

Morphological Description of Ocean-Collected *Portunus* sp. First Crab (Crustacea: Brachyura: Portunidae) from the Obhur Creek, Red Sea, Saudi Arabia

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Abstract. Twenty-one specimens of *Portunus* sp. first crab were obtained from plankton samples collected from the Obhur Creek, Central Red Sea, Saudi Arabia. These specimens have been morphologically described herein. The setal patterns of the first crabs of the present specimens were compared with those of the first crabs of *P. sanguinolentus*. Presence of two to three rows of setae on the coxa of maxillule and coxa and basal of the first maxilliped are found in both the species of *Portunus* first crabs compared herein. These features seem to be taxonomically significant as these features are found in one of the other genera of Portunidae – *Thalamita*.

Keywords: Megalopa, Morphological description, *Portunus*, Red Sea.

1. Introduction

The morphological description of the brachyuran larvae has several implications. It helps to identify brachyuran larvae from zooplanktons; and larval morphological features are used to understand the phylogeny of the different groups of Brachyura (Martin and Davis, 2001). Different species of brachyuran larvae were morphologically described from a same family aids to formulate familial level identification keys (Cuesta et al., 1997, 2006).

In spite of the several applications of this study, only a few species of larvae are morphologically described from the family Portunidae (Josileen and Menon 2004; Samuel et al., 2011). Clark (1984) made comparative larval morphological studies of *Liocarcinus arcuatus*, *L. corrugatus*, *L. depuratus*, *L. holsatus*, *L. puber*, *L. pusillus* and *L.*

marmoreus. Four zoeal and megalopal stages of *Portunus pelagicus* (Linnaeus, 1758) (Shinkarenko, 1979) and first zoea of *Portunus acuminatus* (Stimpson, 1871) have been described by Meyer et al. (2006). The complete larval development of *P. reticulatus* (as *P. pelagicus*) was published by Josileen and Menon (2004). The megalopal stages of *Portunus spinimanus* Latreille, 1819 and *Portunus gibbesii* have been described by Negreiros-Fransozo et al. (2007). In all these works, post-larval stages are not described.

Yatsuzuka and Sakai (1980) described the first crab of *P. pelagicus* incompletely. Only one complete description available from this genus is *P. sanguinolentus* (Samuel et al., 2011); the present study, *Portunus* first crabs obtained from the plankton are morphologically described and compared with this species.

2. Materials and Methods

Plankton samples were collected at dusk using a plankton net (mesh size of 150 μm) on 12- April-2022, and the net was hanged on the pier of jetty. An underwater torch light (320 lumens) was used to attract the zooplankton samples. Altogether, 32 specimens of the first crab were obtained. Of those, 21 were portunid first crabs. Of those nine first crabs were morphologically similar based on colour, pigmentation, characters of anterolateral teeth, frontal teeth and setations of carapace and ambulatories. Five specimens were dissected in polyvinyl lactophenol using Leica M80 microscope. Remaining larvae were reared to obtain the larger post-larval stages, but all of them died within three days. Measurements of the larval appendages were made using the same microscope equipped with ocular micrometre. A compound microscope equipped with a camera Lucida (Leica DM 6000B) was used to draw the appendages of the larvae and for setal count.

The following measurements were made: carapace width (CW), distance across the last anterolateral teeth; carapace length (CL), distance across the frontal margin and posterior border of the carapace. Setal counts and morphological descriptions were made following Clark *et al.* (1998).

3. Results and Discussion

(Figs. 1-7)

CL = 1.5 ± 0.1 mm; CW = 1.2 ± 0.15 mm.

Carapace. (Fig. 1a) Wider than long; front projected anteriorly; 7-8 anterolateral teeth, posterior one larger; frontal, infra orbital, posterior anterolateral spines along with posterior lateral borders spinulated. Eyes well developed.

Antennule. (Fig. 1b) Peduncle 3-segmented with around 22-25 (19-22 simple setae, 2-3 plumose setae), 2 (simple), 2 (simple)

setation; Endopod with 5 segments (0, 5 aesthetascs, 11 aesthetascs, 2 aesthetascs, 6 simple seta). Exopod three segmented with 1, 1, 8 setation, all simple setae.

