of *L. rubra* shows nine not

hairy setae and the beak is distinctly curved downwards (Guinot, 1958; Serène, 1984). The carapace and legs of the recorded specimen appear clearly rough: the chelipeds have a corroded aspect, the last three antero-lateral teeth are rounded at the outer margin and the general characteristics of G1 agree with those described for *L. rugipes* in Guinot (1958).

The CL vs CW ratio of our specimen falls within the ranges reported in the literature for both *L. rugipes* and *L. rubra*, 0.57-0.66 and 0.57-0.65, respectively (Kossmann, 1877; Nobili, 1906; Lenz, 1910; Guinot, 1958; Serène & Nguyen, 1961; Serène, 1984; Galil & Vannini, 1990; Poupin *et al.*, 2018; Takeda & Komatsu, 2018; Al-Hindi, 2019). The size of our male crab, instead, was larger than the maximum size of 13.5 x 23 mm ever reported for a male *L. rugipes* (Serène, 1984).

The xanthid *L. rugipes* is distributed in the Indo-West Pacific oceans, from the Gulf of Suez, Red Sea, Gulf of Aden, Zanzibar, Somalia, Mayotte, Madagascar, Seychelles to Vietnam (Guinot, 1958, 1967; Serène & Nguyen, 1961; Serène, 1984; Galil & Vannini, 1990;



**Fig. 2:** Right first male pleopod of *Liomera rugipes* from Abu-Qir, Alexandria, Egypt (A: whole pleopod, dorsal view; B: apical portion, dorsal view; C: apical portion, ventral view).



Neumann & Spiridonov, 1999; Poupin *et al.*, 2018). It is an intertidal, subtidal species rarely reported, affiliated to the subtidal *L. rubra*, similarly distributed in the Indo-West Pacific from the Red Sea, Mayotte, South Africa up to Hawaii and French Polynesia (Poupin *et al.*, 2018).

The current record of *L. rugipes* is the first for the Mediterranean Sea and increases the number of non-indigenous brachyurans reported in the Egyptian Mediterranean waters to 21, of which 19 species are of Indo-Pacific origin (Nour *et al.*, 2022a). This is the second non-indigenous xanthid detected in the area under study, after *A. roseus* (Moussa & Zenetos, 2015), a species well-established and today present also in the waters of the Suez Canal (Osman *et al.*, 2015).

The small size of *L. rugipes* and its cryptic habits probably contribute to eluding its observation in the field and/or samplings, as for other Indo-Pacific xanthids recorded in Mediterranean waters (Corsini-Foka *et al.*, 2013; Karhan *et al.*, 2013). The region nearby Alexandria is close to the northern mouth of the Suez Canal and particularly rich in Erythraean NIS introduced through this corridor (Nour *et al.*, 2022a, b; Zava & Corsini-Foka, 2022). Consequently, the Suez Canal could be considered as the most plausible pathway of introduction of *L. rugipes* into the basin. Nevertheless, further records of the species are required in order to confirm not only this pathway, but also its eventual establishment, given that the occurrence described in the present communication is based on a single record.

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