

First occurrence of a Hymenosomatid crab *Elamena mathoei* (Desmarest, 1823) (Crustacea: Decapoda: Brachyura) in the Mediterranean Sea

J. ZAOUALI¹, J. BEN SOUISSI¹, M. RIFI¹ and C. d'UDEKEM d'ACQZ²

¹Institut National Agronomique de Tunisie, 43 Avenue Charles Nicolle, Tunis, Tunisia

²Royal Belgian Institute of Natural Sciences, Department Invertebrates, rue Vautier 29, B-1000 Brussels, Belgium

Corresponding author: bensouissi.jamila@inat.agrinet.tn

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Abstract

Mediterranean fauna is undergoing drastic modifications as a result of anthropogenic activities and global warming. The most important of these is the colonization of the Mediterranean Sea by alien species, many of them entering through the Suez Canal. While many of them are still confined to the Levant Basin, several have extended their distribution westwards to Tunisian waters. The presence of the Indo-west Pacific hymenosomatid crab *Elamena mathoei* on a rocky shore at Sidi Daoud, Cape Bon Peninsula, Tunisia, is the first Mediterranean record of this species. It is a testimony to the changes in the patterns of invasion in the Mediterranean Sea.

Keywords: *Elamena mathoei*, Hymenosomatidae, crab, alien, Tunisia, first Mediterranean record.

Introduction

Tunisian carcinological fauna remains rather poorly studied, inshore fauna in particular; species lists are often dated and based on a small number of locals. For example, for the NW shores of Cape Bon Peninsula (Fig. 1), Forest & Guinot (1956) record 3 species: *Xantho porressa* (Olivi, 1792), *Eriphia verrucosa* (Forskål, 1775) and *Pachygrapsus marmoratus* (Fabricius, 1787). Fifty years later, Limam *et al.* (2004) recorded 4 species in the same area, along the Zembra Archipelago: *E. verrucosa*, *Inachus phalangium* (Fabricius, 1775), *P. marmoratus* and *Percnon gibbesi* (H. Milne Edwards 1853), the latter being an alien species of Atlantic origin. The lack of baseline data is to be regretted, as the change in the biota resulting from anthropogenic activities is significant. The most important alteration factor is undoubtedly the colonization by aliens entering through the Suez Canal and establishing populations in Mediterranean waters (e.g. Galil *et al.*, 2002; Zenetos *et al.*, 2010). While so far many Indo-Pacific species are confined to the Levant Basin, some have extended their distribution westwards to Tunisian waters (Zaouali, 1993).

In February 2011, two crabs, were found amongst seaweed on a rocky shore in the vicinity of the small fishing harbour of Sidi Daoud. They were identified as a Hymenosomatid *Elamena mathoei* (Desmarest, 1823), of a family previously unrecorded in the Mediterranean

Sea. The species is known from the Indo-West Pacific Ocean and the Red Sea.

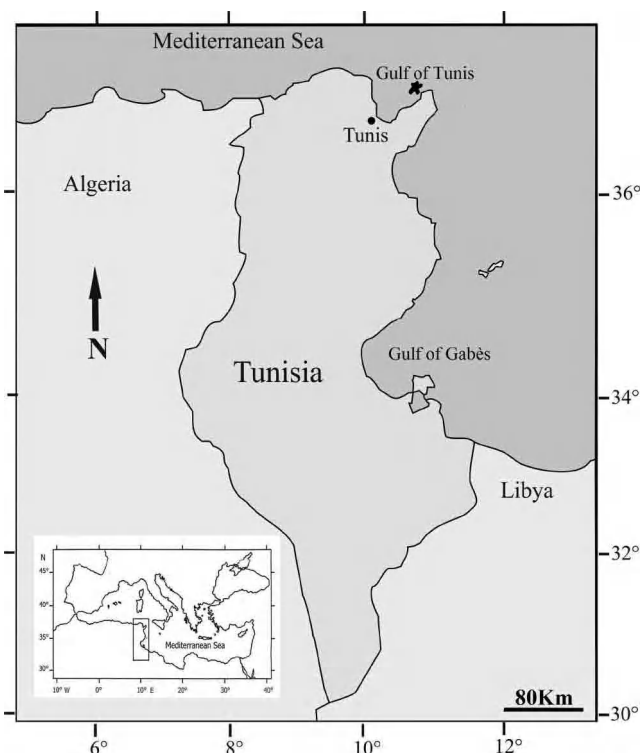


Fig. 1: Map of Tunisia showing the collecting site of *Elamena mathoei* (Desmarest, 1823) (black star).