Antenna. (Fig. 1c) Peduncle 3-segmented with 0, 4 (simple), 1 (plumose) setation. Flagellum 8-segmented with 1, 0, 2, 1, 1, 1, 3, 4 simple setae.

Mandible. (Fig. 2a) Palp 3-segmented, proximal segment without seta, middle segment with 2 plumose setae, terminal segment with 9-10 plumose setae.

Maxillule. (Fig. 2b) Coxal endite with 15 setae (2 plumose, 7 simple, 6 serrated setae). Basal endite with 6 serrated, 13 simple setae. Endopod 2-segmented, two plumose setae on proximal segment; distal segment with three setae (1 sub-median simple seta, 2 terminal simple setae).

Maxilla. (Fig. 3a) Coxal endite bilobed with 6 plumose + 3 (2 simple, 1 plumose setae), basal endite bilobed with 8 (1 plumose, 7 simple) + 8 simple setae. Scaphognathite with 60-62 plumose setae; several lateral simple setae present.

First maxilliped. (Fig. 3b) Coxal endite with 14 setae arranged in two rows (6 simple setae, 8 plumose setae), basal endite with 31-33 setae (10 simple + 21-23 plumose setae). Endopod unsegmented with 13 setae (10 simple, 3 plumose setae). Exopod 2-segmented with 4, 9 setation. Epipod unsegmented with 21-24 simple setae.

Second maxilliped. (Fig. 4a) Endopod 4-segmented with 6 (5 simple, 1 plumose), 0, 7 simple, 11 (2 simple, 9 serrated) setation. Exopod 2-segmented with 8 (5 plumose, 3 simple), 8 (6 plumose, 2 simple) setae.

Third maxilliped. (Fig. 4b) Epipod 6 plumose, 6 simple setae proximally, 10-12 simple setae distally; protopod with 3 plumose, 13-15 simple setae; Endopod 5-segmented: 40-

43 (simple, serrated), 9-10 simple, 10-12 simple, 7 (2 simple + 5 serrated); 7 (5 serrated, 2 simple) setae. Exopod 2-segmented with 14 (simple), 6 (4 plumose, 2 simple) setation.

Pereopds. (Fig. 5a-c, 6a, b) All segments of chelipeds and ambulatory IV thickly furnished with many simple setae and few plumose setae; posterior margin of merus with three stout spines; tips of propodus and dactylus sharp, propodus longer than dactylus. Last two segments of ambulatory IV flattened like paddle; all segments of ambulatories I-III furnished with few plumose and several simple setae.

Abdomen. (Fig. 7) Abdomen with 7 somites, third segment widest, tip of telson rounded.

Discussion

The first crab described herein is belonging to genus *Portunus* because of the following reasons: a) the last pair of anterolateral teeth is very long (8th one); b) 7-8 anterolateral teeth are present excluding the external orbital angle; c) propodus and dactylus of last pair of ambulatory legs are paddle shaped.

Only one morphological description of *Portunus* first crab is available in the literature, *P. sanguinolentus* (Samuel *et al.*, 2011); and this restricts better larval comparisons. Availability of more larval descriptions is essential for better larval comparisons (Rieger, 1998).

The morphological descriptions of *P. sanguinolentus* (Samuel *et al.*, 2011) are based on laboratory reared specimens and the present study specimens are collected from wild.

Plankton-based morphological descriptions of the larvae and post larvae are meagre. In the laboratory reared larvae, physical and biological features are stable but in natural habitats abiotic and biotic factors (such as temperature, salinity and food types) are varying and these variations can impact the larval morphological features (Marco-Herrero *et al.*, 2014). Therefore, plankton-based larvae and post-larvae must be morphologically described for taxonomic studies.

Three segmented peduncle and exopod of antennule, 3-segmented peduncle and 8-segmented flagellum of antenna, 2 segmented endopod of maxillule, 2-segmented exopods of maxillipeds I and III are the common morphological features found between the first crabs of *P. sanguinolentus* described by Samuel *et al.* (2011) and the present study. In between these two species, several features are uncommon including: number of the endopod segments of antennule, number of the segments of the palp of mandible, number of the endopod segments of maxilliped II and the number of setae of almost all thoracic and abdominal appendages. In these two species, two tiers of setae are found on the basal segment of maxillule as well as the coxal and basal endites of maxilliped I. These characters are found in the first crab of *Thalamita chaptalii* also (Effendy *et al.*, 2022).

