Mediterranean Marine Science

Vol 19, No 1 (2018)

Vol 19, No 1 (2018)

First record of exotic Lysmatid shrimp Lysmata vittata (Stimpson, 1860) (Decapoda: Caridea: Lysmatidae) from the Egyptian Mediterranean coast

KHALED MAHMOUD ABDELSALAM

doi: 10.12681/mms.15591

Short Communication

Mediterranean Marine Science
Indexed in WoS (Web of Science, ISI Thomson) and SCOPUS
The journal is available online at http://www.medit-mar-sc.net
DOI: http://dx.doi.org/10.12681/mms.15591

First record of the exotic lysmatid shrimp *Lysmata vittata* (Stimpson, 1860) (Decapoda: Caridea: Lysmatidae) from the Egyptian Mediterranean coast

KHALED MAHMOUD ABDELSALAM

National Institute of Oceanography and Fisheries, Alexandria, Egypt

Corresponding author: Kh.abdelsalam@gmail.com
Handling Editor: Argyro Zenetos

Received: 29 December 2107; Accepted: 10 April 2018; Published on line: 14 May 2018

Abstract

The present study deals with first record of the alien lysmatid shrimp *Lysmata vittata* (Stimpson, 1860) collected in April 2017 from the Egyptian Mediterranean Sea. A concise re-description supplied with illustrations, taxonomic remarks, habitat notes, and distribution of the recorded species are provided.

Keywords: Alien, Egypt, first record, Lysmatidae, Mediterranean Sea, Systematic.

Introduction

The genus *Lysmata Risso*, 1816, a member of the family Lysmatidae Dana, 1852, contains more than 48 described species (*e.g.*, Anker *et al*., 2009; De Grave & Fransen, 2011; De Grave *et al*., 2014; WoRMS, http://www.marinespecies.org/aphia.php?p=taxlist, March 30, 2018), including the species previously placed in *Hippolysmata* Stimpson, 1860. There is a rather confusing synonymy of several taxa, based on variations of some morphological characteristics (Chace, 1997; d' Udekem d'Acoz, 2000; Soledade *et al*., 2013; Alves *et al.*, 2015), as well as portraying new species (*e.g.* Zhibin & Xinzheng, 2016; Prakash & Baeza, 2017).

Many species of *Lysmata* are characterised by their specific colour designs, which can be utilized in the field for species recognition (Rhyne & Lin, 2006; Rhyne & Anker, 2007). On account of their bright colouration and capacity to control problematic anemones, *e.g.*, *Aiptasia pallida* in home aquaria, *Lysmata* species are exceptionally marketable in the aquarium business (Rhyne *et al*., 2004).

The distribution of the genus *Lysmata* is worldwide in tropical, mild, and cool oceans, with a large number of species occurring in the Indo-West Pacific (Chace, 1997). The typical natural surroundings of most species is in shallow waters, on hard and mixed substrates, *e.g*., the intertidal reef flats and reef faces, as well as turtle grass beds with rocks and rubble and coral bommies (Rhyne & Lin, 2006).

Regarding the records of genus *Lysmata* in the eastern Mediterranean Sea, *Lysmata seticaudata* (Risso, 1816) was originally described from Sicily, Italy, and subsequently reported from the Sea of Marmara by Demir (1952-1954), the Mediterranean coast of Israel (Lewinsohn & Holthuis, 1964), Cyprus (Lewinsohn & Holthuis, 1986), the southeastern Aegean Sea (Ateş *et al*., 2007), and Rhodes island (Corsini-Foka & Pancucci-Papadopoulou, 2012). However, several other species are known from the Mediterranean: *L. seticaudata* (Risso, 1816), *L. nilita* Dohrn & Holthuis, 1950, and *L. olavoi* Fransen, 1991. These three species have an east Atlantic-Mediterranean distribution (d' Udekem d'Acoz, 1999). Froglia & Deval (2014) reported the first record of the Indo-Pacific shrimp *Lysmata kempi* Chace, 1997 (= *Hippolysmata dentata* Kemp, 1914) in the Gulf of Antalya, Turkey.

Lysmata vittata (Stimpson, 1860) is a second introduced species, with an originally Indo-West Pacific distribution (Ahyong, 2010).

The present study aims to document the first record of this alien lysmatid shrimpin in the Mediterranean Sea, recorded from the Egyptian coastline. A concise re-description is provided here with illustrations, taxonomic comments, habitat notes, and distribution of the recorded species are given.

Materials and Methods

In April 2017, specimens of *Lysmata vittata* were recovered during a collection of shrimp by-catch, using a trawling net of a fishing vessel working in front of Ras El-Bar (31.33715º N, 31.54217º E), at shallow depths

(7-10 m). On board, specimens were frozen for further examination. In the laboratory, samples of new lysmatid shrimp were isolated and recorded for identification.

Specimens were examined carefully to identify and characterise the species. Relevant scientific publications were consulted for species identification including Bruce (1990), Chace (1997), and Soledade *et al*. (2013). The specimens were then preserved in 70% ethanol, and deposited in the Collection of Taxonomy & Biodiversity of Aquatic Biota (TBAB) laboratory of the National Institute of Oceanography and Fisheries, Alexandria branch, Egypt. The carapace length (CL) was measured in mm along the medio-dorsal line from the post-orbital edge to the back border of the carapace.

Specimens were studied utilizing a stereo-zoom microscope. Length measurements of individuals were made to the closest 0.01 mm using an advanced digital caliper. Illustrations of most anatomical parts were made under a dissecting microscope furnished with a *camera lucida*. Microphotographs were made under a light microscope with a mounted Nikon digital camera (Model D3200).

