Mediterranean Marine Science

Vol 15, No 1 (2014)

Vol. 15, No 1 (unpublished)

First record of an exotic hippolytid shrimp in the eastern Mediterranean Sea

C. FROGLIA, M.C. DEVAL

doi: 10.12681/mms.651

Short Communication

Mediterranean Marine Science
Indexed in WoS (Web of Science, ISI Thomson) and SCOPUS
The journal is available on line at http://www.medit-mar-sc.net
DOI: http://dx.doi.org/ 10.12681/mms.651

First record of an exotic hippolytid shrimp in the eastern Mediterranean Sea

C. FROGLIA[1] and M. C. DEVAL[2]

[1] C.N.R. - Istituto di Scienze del Mare, u.o.s. Ancona, 60015 Ancona, Italy
[2] Akdeniz University, Faculty of Fisheries, TR-07058 Antalya, Turkey

Corresponding author: c.froglia@alice.it

Handling Editor: Argyro Zenetos

Received: 27 September 2013; Accepted: 27 October 2013; Published on line: 17 December 2013

Abstract

The alien hippolytid shrimp *Lysmata kempi* Chace, 1997 (= *Hippolysmata dentata* Kemp, 1914) , never recorded after its original description from the Eastern Indian Ocean, is reported for the first time in the eastern Mediterranean Sea (Gulf of Antalya), with remarks on its taxonomy.

Keywords: Decapoda, Hippolytidae, Lysmata kempi, alien species, Mediterranean Sea.

Introduction

The eastern Mediterranean biota are undergoing dramatic changes, since the opening of the Suez Canal in 1869 and its progressive widening, due to the introduction of hundreds of Indo-Pacific species (Katsanevakis *et al*., 2013). The addition of exotic species has modified the regional biodiversity (Por, 2010). The newcomers sometime have outcompeted the populations of autochthonous species with similar ecological niches (Galil & Shlagman, 2010) and some have become a valued resource for local fishermen (Galil, 2007).

By 2010, the checklist of crustacean decapod fauna in the Israeli Mediterranean Sea (Galil & Shlagman, 2010) included 166 species and that for the Turkish Mediterranean waters included 184 species (Ates *et al.,* 2010). Two years later the decapod species recorded from the Levantine Sea reached 187 (Corsini-Foka & Pancucci-Papadopoulou, 2012), and other records have been added since. About one fifth of the decapod fauna in the region is of Indo-Pacific origin.

Among the "shrimps" (suborders Dendrobranchiata, Pleocyemata), the families Penaeidae and Alpheidae are the most successful Indo-Pacific invaders of the eastern Mediterranean Sea accounting, respectively, for 9 and 4 species, followed by the families Palaemonidae, Pasiphaeidae and Ogyrididae with 3, 2 and 1 species respectively.

Here we report the capture in the eastern Mediterranean Sea (Gulf of Antalya, Turkey) of the first Indo-Pacific representative of the family Hippolytidae: *Lysmata kempi* Chace, 1997 [= *Hippolysmata dentata* Kemp, 1914, nec *Lysmata dentata* (de Haan, 1844) = *Lysmata ternatensis* de Man, 1902].

Materials and Methods

As part of a study on selectivity of bottom-trawl nets used by Turkish Mediterranean trawlers, experimental trawling operations were carried out monthly, at night time, in a circalitoral ground, at depths of 35–38 m, located in the eastern side of the Gulf of Antalya. A sparse *Posidonia oceanica* meadow borders this ground landward. The otter-trawl, made of polyethylene, had groundrope of 17 m, head-line of 15.3 m, and cod-end, stretch mesh opening 44 mm, equipped with a polyamide cover cod-end (stretch mesh opening 24 mm).

In one sample, two small ovigerous shrimps were noticed among the catch and were later identified, using the key provided by Chace (1997), as *Lysmata kempi* Chace, 1997 and compared with the original description of *Hippolysmata dentata* in Kemp (1914). A second haul made one year latter, almost in the same location, made with a 3.5 m beam-trawl equipped with a cover cod-end made of knotless polyamide (stretch mesh opening 16 mm), yielded two more specimens.

Size of shrimps (Standard carapace length (c.l.): distance from the posterior orbital edge to the middorsal posterior border of carapace; Total carapace length: distance from the tip of rostrum to the middorsal posterior border of carapace was measured with a digital calliper to the nearest 0.1 mm.