Most of the larval taxonomists terminate larval culture once megalopal stage is reached (Shinkarenko, 1979; Juwana *et al.*, 1987; Josileen and Menon 2004). More first crab descriptions would be available, if the larval taxonomists continue larval culture up to post-larval stages

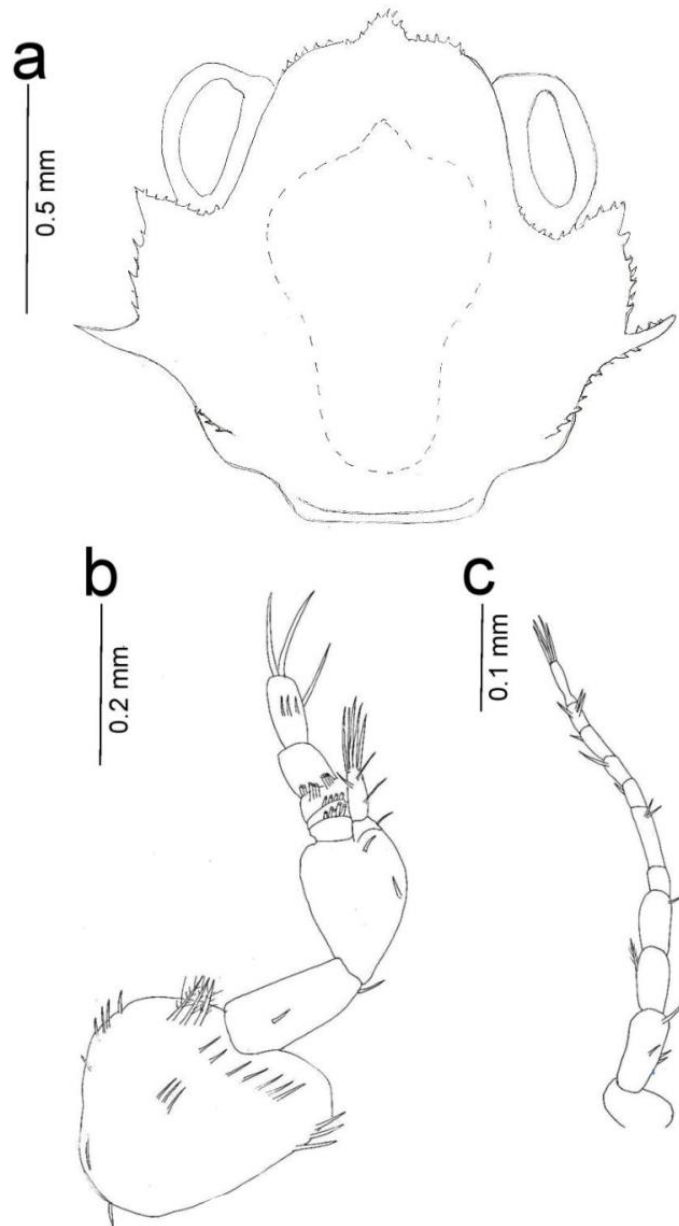


Fig. 1. First crab *Portunus* sp. collected from the Red Sea: a) carapace; b) antennule; c) antenna.