Results

Systematic Account

Family: Lysmatidae Dana, 1852
Genus: *Lysmata* Risso, 1816
Lysmata vittata (Stimpson, 1860)
Figs. 1-9

Synonymy:

Hippolysmata vittata Stimpson, 1860: 95 (type locality: Hong Kong).
Nauticaris unirecedens Bate, 1888:608, pl. 110, fig. 1 (type locality: Hong Kong).
Hippolysmata durbanensis Stebbing, 1921:20, pl. 5 (type locality: Durban Bay, South Africa).
Hippolysmata (Hippolysmata) vittata - Kubo, 1951: 284-287, figs. 13N, 14 EF, 16. - Hayashi and Miyake, 1968: 156, fig. 17.- Bruce, 1990:601-608, figs. 23-28. - Chace, 1997: 78. - Laubenheimer & Rhyne, 2010: 299-302, figs. 1-3.

***Material examined*:**

TBAB (CR 2017-2-1), April 13, 2017, 2 ovigerous females (CL = 9.48 and 8.59 mm) and 2 males (CL = 8.23 and 8.46 mm), 7-10 m depth.

Description:

Colour

Body semi-transparent with longitudinal, oblique, transverse reddish brown stripes; with an almost complete transverse stripe on the anterior and posterior ends of both first and third abdominal pleurons. Dorsally, abdominal somites with three longitudinal reddish brown stripes extending to the distal end of uropods and telson. The carapace is finely dotted (Fig. 1).

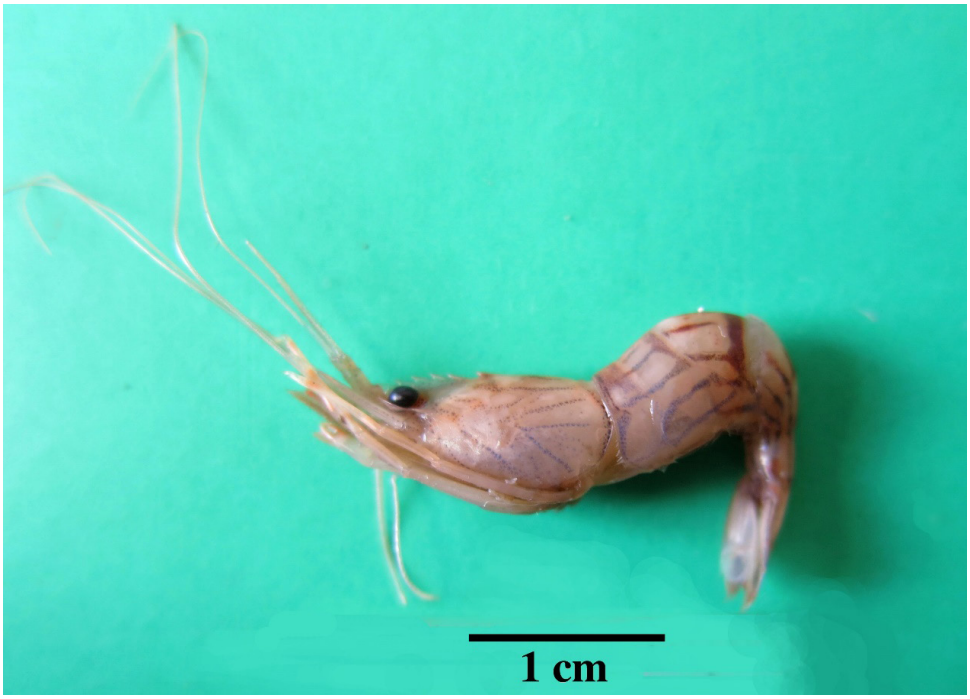

Fig. 1: *Lysmata vittata* (Stimpson, 1860). Lateral view of preserved male specimen, showing the colour pattern: carapace length 8.46 mm.

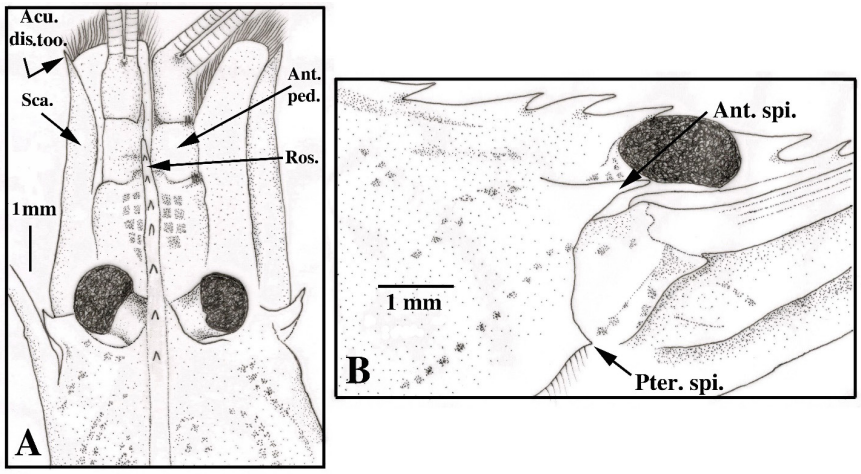

Fig. 2: Carapace of *Lysmata vittata*. **A.** Dorsal view showing the rostrum (Ros.), antennular peduncle (Ant. ped.), scaphocerite (Sca.), and acute distolateral tooth (Acu. dis. too.). **B.** Right side lateral view showing antennal spine (Ant. spi.) and pterygostomian spine (Pter. spi.).