Material and Methods

Sampling of the rocky mediolittoral and upper infralittoral macrofauna was carried out along the north-western coast of Cape Bon (37°02'40.61"N - 10°54'25.50"E) northern Tunisia (Fig. 1) in February 2011. Collected crustaceans were fixed in 95° ethanol. The two specimens recorded herein were deposited at the Royal Belgian Institute of Natural Sciences, Brussels. Drawings were inked using Adobe Illustrator software.

Results

Elamena mathoei (Desmarest 1823) Fig. 2.

Hymenosoma Mathæi Desmarest, 1823: 275-276; 1825: 163-164; H. Milne-Edwards, 1837: 33-35.

Hymenosoma Mathei Rüppell, 1830: 21, pl. 5 fig. 1.

Elamena mathæi; Paulson, 1875: 71, pl. 9, figs. 3-3b; Tesch, 1918: 20 (key), 21; Gordon, 1940: 63, figs. 1a-b, 2, 3; Paulson, 1961: 77, pl. 9, fig. 3-3b; Lucas, 1980: 158 (key); Ng & Chuang, 1996: 70, fig. 29.

Elamene Mathæi; Heller, 1861: 371.

Not *Elamene Mathæi* H. Milne-Edwards, 1853: 223, pl. 11 fig. 4 (? = *Halicarcinus* sp.).

Material: Sidi Daoud, 37°02'40.61"N - 10°54'25.50"E, on algae growing on rocks, 15-25. ii.2011: 2 males, length x width: 3.2 x 3.7 mm and 2.6 x 2.7 mm, RBINS, Inv.

Diagnosis of Tunisian specimens: Carapace slightly broader than long, bluntly triangular to broadly pyriform, without grooves, laterally smooth. Rostrum very broad, bluntly truncated with ventral rostral keel triangular, strong, visible dorsally. Eyes scarcely visible dorsally. Chelipeds stouter than ambulatory legs, with spatulate fingers. Ambulatory legs long and slender; with more or less distinct protrusion at distal dorsal edge of both merus and carpus; with dactylus laterally flattened, slightly curved inwards, ventral border lined with well-developed row of setae and with 2 subterminal teeth (one tooth broken on P5). Abdomen triangular and 5-segmented, with lateral border of antepenultimate and penultimate segments forming an angular concavity on each side. First gonopod sigmoid, tapering to pointed tip; with 9 subterminal setulose setae.

Colour pattern (in alcohol): pale brown; Desmarest (1823) described it as "couleur de corne" [horn coloured] and Rüppell (1830) as "einformig erdbräun" [uniformly earth brown].

Maximal length of carapace: "just under 6 mm" (Gordon, 1940).

Habitat: among algae on a rocky shore (present material) or "zwischen dem Meergras" [between sea grasses] (Rüppell 1830).

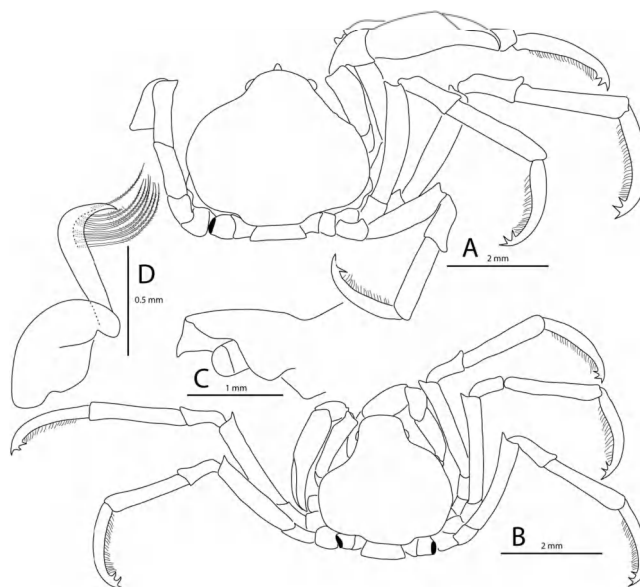


Fig. 2: *Elamena mathoei* (Desmarest, 1823), males, Sidi Daoud, 37°02'40.61"N - 10°54'25.50"E. A-B, habitus; C, anterior part of carapace in lateral view (largest specimen); D, right first gonopod.