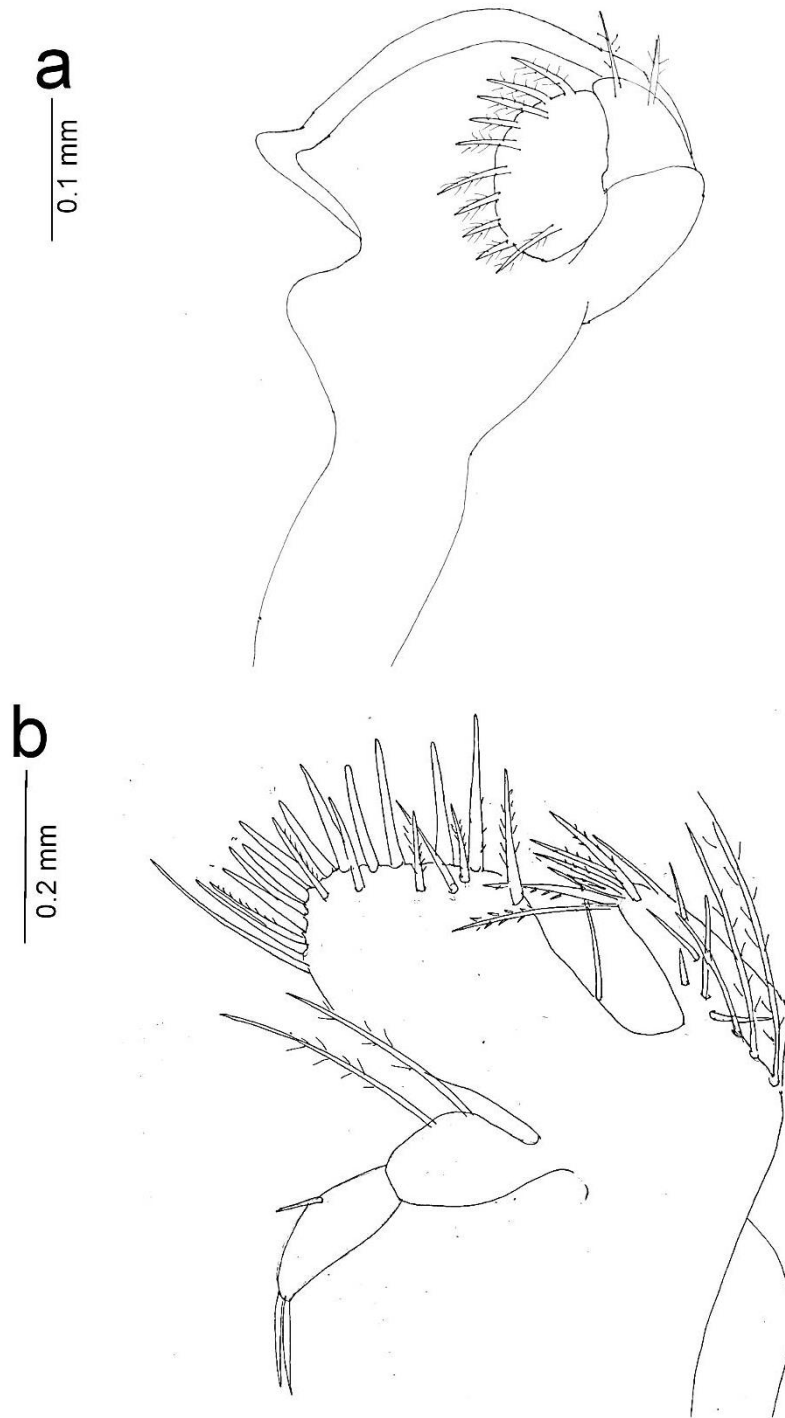


Fig. 2. First crab *Portunus* sp. Collected from the Red Sea: a) mandible; b) maxillule.