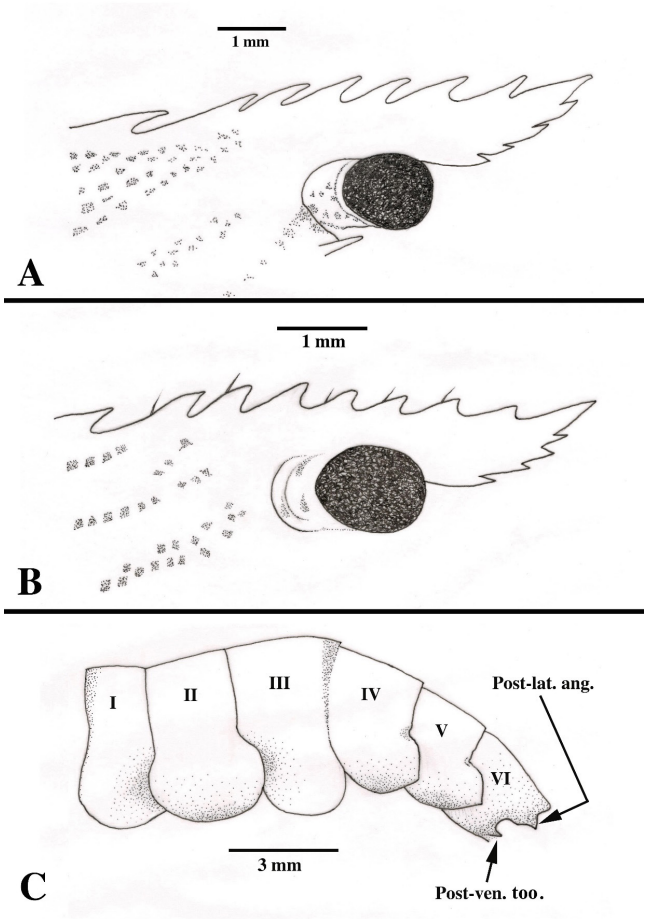

Fig. 3: *Lysmata vittata*. **A.** & **B.** Anterior carapace showing dorsal and ventral teeth of rostrum. **C.** Lateral view of abdomen showing the posteroventral tooth (Post-ven. too.) and the posterolateral angle (Post-lat. ang.) of the sixth pleuron.

Carapace

Carapace smooth, robust, the posterio-ventral margin almost rounded, with short, thin straight rostrum, slightly ascending, almost reaching the distal margin of the second segment of the antennular peduncle (Fig. 2A). Dorsal margin of rostrum with 7–8 teeth, the most posterior tooth not reaching the mid-length of carapace; ventral margin of rostrum usually with four teeth; eyes relatively large, not reaching dorsal margin of rostrum (Fig. 3A, B). Carapace with well-developed marginal, acute and slender antennal spine and with small acute pterygostomian spine (Fig. 2B).

Abdomen

Smooth abdominal segments. First to third abdominal pleurae rounded ventrally; fourth pleuron rounded, without acutely angled end; fifth pleuron with subacute or acute posterolateral tooth; sixth pleuron with small posteroventral tooth and acute posterolateral angle (Fig. 3C). Telson tapering posteriorly, with two pairs of dorsal spines (Fig. 4A), and anteriorly there is a perpendicular medial fringe of hairs; tip of telson with central pair of long densely plumose setae, followed by a pair of long slender spines each flanked on the outer margins by a short spine (Fig. 4B).

Appendages

Antenna and Antennule

Antennular peduncle moderately robust, clearly surpassing rostrum, less than the anterior margin of scaphocerite (Fig. 2A); first segment longest, with stylocerite reaching beyond the midpoint of basal segment (Fig. 5A); long dorsal antennular flagellum, carrying a group of aesthetascs, with rudimentary accessory branch (Fig. 5B). Antenna with robust basicerite having strong lateral tooth; carpocerite almost stout, with well-developed filamentous flagellum (Fig. 5C). Antennal scale (scaphocerite) with acute distolateral tooth, partially exceeding the blade (Fig. 2A).

