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The collection of an exuvia identified as *Panulirus longipes longipes* (A. Milne-Edwards, 1868) from off Haifa, Israel

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Abstract

An exuvia of an adult female spiny lobster was found off the coast of Haifa, Israel. The finding was identified as a moult of the Indo-pacific long-legged spiny lobster, *Panulirus longipes longipes* (A. Milne-Edwards, 1868) of the western spotted-legged form. The specimen is described and possible explanations associated with the finding of this tropical lobster from the Levant are discussed.

Keywords: *Panulirus longipes longipes*; Non-indigenous species; exuvia; Crustacea; Palinuridae; Levant.

Introduction

Two species of spiny lobsters are reported from the Mediterranean Sea, *Palinurus elephas* (Fabricius, 1787) and *Palinurus mauritanicus* Gruvel, 1911 (Holthuis, 1991; Cannas *et al.*, 2006). They have only a westerly distribution as neither species appear to be found in the extreme eastern and south eastern areas of the Mediterranean (Holthuis, 1991). Galil *et al.* (1989), however, recorded a single find of an indo-pacific lobster, *Panulirus ornatus* (Fabricius, 1798), from the coastal waters of Israel in 1988. The purpose of the present study is to report an exuvia of an adult female spiny lobster, of another species of *Panulirus*, found while diving off the coast of Haifa, Israel.

Material and Methods

Collection details

During a diurnal SCUBA diving activity of the second author, on April 18th, 2018, in search for the nocturnal common lionfish, *Pterois miles* (Bennett, 1828), a Lessepsian non indigenous species (Golani & Sonin, 1992., Bilge *et al.*, 2017), in rocky caves and crevices using underwater flashlight, approximately 1500 m off the southern coast of Haifa, the northern Mediterranean coast of Israel, a complete, apparently fresh (strong shining

colours) single exuvia of an adult spiny lobster was found. The depth, water temperature, and the GPS data of the location site were recorded as well as the geomorphology of the site. The exuvia was carefully removed from the water, photographed and then kept in refrigeration until measurements of Carapace Length (CL), Carapace Width (CW) and Total Length (TL) as well as determining the sex of the specimen, were conducted. Identification was confirmed using Williams (1986), Holthuis (1991), Chan & Chu (1996), Chan & Ng (2001) and Anam & Mostarda (2012).

Results

Systematic Account

Infraorder: Palinuridea Latreille, 1802
 Superfamily: Palinuroidea Latreille, 1802
 Family: Palinuridae Latreille, 1802
 Genus: *Panulirus* White, 1847
Panulirus longipes (A. Milne Edwards, 1868)
 Figs. 1-2.

Synonymy

Palinurus femoristriga von Martens, 1872.
Palinurus longitarsus Lenz & Richters, 1881 (erroneous spelling of *P. longipes*). *Senex femoristriga* – Ortmann, 1891.

Panulirus bispinosus Borradaile, 1899.
Panulirus japonicus longipes – De Man, 1916.

Material examined

The exuvia (Fig. 1) was found at noon time on April 11th, 2018 at a depth of 15 m under a rocky shelf approximately 3 m inside this ledge in a dark area. The arched distance from the collection site (32. 49169° N, 34. 56571° E) to the opening of the nearby Port of Haifa (head of the breakwater) is approximately 7.8 kilometres. The geomorphology of the area is governed by cemented aeoli-



Fig. 1: The exuvia of *Panulirus longipes longipes* (TL = 305 mm) shortly after being removed from the water (Photographed by E. Friedmann).



Fig. 2: The antennular plate of the exuvia of *Panulirus longipes longipes* (Photographed by E. Spanier).

an sandstone that forms a rocky substrate locally known as “Kurkar”, rich with crevices, ledges and caves. The bottom is composed of coarse biogenic sand and gravel. Water temperature at the site was 19°C.