Results

Lysmata kempi Chace, 1997 (Fig. 1, Fig. 2A-D)

Material examined: Eastern Mediterranean, Gulf of Antalya: (36°49.2'N 30°57.4'E - 36°43.4'N 31°10.9'E), depth 35–38 m, silt, 16 April 2010, 2 specimens, ovigerous,

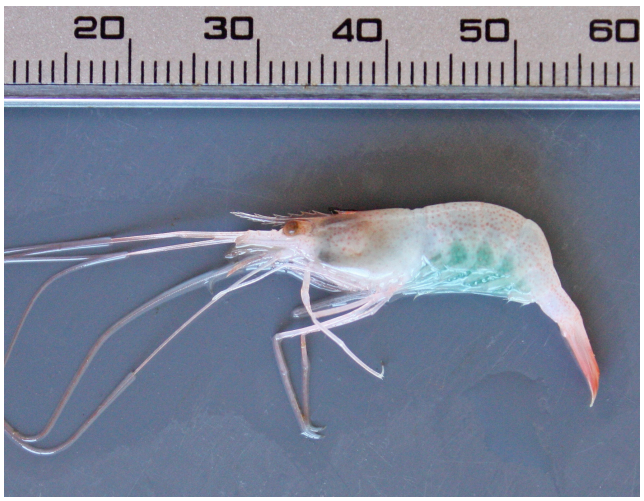

Fig. 1: *Lysmata kempi*, Gulf of Antalya, Turkey. Colour few hours after capture and storage in chilled sea-water.

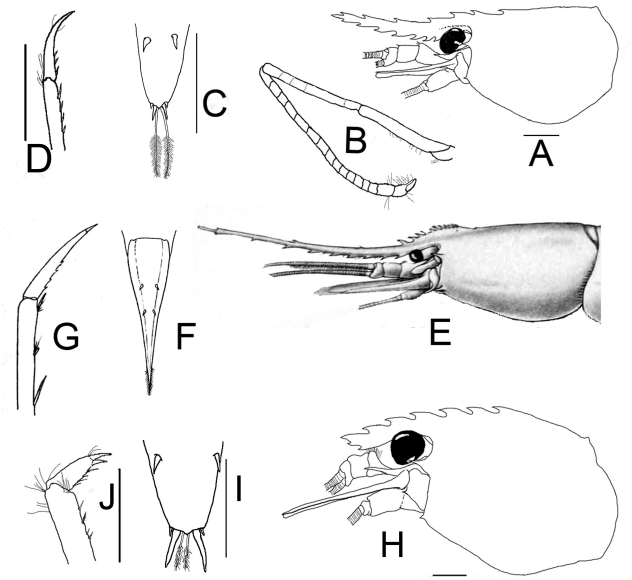

Fig. 2: *Lysmata kempi*, ovigerous, c.l. 7.4 mm, Gulf of Antalya (Turkey): A – carapace and anterior appendages, B – 2nd pereopod, C – telson (lateral setae omitted), D – dactylus 5th pereopod; *Exhippolysmata ensirostris* : E – carapace and anterior appendages, F – telson, G – dactylus 5th pereopod, (from Kemp, 1914); *Lysmata seticaudata*, ovigerous, c.l. 9.8 mm, Gulf of Alghero (Italy): H – carapace and anterior appendages, I – telson (lateral setae omitted), J – dactylus 5th pereopod. Scale bars = 2 mm.

c.l. 7.6–7.9 mm; (36°49.1'N 31°00.6'E - 36°48.7'N 31°02.9'E), depth 30 m, silt, 21 April 2011, 2 specimens, ovigerous, c.l. 6.3–7.4 mm.

The specimens are deposited in the Reference Collection of the Faculty of Fisheries, Akdeniz University, Antalya (Turkey) and in the senior author (CF) Crustacea Collection (to be deposited later in the Museo civico di Storia naturale, Verona, Italy).

Specimens can be distinguished immediately from all the other species in the genus by their long rostrum, exceeding scaphocerite and slightly shorter than carapace (Fig. 2A).

In all 4 specimens, the rostrum has 7 dorsal teeth, including 2 placed posteriorly to orbital margin, whereas the number of ventral teeth ranges between 5 and 7 (Table 1). The dorso-lateral flagellum of the antennula has the proximal 26 – 29 articles thickened and setigerous without an accessory branch. The scaphocerite just overreaches the antennular peduncle. The second pereopods have the carpus subdivided in 14 -17 articles and the carpo-merus articulation reaches the base of the scaphocerite. The dactylus of the 3rd to 5th pereopods is long and falciform with only 2-3 thin articulated spines on the proximal third of the flexor margin (Fig. 2D). The telson has 2 pairs of acute prominent spines on the dorsal surface and its distal margin is acute mesialy and armed with 2 pairs of spines, the inner longer, separated by a mesial pair of long plumose setae (Fig. 2C); long setae border the lateral margins. The endopod of the first pleopods is devoid of apical cincinnuli and the second pleopods have only appendix interna. No male gonopore could be detected on the coxa of the fifth pereopods, which could be due to the condition of the preserved specimens, as the protandric simultaneous hermaphroditism is suspected to be a fixed trait in the genus (Baeza, 2009).