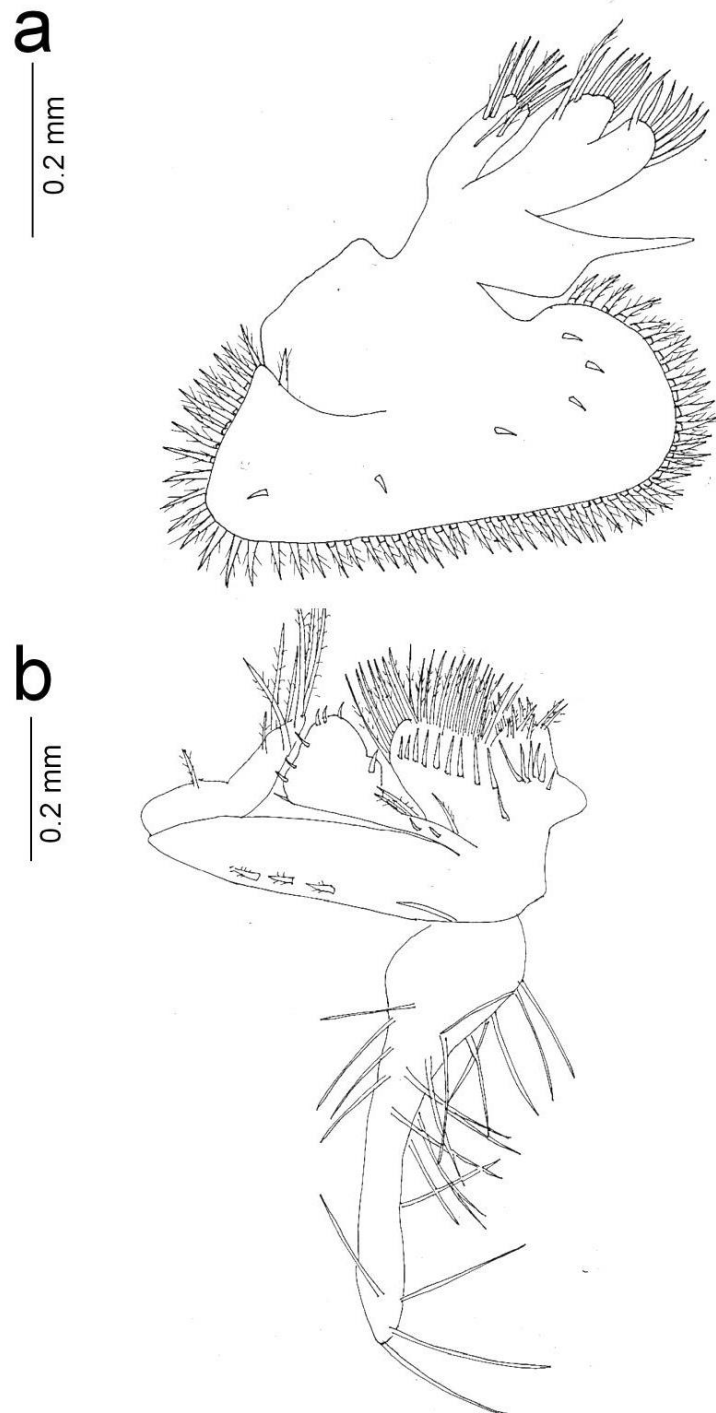


Fig. 3. First crab *Portunus* sp. Collected from the Red Sea: a) maxilla; b) first maxilliped.