Type locality: Ile-de-France (= Mauritius)] (Desmarest, 1823, 1825).

Distribution: *Elamena mathoei* has been reliably recorded from Somalia, Mombasa, Madagascar (Ng & Chuang, 1996), Réunion (Milne-Edwards, 1862), Mauritius (Desmarest, 1823, 1825) and the Red Sea (Rüppell, 1830: Bucht von Tor [= Bay of El-Tor]; Heller, 1861: no precise locality; Paulson, 1875: no precise locality; Gordon, 1940: Ghardaqa). The species has been recorded from French Polynesia: (Peyrot-Clausade, 1989), but the record needs confirmation and could be based on other *Elamena* species of the *truncata* group (Stimpson, 1858).

Remarks: The systematic position of the Hymenosomatidae Macleay, 1838, sometimes named false or crown spider crabs (Ng & Chuang, 1996), has been much debated, but recent evidence suggests that it occupies a very isolated position amongst eubrachyuran crabs (Guinot, 2011). The centre of diversity of the family is the tropical and sub-tropical Indo-West Pacific region, with some species living in inland waters and one in sub-Antarctic seas, *Halicarcinus planatus* (Fabricius, 1775) (Lucas 1980; Ng & Chuang, 1996). Hymenosomatidae are absent from a large part of the East Pacific, West Atlantic and North-eastern Atlantic and from the Mediterranean Sea. The Tunisian hymenosomatid specimens agree rather well with the illustrations of *E. mathoei* published by Paulson (1875), Gordon (1940) and Ng & Chuang (1996), except for the lateral border of the carapace, which looks completely smooth instead of presenting two low angles or traces of tooth on each side. This apparent difference presumably results from distortion of the rather soft body of these tiny crabs.

Discussion

The discovery of *E. mathoei* in the Gulf of Tunis is a surprise, because this Indo-Pacific crab was not previously recorded from the Mediterranean Sea, and Indo-Pacific aliens are more likely to be first recorded in the Levant Basin, and only later on in more western parts of the Mediterranean. While several Indo-Pacific alien crab species were recorded in southern Tunisia (Zaouali *et al.*, 2008), only one, *Eucrate crenata*, was recorded from northern Tunisia. This Euryplacidae crab, had first colonized and became abundant in the Gulf of Gabès (southern Tunisia) (Zaouali, 1993), and only ten years later was collected in the lagoon and Gulf of Tunis (Ben Souissi *et al.*, 2003), and the Bizerte lagoon in the northern part of the country (Shaiek *et al.*, 2010). Interestingly, 400 km separate the southern and northern Tunisian populations. The very small size of *E. mathoei* has possibly played a role in the lack of records in the Mediterranean and it must be pointed out that even in its native range there are few records of this tiny crab. It is possible that shipping served as the vector of the present record. The crab may have either arrived from the Red Sea or the Indian Ocean or from a yet undetected population in the Levant Basin. Indeed, several alien species of molluscs and crustaceans, including the presumably ship-transported crab *Hemigrapsus sanguineus* (De Haan, 1853) and *Pilumnopus vauquelini* (Audouin, 1826) (Ben Souissi *et al.*, 2003; 2004; 2005) respectively, which have been found in the lagoon of Tunis (SW of the Gulf of Tunis), where a large commercial harbour has been established. Such large harbours located in a confined environment are suitable environments for the settlement of alien species, which travel on the fouling of ship hulls or in their ballast waters. The Tunisian specimens of *E. mathoei* were recorded less than 100 km from the lagoon of Tunis, which could possibly be the point of arrival of the species. A search for positive and negative records of *E. mathoei* in other localities in Tunisia and elsewhere in the Mediterranean could assist in elucidating its pathway of colonization.