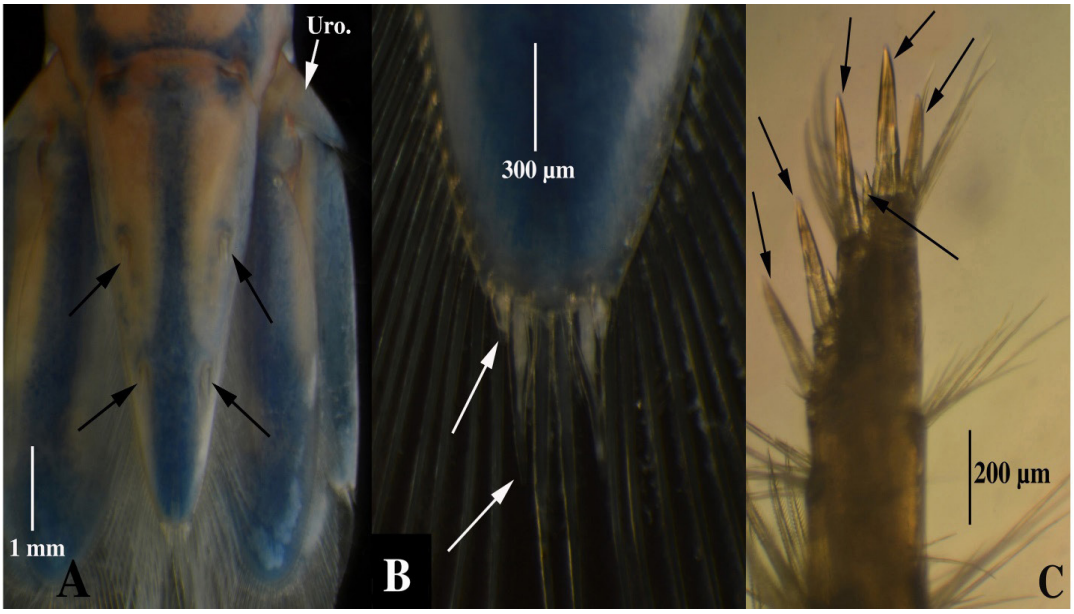

Fig. 4: Telson and third maxilliped. **A.** Dorsal view of telson, arrows indicate dorsal spines, uropod (Uro.). **B.** Tip of telson with central pair of long plumose setae, arrows point to the long and short spines. **C.** Denuded distal end of third maxilliped.

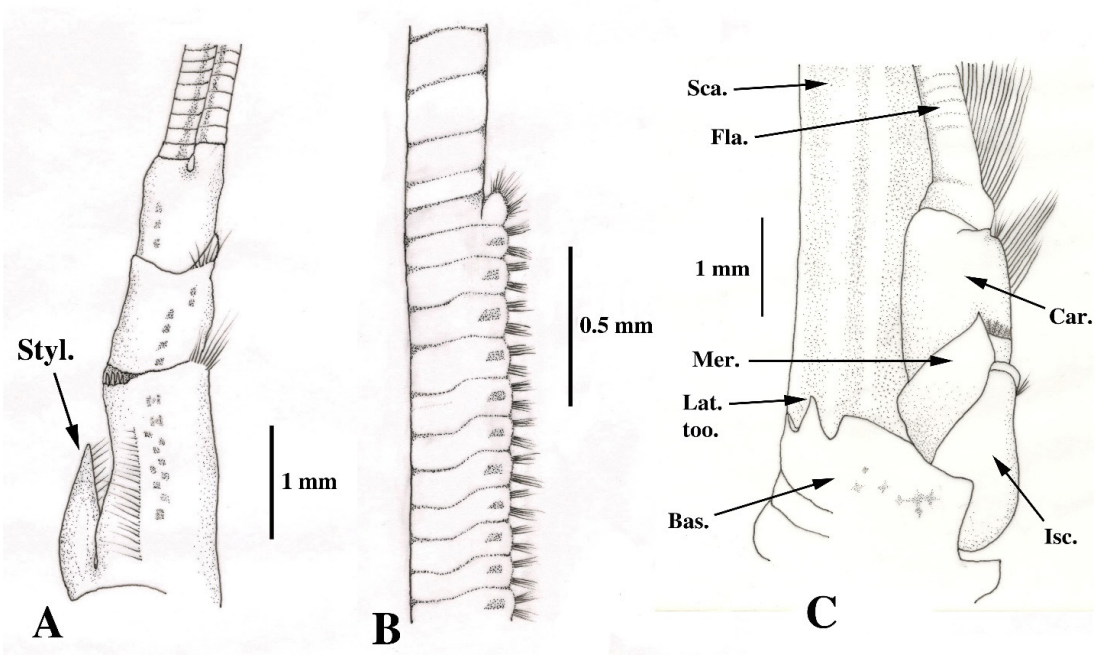

Fig. 5: Antennule and antenna of *Lysmata vittata*. **A.** Antennular peduncle showing stylocerite (Styl.). **B.** Dorsal antennular flagellum carrying a group of aesthetascs, with rudimentary accessory branch. **C.** Antenna showing scaphocerite (Sca.), Basicerite (Bas.), Ischiocerite (Isc.), Merocerite (Mer.), Carpocerite (Car.), Flagellum (Fla.), and lateral tooth (Lat. too.).

Mouth parts

Third maxilliped (Fig. 6A) with slender endopod, its basal segment or ischiomerus longest and slightly bent. Its terminal segment tapering distally and provided with both simple and spinose setae, with six robust spines distodorsally (Fig. 4C); with well-developed exopod, reaching approx. 2/3 length of ischiomerus segment, with long plumose setae distally.

Second maxilliped (Fig. 6B). The terminal segment of endopod (dactylus) narrow, thickly spinose; penultimate segment nearly elongated diamond in shape, with long marginal spines; carpus short and merus with long plumose setae; with well-developed long exopod carrying long plumose setae distally.

First maxilliped (Fig. 6C). Endopod short compared to exopod, comprised of elongated weakly three-segmented