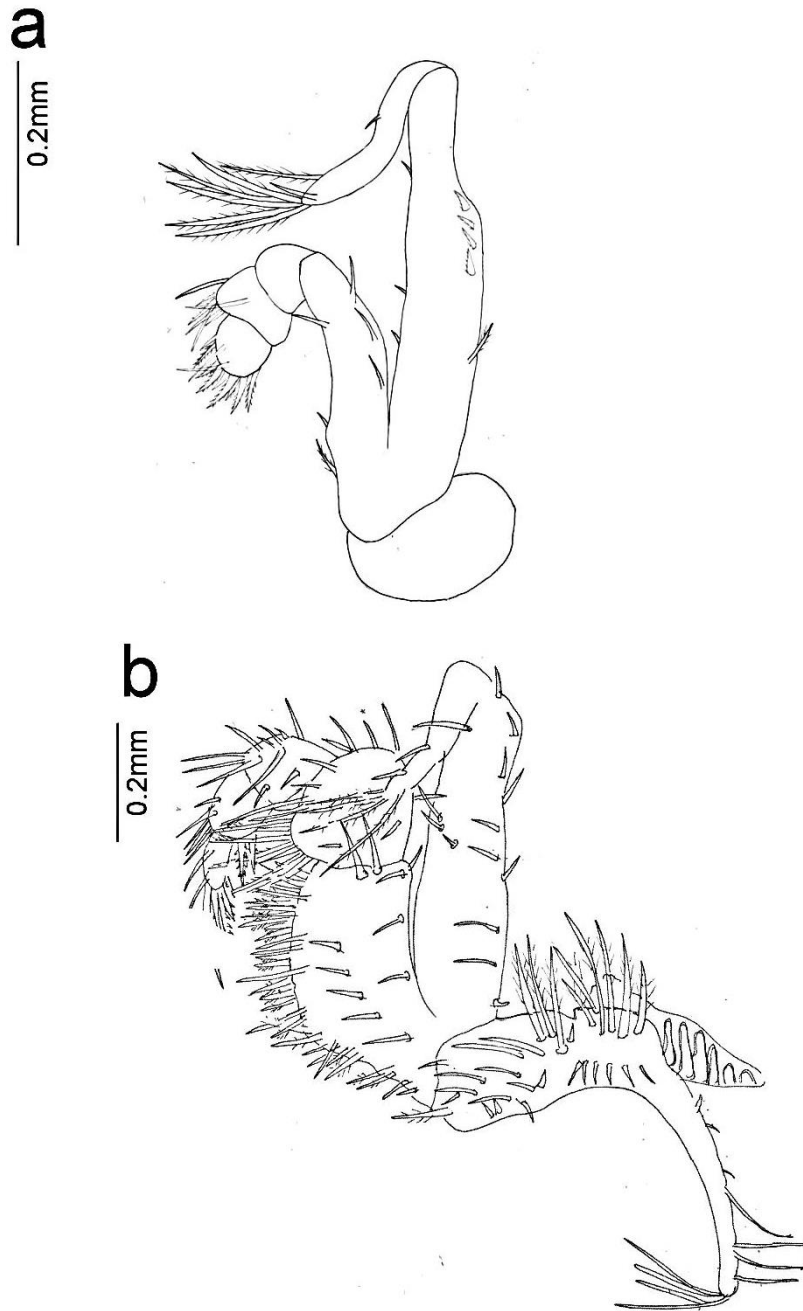


Fig. 4. First crab *Portunus* sp. collected from the Red Sea: a) second maxilliped; b) third maxilliped.