The shrimps were dark-red when caught, and turned to light-pink with sparse reddish chromatophores after a few hours (Fig. 1); cornea brownish.

The four specimens are ovigerous and the eggs, emerald green in life (Fig. 1), measure 0.45 mm in diameter.

The largest specimen (TL, about 35 mm, CL 7.9 mm) is slightly larger than Kemp's type specimen.

The decapod assemblage associated with these hippolytid shrimps was characterized by the following lessepsian species, listed in order of abundance: *Charybdis longicollis* Leene, 1938, *Metapenaeus monoceros* (Fabricius, 1798), *Metapenaeopsis aegyptia* Galil &

Table. 1. Morphometric and meristic data of the specimens of *L. kempi* caught in the Gulf of Antalya.

Sampling date	**16 Apr 2010**	**16 Apr 2010**	**21 Apr 2011**	**21 Apr 2011**
Standard Carapace Length c.l. (mm)	7.6	7.9	6.3	7.4
Total Carapace Length (mm)	15.0	16.8	11.8	14.1
Rostrum teeth (dorsal/ventral)	2+5 / 7	2+5 / 7	2+5 / 5	2+5 /7
Carpus of 2nd pereopods, number of articles (left – right)	15 – 15	15 – 15	15 – 14	17 - 16

Golani, 1990, *Marsupenaeus japonicus* (Bate, 1888), *Penaeus semisulcatus* De Haan, 1844, *Melicertus hathor* (Burkenroad, 1959), *Ixa monodi* Holthuis & Gottlieb, 1959, and *Alpheus rapacida* De Man, 1908; the autochthonous Mediterranean decapods were represented by few *Melicertus kerathurus* (Forskål, 1775), *Aegaeon cataphractus* (Olivi, 1792) and *Macropodia rostrata* (Linnaeus, 1761).

Discussion

Members of the genus *Lysmata* have attracted the interest of several investigators for their unique reproductive biology that is characterized by protandric simultaneous hermaphroditism (see: Baeza *et al*., 2009, and references therein).

De Grave & Fransen (2011) listed 42 species in the genus *Lysmata* Risso, 1816, type species *Lysmata seticaudata* (Risso, 1816), as currently understood (i.e. including the species previously placed in *Hippolysmata* Stimpson, 1860, type species *Hippolysmata vittata* Stimpson, 1860).

Three species of *Lysmata* are known in the Mediterranean Sea: *L. seticaudata* (Risso, 1816), *L. nilita* Dohrn & Holthuis, 1950 and *L. olavoi* Fransen, 1991, all with East Atlantic-Mediterranean distribution (Udekem d'Acoz, 1999).

Hippolysmata dentata was established by Kemp (1914) on two specimens collected in the Bay of Bengal: off the mouth of River Irrawaddy (Myanmar) and off False Point Harbour (State of Orissa, India). As far as we know, no other specimen has been collected thereafter. The nomenclatorial status of *H. dentata*, clearly depicted by Holthuis (see: Chace, 1997, pag. 71), motivated Chace to rename it *Lysmata kempi*.

Recent phylogenetic studies based on the sequences of *16S 12S* and *COI* mitochondrial DNA (Baeza, 2010; Baeza & Fuentes, 2013) or *16S* mtDNA and *28S* rDNA (Fiedler *et al*., 2010) suggest that the genus *Lysmata s.l.* is paraphyletic, with 3 - 4 clades and with the genus *Exhippolysmata* Stebbing, 1915 - type species *Exhippolysmata ensirostris* (Kemp, 1914) - nested within it.

Members of the genus *Lysmata -sensu lato-* have short rostrum, at most reaching the distal end of the antennular peduncle, pereopods 3rd to 5th with short and biunguiculate dactylus, and tip of telson rounded and flanked by two pairs of articulate spines (Fig 2H-J), whereas in the genus *Exhippolysmata* the rostrum is long, exceeding the distal end of the scaphocerite, pereopods 3rd to 5th have a long falcate dactylus, not biunguiculate, and the telson ends in an acute tip without distal articulate spines (Fig. 2 E-G).

The present species, due to its long rostrum and falcate, not biunguiculate, dactyls (Fig. 2A-C), set apart from all the species currently placed in the genus *Lysmata,* may belong to the genus *Exhippolysmata.* In the future, combined morphological and molecular studies may confirm our assumption, in which case Kemp's name will take priority and the correct name of the species would be *Exhippolysmata dentata* (Kemp, 1914).