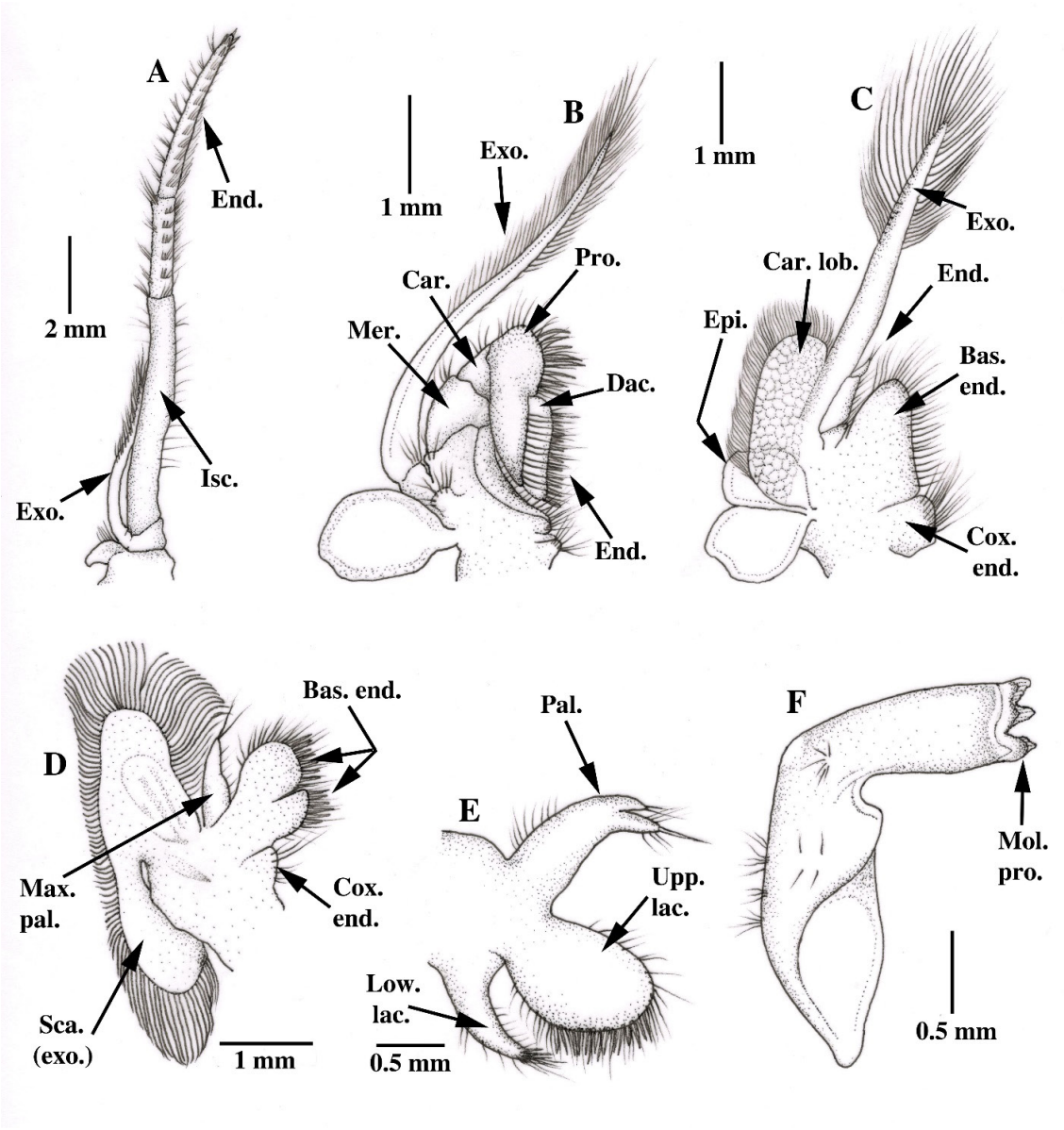

Fig. 6: Mouth parts. **A.** Third maxilliped, exopod (Exo.), endopod (End.), ischiomerus (Isc.). **B.** Second maxilliped, dactylus (Dac.), propodus (Pro.), carpus (Car.), and merus (Mer.). **C.** First maxilliped, basal endite (Bas. end.), coxal endite (Cox. end.), caridean lobe (Car. Lob.), epipod (Epi.). **D.** Maxilla, maxillary palp (Max. pal.), scaphognathite (Sca.). **E.** Maxillula, palp (Pal.), upper lacinia (Upp. lac.), lower lacinia (Low. lac.). **F.** Mandible, molar process (Mor. pro.).

sections, but supported with plumose setae; with well-developed coxal and basal endites, with medial spine and spinose setae; long exopod distally with long plumose setae, connecting to the plumose lateral expansion (caridean lobe); with bilobed epipod.

Maxilla (Fig. 6D). With well-developed tapering maxillary palp with two distal plumose setae; well-developed bilobed basal endite, both with dense spinose setae medially; less developed coxal endite with few long plumose setae and some short simple setae; narrow well-developed exopod (scaphognathite), almost surrounded by plumose setae.

Maxillula (Fig. 6E). With weakly bilobed palp, smaller upper lobe carrying simple setae, large lower lobe with one spiniform seta and few spines; wide, oval upper lacinia, carrying many simple and spiny setae marginally; lower lacinia tapering with numerous simple and spiny setae distally.

Mandible (Fig. 6F). Strong molar process, subcylindrical, distally truncate, with three robust coarse teeth dorsally for grinding and dense fringe of minute setae ventrally; without incisor process or mandibular palp.

Pereiopods

First pereiopod relatively short (Fig. 7A); with simple chela, dactylus nearly 1/3 the length of the palm (Fig. 7B). Second pereiopod slender, long, merus nearly 1/2 the length of carpus, carpus with 17-19 distinct articles and merus with 7-9 inconspicuous articles (Fig. 8A), with small chela (Fig. 8B). Third to fifth pereiopods long,

slender; their dactyli moderate in length with biunguiculate end, ventral unguis shorter than dorsal, flexor margin with four movable spines, most proximal spine minute (Fig. 9).