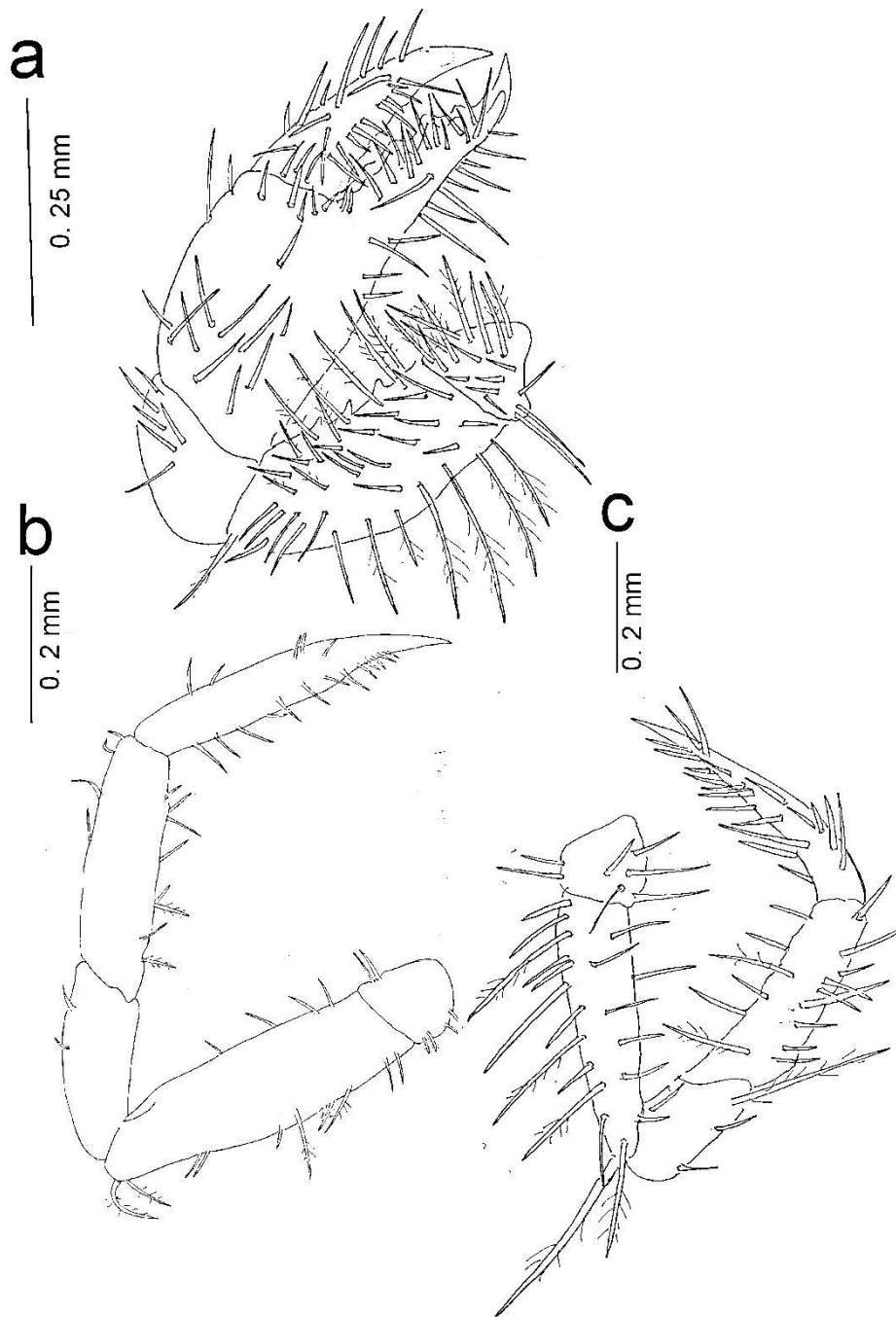


Fig. 5. First crab *Portunus* sp. collected from the Red Sea: a) cheliped; b-c) first and second ambulatories.

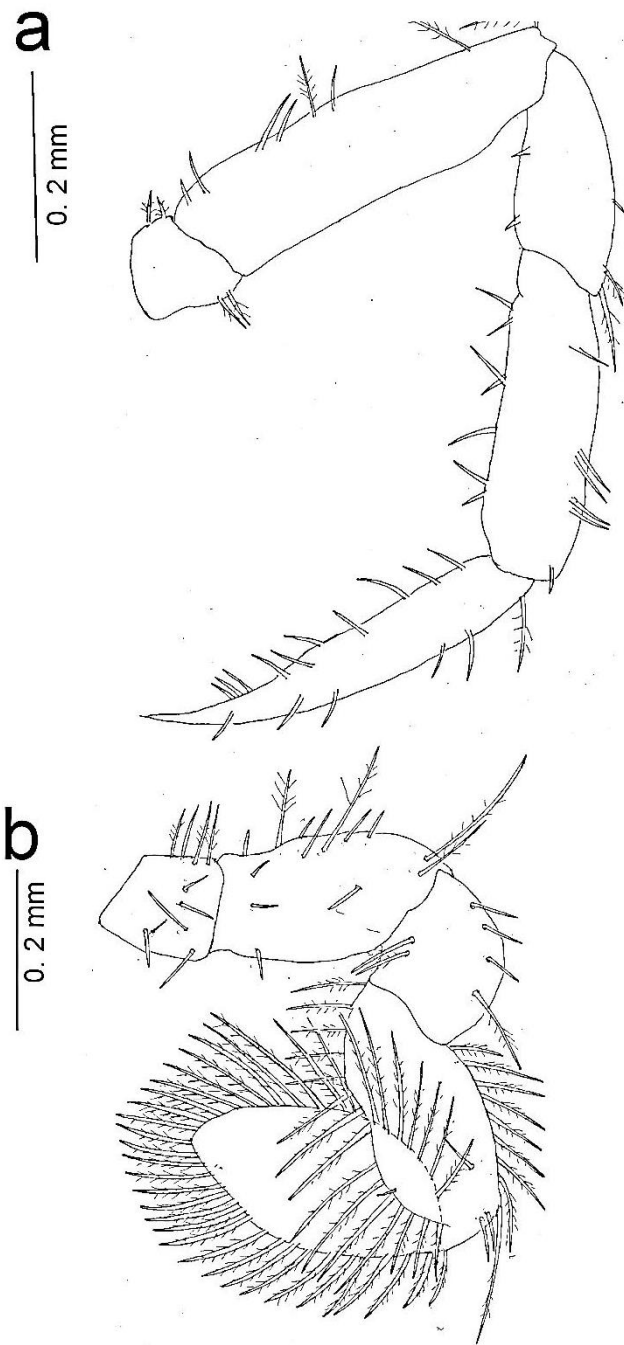


Fig. 6. First crab *Portunus* sp. collected from the Red Sea: a-b) third and fourth ambulatories.

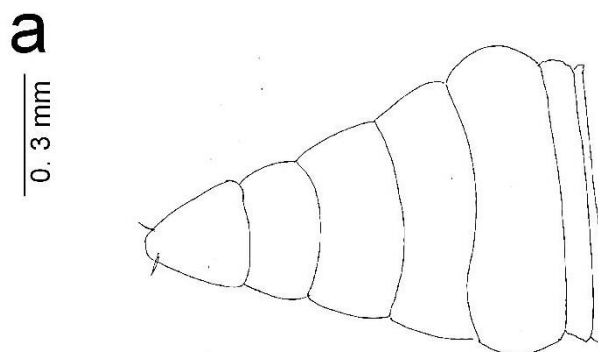


Fig. 7. First crab *Portunus* sp. collected from the Red Sea: abdomen.