The species was never recorded since its description by Kemp in 1914 from the eastern Indian Ocean; thus, the vector of its introduction in the eastern Mediterranean Sea is only a matter of speculation, even if shipping may be likely.

References

Ates, A.S., Kocatas, A., Katagan, T., Özcan, T., 2010. An updated list of decapod crustaceans on the Turkish coast with a new record of the Mediterranean shrimp, *Processa acutirostris* Nouvel and Holthuis 1957 (Caridea, Processidae). *North-Western Journal of Zoology,* 6 (2), 209-217.

Baeza, J.A., 2009. Protandric simultaneous hermaphroditism is a conserved trait in *Lysmata* (Caridea: Lysmatidae): implications for the evolution of hermaphroditism in the genus. *Smithsonian Contributions to Marine Sciences,* 38, 95-110.

Baeza, J.A., 2010. Molecular systematics of peppermint and cleaner shrimps: phylogeny and taxonomy of the genera *Lysmata* and *Exhippolysmata* (Crustacea: Caridea: Hippolytidae). *Zoological Journal of the Linnean Society*, 160, 254-265.

Baeza, J.A., Fuentes, M.S., 2013. Exploring phylogenetic informativeness and nuclear copies of mitochondrial DNA (numts) in three commonly used mitochondrial genes: mitochondrial phylogeny of peppermint, cleaner, and semiterrestrial shrimps (Caridea: *Lysmata*, *Exhippolysmata*, and *Merguia*). *Zoological Journal of the Linnean Society,* 168, 699-722.

Baeza, J.A, Schubart, C.D., Zillner, P., Fuentes, S., Bauer, R.T., 2009. Molecular phylogeny of shrimps from the genus *Lysmata* (Caridea: Hippolytidae): the evolutionary origins of protandric simultaneous hermaphroditism and social monogamy. *Biological Journal of the Linnean Society,* 96, 415-424.

Chace, F.A. Jr., 1997. The Caridean Shrimps (Crustacea: Decapoda) of the Albatross Philippine Expedition, 1907-1910, Part 7: Families Atyidae, Eugonatonotidae, Rhynchocinetidae, Bathypalaemonellidae, Processidae, and Hippolytidae. *Smithsonian Contributions to Zoology,* 587, 1-106.

Corsini-Foka, M., Pancucci-Papadopoulou, M.A., 2012. Inventory of Crustacea Decapoda and Stomatopoda from Rhodes Island (Eastern Mediterranean Sea), with emphasis on rare and newly recorded species. *Journal of Biological Research - Thessaloniki*, 18, 359-371.

De Grave, S., Fransen, C.H.J.M., 2011. Carideorum catalogus: the recent species of the dendrobranchiate, stenopodidean, procarididean and caridean shrimps (Crustacea: Decapoda). *Zoologische Mededelingen,* 85 (9), 195-589.

Fiedler, G.C., Rhyne, A.L., Segawa, R., Aotsuka, T., Schizas, N.V., 2010. The evolution of euhermaphroditism in caridean shrimps: a molecular perspective of sexual systems and systematics. *BMC Evolutionary Biology,* 10 (297), 1-14.

Galil, B.S., 2007. Seeing Red: Alien species along the Mediterranean coast of Israel. *Aquatic Invasions,* 2(4), 281-312.

Galil, B.S., Shlagman, A. 2010. An annotated list of the decapod Crustacea of the Mediterranean coast of Israel - half a century later. p. 269-281. In: *Studies on Malacostraca: Lipke Bijdeley Holthuis memorial volume*, Fransen C.H.J.M., De Grave S., Ng P.K.L. (Eds). Crustaceana Monographs, 14. Brill, Leiden, Boston.

Katsanevakis S., Zenetos A., Belchior C., Cardoso A.C., 2013. Invading European Seas: assessing pathways of introduction of marine aliens. *Ocean & Coastal Management,* 76, 64-74.

Kemp S., 1914. Notes on Crustacea Decapoda in the Indian Museum, V: Hippolytidae. *Records of the Indian Museum,* 10 (2), 81-129.

Por, F.D. 2010. Climate Optimum rejuvenates the Mediterranean marine world. *Integrative Zoology,* 5 (2), 112-121.

Udekem d'Acoz d', C., 1999. Inventaire et distribution des crustacés décapodes de l'Atlantique nord-oriental, de la Méditerranée et des eaux continentales adjacentes au nord de 25° N. *Patrimoines Naturels (M.N.H.N./.P.N.),* 40, 1-383.