Conclusion

As a consequence of anthropogenic activities, biogeographical boundaries are becoming more mutable. Mediterranean fauna has been heavily affected by these processes, which have increased dramatically in the last decades. The *mare nostrum* is in the rapid process of losing its faunistic identity, the biocenoses of the Levant Basin being already largely dominated by euryecious Indo-Pacific species. The discovery of the crab *E. mathoei* in northern Tunisia indicates that species dispersal capacity is more significant than previously assumed. Finally, there are little doubts that a more thorough monitoring of

Tunisian marine fauna would lead to further discoveries of previously established and recently arrived alien species.

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References

- Audouin, V., 1826. Explication sommaire des planches de Mollusques dont les dessins ont été fournis par M.J.C. Savigny, offrant une expose des caracteres naturels de genres avec les descriptions des especes. Description l'Egypte. *Histoire Naturelle*, 2 (4), 1-339.
- Ben Souissi, J., Rezig, M., Zaouali, J., 2003. Appearance of invasive species in southern lake of Tunis p. 911-922. In: *Proceedings of the Sixth International Conference on the Mediterranean Coastal Environment, MEDCOAST 03*. October 2003, Ravenna, Italy.
- Ben Souissi, J., Zaouali, J., Rezig, M., Bradai, M.N., Quignard, J.P. *et al.*, 2004. Contribution à l'étude de quelques récentes migrations d'espèces exotiques dans les eaux tunisiennes. *Rapports de la Commission Internationale pour l'Exploration Scientifique de la Mer Méditerranée*. 37, 312.
- Ben Souissi, J., Trigui El Menif, N., Mahjoub, M.S., Mejri, H., Quignard, J.P. *et al.*, 2005. On the recent occurrences of marine exotic species in the Tunisian waters p. 529-540. In: *Proceedings of the Seventh International Conference on the Mediterranean Coastal Environment, MEDCOAST 05*, 25-29 October 2005, Kusadasi. Turkey.
- Desmarest, A.G., 1823. Crustacés malacostracés In: F.G. Levrault and Le Normant (Eds), *Dictionnaire des Sciences Naturelles*. Strasbourg & Paris, 28, 211-285.
- Desmarest, A.G., 1825. Considérations générales sur la classe des crustacés et description des espèces de ces animaux, qui vivent dans la mer, sur les côtes, ou dans les eaux douces de la France. Paris & Strasbourg.
- Forest, J., Guinot, D., 1956. Sur une collection de Crustacés Décapodes et Stomatopodes des mers tunisiennes. *Bulletin de l'Institut National Scientifique et Technique d'Océanographie et de Pêche Salammbô*, 53, 24-43.
- Galil, B., Frogliani, C., Noel, P., 2002. Crustaceans: decapods and stomatopods. *CIESM Atlas of Exotic Species in the Mediterranean, Vol. 2 Crustaceans*. CIESM Publishers, Monaco, 192 pp.
- Gordon, M.J., 1940. On some species of the genus *Elamena* (s.s.) (Crustacea, Decapoda). *Proceedings of Linnean Society of London*, 152, (1), 60-78.
- Guinot, D., 2011. Odiomarinae nov. fam., a new subfamily for two primitive genera of Hymenosomatidae MacLeay, 1838, with preliminary remarks on the family (Crustacea, Decapoda, Brachyura). *Zootaxa*, 2732, 20-32.
- Heller, C., 1861. Beiträge zur Crustaceen-Fauna des Rothen Meeres. I. Theil. *Sitzungsberichte der Mathematisch-Naturwissenschaftlichen Klasse der Kaiserlichen Akademie der Wissenschaften, Wien* 43, 297-374.