Diagnosis

This specimen was identified as a female by the gonophores set at the bases of the third pair of the walking legs and the chela at the end of each of the fifth pair of legs (pereopods). The female was identified as *Panulirus* according to the long flagella of the antennulae which is longer than the peduncle of antennule (Fig. 1) (Holthuis, 1991). As in other spiny lobsters, the carapace is rounded without a distinct median rostrum, ornamented with spines and granules of various sizes. Each eye is protected by a strong, spiny frontal projection of the carapace (frontal horn). The bases of the antennae are separated by a broad antennular plate. Typical to the species *Panulirus longipes* (A. Milne Edwards, 1868), this antennular plate bears 2 widely separated large spines, with scattered small spinules behind these (Fig. 2). Exopods of the third maxilliped are present. Each somite of the pleon is with a complete transverse groove joining the pleural groove. Legs 1 to 4 are without pinchers. No pubescent area on the pleonal somites behind the transverse groove. Anterior margin of pleura of pleonal somite two is without distinct teeth. Transverse groove of the pleonal somites is with straight margins, not crenulated. Transverse grooves of pleonal somites 2 to 4 join the groove along the anterior margin of the corresponding pleuron (Holthuis, 1991; Anam & Mostarda, 2012). Two subspecies can be recognized: 1) *Panulirus longipes longipes* (A. Milne-Edwards, 1868) is the western form occurring from East Africa to Thailand, Taiwan, the Philippines and Indonesia and 2) the eastern subspecies *Panulirus longipes femoristriga* (von Martens, 1872) inhabiting Japan, the Moluccas, New Guinea, eastern Australia, New Caledonia and Polynesia. Intermediate forms have been observed, especially in the area of overlap between the two ranges (Holthuis, 1991; Chan & Chu, 1996). The two “forms” differ only in the colour pattern of the pereopods (Chan & Chu, 1996): the western spotted-legged, *P. l. longipes* as the present exuvia (Fig. 1) and the eastern striped-legged, *P. l. femoristriga*. Chan & Ng (2001) corrected the name of the latter subspecies to *P. longipes bispinosus* Borradaile, 1899 (Pacific, with striped legs). Both subspecies have both their antennular flagella banded (e.g., Fig. 1). The name for the species with the white inner antennular flagellum should be, according to these authors, *P. femoristriga* (Von Martens, 1872), with *P. albiflagellum* Chan & Chu, 1996, as its junior subjective synonym.

Brief description

CL= 97 mm, CW= 81 mm, TL = 305 mm. These dimensions are typical of fully grown adults of this species (Holthuis, 1991). The exuvia was found without any

signs of biofouling. Colour: ground colour – dark-reddish brown. Body, and especially the pleon, covered with numerous distinct medium-sized, yellowish - white round spots with larger ocellated white spots on each segment in a row alongside and a central darker region on the carapace. Antennular flagella are cross-banded; legs are dark-brown with white spots and light incomplete longitudinal yellowish lines in between (Fig.1). Telson and uropods are yellow with darker margins. Carapace is covered with many spines of variable sizes, black-brown, black and white and yellow-reddish in colouration. The large frontal horns are black with white spots (Figs. 1 and 2). The broad antennular plate and the base of the antennae are purple; the 2 widely separated large spines on the broad antennular plate and the small scattered spinules behind these are yellow with brown bases and tips (Fig. 2).

Discussion

Contrary to the *P. ornatus* Galil *et al.* (1989), recorded in this same area in the 1980s, the, seemingly, fresh exuvia found in the present study is devoid of biofouling and suggests it was recently released from an aquarium where biofouling activities were minimal. The site where the exuvia was found, deep in a dark shelter, is typical a common moulting habitat of *Panulirus* species (Butler *et al.*, 2006). Thus, we assume that this lobster moulted under the ledge leaving behind an intact exuvia. However, this species, as other colourful spiny lobsters, are used in the aquaria trade (e.g., Friese, 1984). Thus, one cannot reject the possibility that the exuvia had been disposed of from an aquarium of a slow moving (so that it would have remained fully intact and undamaged) passing cruise-ship or a pleasure yacht entering or exiting the close-by Haifa Port. The issue of the source of the exuvia can be solved only when more evidence is found. If the moult was really fresh as its strong colours have indicated (although these lobsters can also keep the colour for a very long time), the adult may still be found in the vicinity. Intensive and repetitive SCUBA diving searches in the general location of the find since April 2018, as well as wide-spread inquiry among professional and sport fishermen in the area have been, so far, fruitless.

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