Remarks:

In *L. vittata*, the carpus and the merus of the second pereiopods are composed of 17-19 distinct and 7-9 inconspicuous articles, respectively. Comparatively, the carpus and the merus of *L. nilita* are subdivided into 30-35 distinct and 14-24 less distinct articles (Dohrn & Holthuis, 1950), the carpus and the merus of *L. olavoi* is composed of 34-35 and 18-22 articles, respectively (Fransen, 1991). The carpus and the merus of the widely distributed Mediterranean species, *L. seticaudata*, are also subdivided into 30 and 17 inconspicuous segments, respectively. The accessory branch of the dorsal antennular flagellum of *Lysmata seticaudata* is 1/2 as long as the fused portion or longer; meanwhile in *L. nilita* it is shorter than 1/3 of the fused portion (Dohrn & Holthuis, 1950). The accessory branch of the dorsal antennular flagellum of both *L. vittata* and *L. olavoi* is rudimentary or vestigial.

The exotic *Lysmata kempi* can be recognized immediately from *Lysmata vittata* by the long rostrum, exceeding the length of the scaphocerite and slightly shorter than carapace.

In the present study, the rostrum almost reaches the distal margin of the second segment of the antennular peduncle, an intermediate feature between the Indo-Pacific *L. vittata* and *L. rauli* Laubenheimer & Rhyne, 2010, from Brazil. Soledade *et al*. (2013) reappraised individuals of *L. rauli* from Camamu Bay, northeastern Brazil, and indicated that the rostrum of *L. rauli* reaches to 1/2 of the second segment of the antennular peduncle and that in *L. vittata*, it reaches slightly beyond the distal margin of the second article (Table 2). On the other hand, in the original description of *L. rauli*, the carpus of the second pereiopod has 15 segments and the merus seven segments. However, Soledade *et al*. (2013) mentioned that the carpus of second pereiopod of *L. rauli* has 15-19 segments and the merus has 5-9 segments. Moreover, they added that the carpus of *L. vittata* is subdivided into 15-31 segments and merus is composed of nine segments. In the examined specimens the carpus has 17-19 articles and the merus 7-9 articles, a condition more similar to *L. rauli*. Another issue is the number of spines or spinules on the flexor margin of pereiopods 3-5. Laubenheimer & Rhyne (2010) reported that the flexor margins in *L. rauli*, is supplied with three spinules, increasing in size distally. In the re-description of *L. vittata* provided by Bruce (1990), the flexor margin features three slender spines, of decreasing size proximally, along the ventral margin, with an extra spine proximally on the left side. In this respect, the characterisation of the examined specimens shows a flexor margin with four movable spines, thus in agreement with the description of *L. vittata.*

The colour pattern of the examined material is similar to *L. rauli*, with an almost complete transverse strap on the anterior and posterior ends of both first and third abdominal pleurons. However, Kemp (1914) described the colour of *L. vittata* with two complete transverse bands on the anterior end of both first and fourth abdominal somites.

Soledade *et al*. (2013) suggested that variations between the *L. rauli* and *L. vittata* can be considered intra-specific and that *L. rauli* should be considered a junior synonym of *L. vittata*. This is supported by their investigation on the molecular phylogenetic analyses (using the 16S mt DNA fragment) which did not detect any significant genetic difference between *L. rauli* and *L. vittata*.

***Habitat and distribution*:**

Lysmata vittata are free-living shrimp living in swarms. They are nocturnally active animals, escaping from direct sunlight. The preferred depths of occurrence are from 2 to 40 or 50 m (Marin *et al*., 2012). These crustaceans are recorded along the eastern coast of the African continent and the mainland coast of China, Philippines, Japan, Indonesia, Australia, and along the northern coast of New Zealand (Chace, 1997; Ahyong, 2010; Okuno &

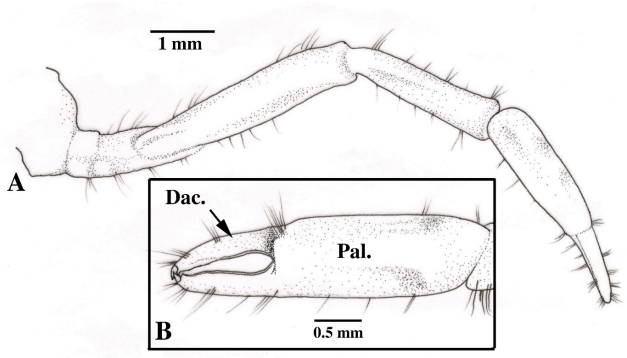

Fig. 7: First pereiopod. **A.** The full length. **B.** Details of chela showing dactylus (Dac.), and palm (Pal.).

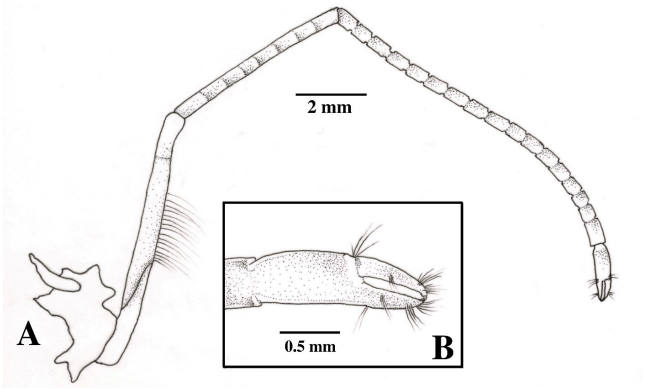

Fig. 8: Second pereiopod. **A.** The full length. **B.** Details of chela.