- Limam, A., Rais, C., Ramos-Espla, A.A., 2004. Rapport global des travaux de prospection de la partie marine du Parc National de Zembra et Zembretta, *Projet MedMPA*, 71 pp. 5 annexes.
- Lucas, J.S., 1980. Spider crabs of the family Hymenosomatidae (Crustacea: Brachyura) with particular reference to Australian species: systematic and biology. *Records of Australian Museum*. 33 (4), 148-247.
- Milne Edwards, A., 1862. Faune carcinologique de l'île de la Réunion. In: Maillard, L. (Eds.). *Notes sur l'île de la Réunion*. Vol. Annexe F, Paris, 1-16.
- Milne Edwards, H., 1834-1840. Histoire naturelle des Crustacés, comprenant l'anatomie, la physiologie et la classification de ces animaux. *Librairie Encyclopédique de Roret*. Vol. 1-3. Paris: Roret. (1) 468, (2) 532, (3) 638 pp, Atlas 1-32, Plates I-XLII.
- Milne Edwards, H., 1853. Mémoire sur la famille des Ocypodides. Suite (1). Deuxième Tribu Principale. *Annales de la Société des sciences naturelles*, 3e série 20: 163-228, Plates 6-11.
- Ng, P.K.L., Chuang, C.T.N., 1996. The Hymenosomatidae (Crustacea, Decapoda, Brachyura) of Southeast Asia, with notes on other. *The Raffles Bulletin of Zoology*, Supplement No 3, 18 September, 82 pp.
- Paulson, O., 1875. Studies on Crustacea of the Red Sea with notes regarding other seas. Part I. Podophthalmata and Edriophthalmata (Cumacea). Kiev: *S.V. Kul'zhenko*. xiv, 144 pp, Plates 1-22. (In Russian).
- Paulson, O., 1961. Studies on Crustacea of the Red Sea with notes regarding other seas. Part I. Podophthalmata and Edriophthalmata (Cumacea). English translation by the Israel Program for Scientific Translations, Jerusalem. 164 pp.
- Peyrot-Clausade, M., 1989. Crab cryptofauna (Brachyura and Anomura) of Tikehau, Tuamotu Archipelago, French Polynesia. *Coral Reefs*, 8, 109-117.
- Rüppell, E., 1830. Beschreibung und Abbildung von 24 Arten kurzschwänzigen Krabben, also Beitrag zur Naturgeschichte des Rothen Meeres. Frankfurt am Main: H. L. Bröner. 28 pp, Plates 1-6.
- Stimpson, W., 1858. Crustacea Anomura, Pars VII. Prodromus descriptionis animalium evertibratorum, quae in Expeditione ad Oceanum Pacificum Septentrionalem, a Republica Federata missa, Cadwaladaro Ringgold et Johanne Rodgers Ducibus, observavit et descripsit W. Stimpson, Pars VII. *Proceedings of the Academy of Natural Sciences of Philadelphia* 10, 225-252.
- Shaiek, M., Romdhane, M.S., Jenhani Ben Rejeb, A., 2010. Communauté actuelle de crabes (Brachyura, Decapoda, Crustacea, Artropoda) de la lagune de bizerte (Tunisie Septentrionale). Rapport des communications internationales de la mer Méditerranée, 39.
- Tesch J.J., 1918. Decapoda F. (Decapoda Brachyura continued) Hymenosomatidae, Retropilumnidae, Ocypodidae, Grapsidae and Gecarcinidae. *Siboga Expédition*, 39 (C), 1-148, Plates 1-6.
- Zaouali, J., 1993. Présence d'*Eucrate crenata* dans le golfe de Gabès (Crustacea, Decapoda, Brachyura) *Marine Life*, 53-56.
- Zaouali, J., Ben Souissi, J., Galil, B.S., d'Udekem d'Acoz, C., Ben Abdallah, A., 2008. Grapsoid crabs (Crustacea: Decapoda: Brachyura) new to the Syrtic Basin, southern Mediterranean Sea. The roles of vessel traffic and climate change. *Marine Biodiversity Records*, 1, e73 doi:10.1017/S1755267207007701.
- Zenetos, A., Gofas, S., Verlaque, M., Cinar, M.E, García Raso, J.E. et al., 2010. Alien species in the Mediterranean Sea by 2010. A contribution to the application of European Union's Marine Strategy Framework Directive (MSFD). Part I. Spatial distribution. *Mediterranean Marine Science* 11 (2), 381-493.