Table 1. Morphological differences between megalopae of two species of *Thalamita* Latreille, 1829.

Morphological characters		<i>Portunus</i> sp. (Present study)	<i>P. sanguinolentes</i> . Samuel <i>et al.</i> (2011)
Carapace	CL in mm	1.1-1.3	-
	CW in mm	1.3-1.6	2.8-3.6
Antennule	Peduncle	3 SEG (22-25,2,2S)	3 SEG (15,6,3S)
	Endopod	5SEG (0,5AE,11AE,2AE,6S)	7 SEG (0,6AE,6AE+2S,4AE+1S,0,1AE+2S,1AE+1S)
Antenna	Exopod	3 SEG (1,1,8 S)	3 SEG (1,2,4S)
	Peduncle	3 SEG (0,4,1S)	3 SEG (10,4,2S)
	Flagellum	8 SEG (1,0,2,1,1,1,3,4 S)	8 SEG (0,1,4,1,3,1,3,2,1S)
Mandible	Palp	3 SEG (0,2,9-10S)	2 SEG (1,12S)
Maxillule	Coxa	15S	19S
	Basis	19S	19S
	Endopod	2 SEG (2,3S)	2 SEG (4,3S)
Maxilla	Coxa	6+3S	6+7S
	Basis	8+8S	9+13S
	Sch	60-62 S	73S
Maxilliped I	Coxa	14S	19S
	Basis	31-33S	46S
	Endopod	13S	22S
	Exopod	2 SEG (4,9S)	2SEG (6,8S)
	Epipod	21-24S	37S
MaxillipedII	Endopod	4 SEG (6,0,7, 11S)	5 SEG (3,11,3,7,13S)
	Exopod	2 SEG (8,8S)	2SEG (0,7S)
Maxilliped III	Endopod	5SEG (40-43,9-10,10-12,7,7S)	5 SEG (48,20,17,10,9S)
	Exopod	2SEG (14,6S)	2 SEG (17,6S)
	Epipod	22-24 S	29S

Abbreviations: AE, aesthetascs; CL, carapace length; CW, carapace width; S, seta/setae; Sch, scaphognathite; SEG, segmented;

4. Conclusions

Only two complete morphological descriptions are available for the first crabs of *Portunus*. In the present study, plankton-based first crab is morphologically described for the first time. Only a few morphological characters are common between the first crabs of *P. sanguinolentus* and *Portunus* sp. (present study). Several morphological descriptions are required to formulate identification keys for the first crabs of *Portunus*.

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الوصف الظاهري للسرطان الأول من أحد أنواع السرطانات العائمة من نوع
البورتينوس (*Portunus*) والتي تم جمعها من منطقة شرم أبحر - البحر الأحمر -
المملكة العربية السعودية

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المستخلص. تم جمع ٢٠ عينة من يرقات سرطان البحر من نوع البورتينوس (*Portunus*) من عينات بلانكتون، والتي تم جمعها من شرم أبحر وسط البحر الأحمر - المملكة العربية السعودية. تم وصف هذه العينات مورفولوجياً في هذا البحث. كما تمت مقارنة أنماط الشعيرات بمجموعة السرطانات الأولى للعينات الحالية مع أنماط الشعيرات السرطانات الأولى في نوع *P. sanguinolentus*. أوضحت النتائج أنه يوجد صفان إلى ثلاثة صفوف من الشعيرات على قاعدة الفك العلوي وقاعدة الفك العلوي الأول في كلا النوعين من سرطان البحر، الأول نوع البورتينوس (*Portunus*) وتمت مقارنة هذا في البحث، ويتضح أن هذه الخصائص مهمة من الناحية التصنيفية، إذ توجد هذه الخصائص في أحد الأجناس الأخرى، فصيلة السرطانات العائمة *Portunidae*، وهو جنس *Thalamita*.

الكلمات المفتاحية: يرقة الميجالوبا، الوصف الظاهري، السرطانات العائمة، البحر الأحمر.