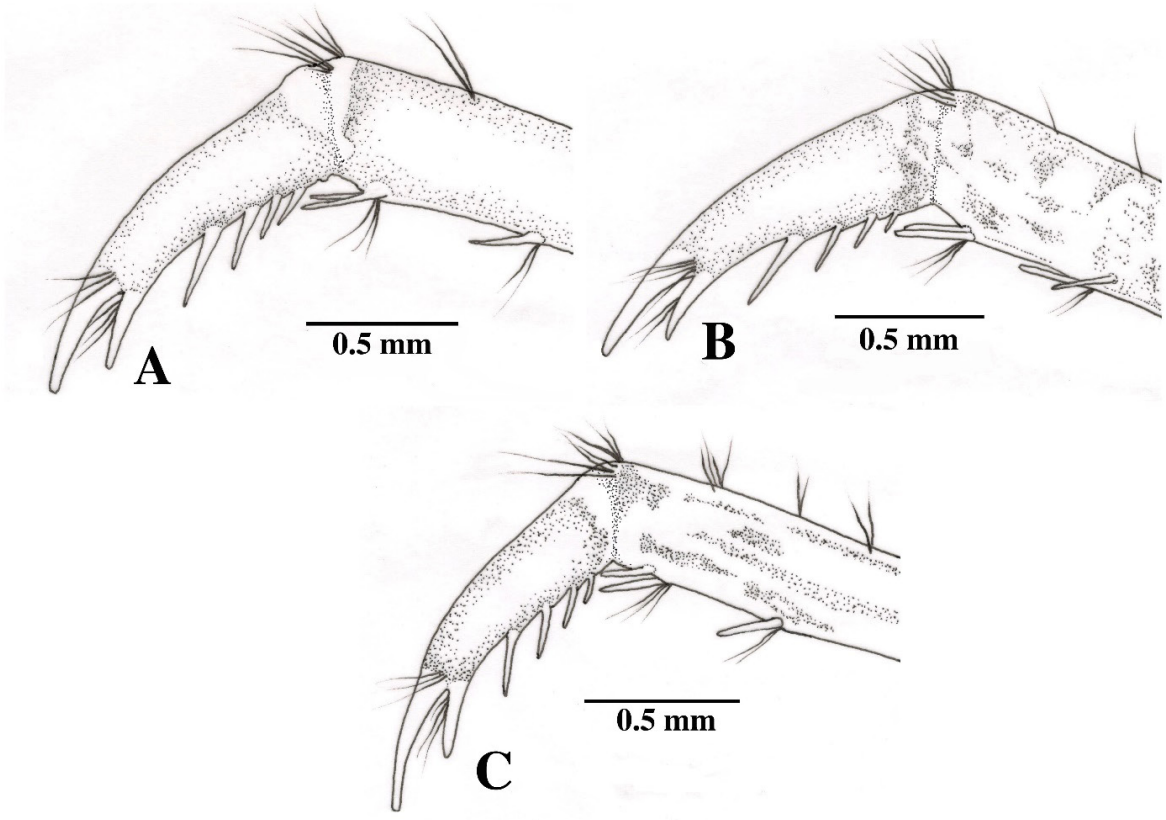

Fig. 9:The dactyli of pereiopods with biunguiculate end and four movable spines. **A.** Third pereiopod. **B.** Fourth pereiopod. **C.** Fifth pereiopod.

Fiedler, 2010). This species has extended range in NW Pacific (Marin *et al*., 2012), and SW Atlantic (Laubenheimer & Rhyne, 2010; Soledade *et al*., 2013).

The present study is the first record of the species in the Mediterranean Sea and the Egyptian waters. However, the pathway of its entrance to the eastern Mediterranean Sea is questionable, even if shipping may be likely. Ahyong (2010) had supposed that this species could be introduced into many areas with the ballast water of cargo ships, especially the southernmost and northernmost parts of its geographic range.

References

Ahyong, S., 2010. New Species and new records of Caridea (Hippolytidae: Pasiphaeidae) from New Zealand, *Zootaxa*, 2372, 341-357.

Alves, D.F.R., Barros-Alves, S.d-P., Hirose, G.L., Cobo, V.J., 2015. Morphological remarks on the peppermint shrimp *Lysmata ankeri* (Decapoda, Hippolytidae): implications for species identification of the *L. wurdemanni* complex. *Nauplius*, 23 (1), 53-58.

Anker, A., Baeza, J.A., De Grave, S., 2009. A new species of *Lysmata* (Crustacea: Decapoda: Hippolytidae) from the Pacific coast of Panama, with observations of its reproductive biology. *Zoological Studies*, 48, 682-692.

Ateş, A. S., Katağan, T., Kocataş, A., 2007. Decapod Crustaceans on the Coast of Gökova Bay (the southeastern Aegean Sea). *E.U. Journal of Fisheries & Aquatic Sciences*, 24 (1-2), 159-164.

Bate, C.S., 1888. Report on the Crustacea Macrura Collected by the *Challenger* during the Years 1873-1876. In: *Report on the Scientific Results of the Voyage* of H.M.S. "Challenger" *during the Years 1873-76,* 24: xc + 942 pages. 76 figures. 157 plates.

Bruce, A. J., 1990. Redescriptions of five Hong Kong carideans first described by William Stimpson, 1860, p. 569-610. In: *Proceedings of the Second International Marine Biological Workshop: The Marine Flora and Fauna of Hong Kong and Southern China*. Morton, B. (Ed). Hong Kong University Press, Hong Kong.

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, procaridid ean and caridean shrimps (Crustacea: Decapoda). *Zoologische Mededelingen,* 85 (9), 195-589.

De Grave, S, Li, C.P., Tsang L.M., Chu K.H., Chan T.-Y., 2014. Unweaving hippolytoid systematics (Crustacea, Decapoda, Hippolytidae): resurrection of several families. *Zoologica Scripta*, 43, 496-507.

Demir, M., 1952-1954. Bogaz ve Adalar Sahillerinin Omurgasiz Dip Hayvanlari. - *Hidrobiol. Arast. Enstit. Yayinlarin-*

dan 3: i-viii, 1-615, 1-14, text-fig. 1-235, pl. 1-15 (pages 1-320 are published in 1952, pp. 321-615 in 1954).

Dohrn, P.F.R., Holthuis, L.B., 1950. *Lysmata nilita*, a new species of prawn (Crustacea, Decapoda) from the Western Mediterranean. *Pubblicazioni della Stazione Zoologica di Napoli*, 22, 339-347, Plates 9-10.

d' Udekem d'Acoz, 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.

d' Udekem d'Acoz, C., 2000. Redescription of *Lysmata intermedia* (Kingsley, 1879) based on topotupical specimens, with remarks on *Lysmata seticaudata* (Risso, 1816) (Decapoda, Caridea, Hippolytidae). *Crustaceana*, 73 (6), 719-735.

Fransen, C.H.J.M., 1991. *Lysmata olavoi*, a new shrimp of the family Hippolytidae (Decapoda, Caridea) from the eastern Atlantic Ocean. *Arquipélago. Life and Earth Sciences*, 9, 63-73.

Froglia, C., Deval, M. C., 2014. First record of an exotic hippolytid shrimp in the eastern Mediterranean Sea. *Mediterranean Marine Science*, 15, 168-171.

Hayashi, K.-I., Miyake, S., 1968. Studies on the Hippolytid Shrimps from Japan, V: Hippolytid Fauna of the Sea around the Amakusa Marine Biological Laboratory. *OHMU,* 1 (6), 121 -163.

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

Kubo, I., 1951. Some macrurous decapod crustacea found in Japanese waters, with descriptions of four new species. *Journal of the Tokyo University of Fisheries*, 38 (2), 259-89.

Laubenheimer, H., Rhyne, A.L., 2010. *Lysmata rauli,* a new species of peppermint shrimp, (Decapoda: Hippolytidae) from the southwestern Atlantic. *Zootaxa*, 2372, 298-304.

Lewinsohn, C., Holthuis L.B., 1964. New records of decapod Crustacea from the Mediterranean coast of Israel and the eastern Mediterranean. *Zoologische Mededelingen*, 40, 45-63.

Lewinsohn, C., Holthuis L.B., 1986. The Crustacea Decapoda of Cyprus. *Zoologische Verhandelingen* Leiden, 230, 1-64, fig. 1.

Marin, I. N., Korn, O. M., Kornienko, E. S., 2012. The Caridean Shrimp *Lysmata vittata* (Stimpson, 1860) (Decapoda: Hippolytidae): A New Species for the Fauna of Russia. *Russian Journal of Marine Biology,* 38 (4), 359-363.

Okuno, J., Fiedler, G. C., 2010. *Lysmata lipkei,* A new species of peppermint shrimp (Decapoda, Hippolytidae) from warm temperate and subtropical waters of Japan*. Studies on Malacostraca*: 597-610.

Prakash, S., Baeza, J.A., 2017. A new species of *Lysmata* Risso, 1816 (Crustacea, Decapoda, Lysmatidae) from the Gulf of Mexico. *Zootaxa*, 4363 (4), 576-582.

Rhyne, A.L., Anker, A., 2007. *Lysmata rafa*, a new species of peppermint shrimp (Crustacea, Caridea, Hippolytidae) from the subtropical western Atlantic. *Helgoland Marine Research*, 61, 291-296.

Rhyne, A.L., Lin, J., 2006. A western Atlantic peppermint species complex: redescription of *Lysmata wurdemanni* (Gibbes), description of four new species and remarks on *L. rathbunae* Chace (Crustacea: Decapoda: Hippolytidae). *Bulletin of Marine Science*, 79, 165-204.

Rhyne, A.L., Lin, J., Deal, K., 2004. Biological control of aquarium pest anemone *Aiptasia pallida* Verrill by peppermint shrimp (*Lysmata* sp.) Risso. *Journal Shellfish Research*, 23, 227-230.

Soledade, G.O., Baeza, J. A., Boehs, G., Simões, S.M., Santos, P.S. *et al*., 2013. A precautionary tale when describing species in a world of invaders: morphology, coloration and genetics demonstrate that *Lysmata rauli* not a new species endemic to Brazil but a junior synonym of the Indo-Pacific *L. vittata*. *Journal of Crustacean Biology*, 33 (1), 66-77.

Stebbing, T.R.R., 1921. Some Crustacea of Natal. *Annals of the Durban Museum.* 3 (1), 12- 26,

Stimpson, W., 1860. Prodromus descriptionis animalium evertebratorum, quae in Expeditione ad Oceanum Pacificum Septentrionalem, a Republica Federata missa, C. Ringgold et J. Rodgers Ducibus, observavit et descripsit. *Proceedings of the Academy of Natural Sciences of Philadelphia*, 1860, 22-48.

Zhibin, G., Xinzheng, L., 2016. *Lysmata leptodactylus*, a new species of lysmatid shrimp (Crustacea: Decapoda: Caridea) from China. *Zootaxa*, 4138 (1), 181-188.