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Description of the First Four Zoeal Stages of *Grapsus albolineatus* (Decapoda: Brachyura: Grapsidae) of the Red Sea Reared under Laboratory Conditions

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Abstract. Larvae of *Grapsus albolineatus* (Latreille, in Milbert, 1812) of the Red Sea were reared in the laboratory for 24 days and four zoeal stages were obtained. In this paper, these first four zoeal stages of *Grapsus albolineatus* have been described for the first time; these descriptions aid to compare this species with other congeneric species and to show that its morphological features are basically equal to those defined for grapsid zoeae. Cephalothorax lateral spines are present from the second zoeal stage, however, a third seta on the second segment of the endopod of the first maxilliped in the fourth zoea is observed for the first time in a grapsid four zoea and the diagnostic value of this character needs to be investigated further.

Keywords: *Grapsus albolineatus*, Brachyura, zoea, Red Sea.

1. Introduction

The subfamily Grapsinae (MacLeay, 1838) presently consists of 40 species assigned to eight genera (Ng *et al*., 2008). The genus *Grapsus* Lamarck, 1801 includes eight species (Ng *et al*., 2008) and three of them have been recorded in the Red Sea (Holthuis, 1977): *G. tenuicrustatus* (Herbst, 1783) and *G. albolineatus* Latreille, in Milbert, 1812. and *G. granulosus* H. Milne Edwards, 1853.

There are larval descriptions for six species of this genus, *viz*., the first zoea of *G. adscensionis* (Osbeck, 1765) by Cuesta et al. (1997); zoeae I-V (from plankton) of *G. albolineatus* by Gohar and Al-Kholy (1957) as *G. strigosus;* zoea I of *G. fourmanoiri* Crosnier, 1965 by Flores *et al*. (2003); zoea I of *G. grapsus* (Linnaeus, 1758) by Guerao *et al*. (2001); the megalopa (from plankton) of *G. longitarsis* Dana, 1851 by Chen (1995) and zoea I (from plankton) and zoea I of *G. tenuicrustatus* by Aikawa (1937) and Flores *et al*. (2003), respectively. The larval characteristics of the zoeae of *G. tenuicrustatus* illustrated by Aikawa (1937) and *G. albolineatus* (as *G. strigosus*) by Gohar and Al-Kholy (1957) from individuals collected from plankton do not belong to these species according to their larval characters that do not correspond with grapsid larval features (Cuesta *et al*., 1997; Cuesta and Schubart, 1999). Recently, Landeria and Cuesta (2012) described the second zoeal stage of *G. adscensionis* (Osbeck, 1765) from Canary Islands, NE Atlantic. The megalopa stage of Grapsus is poorly studied and described. The only incomplete descriptions of *G.longitarsis* (Dana, 1851) megalopa was done by Chen (1995) from Tungkang coast, Taiwan. Cuesta *et al*. (2011) summarized all known larval data for this subfamily.

Only a very few studies have been carried out on the larval taxonomy of Grapsidae in the Red Sea. Gohar and Al-Kholy (1957) collected the zoea stage four of *G. albolineatus* (as *G.strigosus*) from plankton at the northern Red Sea, El-Ghardaqa region. The early three zoeal stages of *Metopograpsus messor* (Forskål, 1775) described by Al-Aidaroos (2005), and recently Al Haj and Al-Aidaroos (2014) Described the first zoeal stage of *Geograpsus crinipes* (Dana, 1851) reared material from the central Red Sea.

Grapsus albolineatus (Latreille, in Milbert, 1812) inhabits rocky beaches of the high tide mark and is distributed from Japan to the east coast of Africa (Naderloo, 2011). There have been no larval descriptions for *G. intermedius* (De Mann, 1888) and *G. albolineatus* thus far. In the present paper, four zoeal stages of *G. albolineatus* have been described and illustrated for the first time.

2. Materials and Methods

Ovigerous *G. albolineatus* were collected by hand from the rocky shore from Farasan Islands, (16° 51.881' N 41° 48.615' E), southern Red Sea, Saudi Arabia on 25 Feb. 2012 and kept in an aquarium (50×20×25 cm) in the Faculty of Marine Sciences. The hatched out larvae were reared in the laboratory. Around 800 actively larvae hatched were reared. Each 50 larvae were reared in 1-litre containers with 800 ml seawater with a salinity of 37‰ at 27°C and photoperiod at 12 hr light and 12 hr dark. The early larval (Z1 and Z2) stages were fed with the rotifer *Brachionis* sp. Third and fourth zoeal stages were supplied with a mixture of the rotifer *Brachionis* sp. and *Artemia salina* nauplii.

Ten larvae from each stage were preserved in 70% ethanol and dissected in polyvinyl lactophenol using a WILD stereoscope and allowed to clear for 24 hr. Appendages were drawn using an Olympus BH-2 microscope equipped with differential interference contrast (DIC), with a *camera lucida*.

All the zoeal stages have been described and illustrated. The sequence of the zoeal descriptions is based on the malacostracan pleonite plan and described from anterior to posterior. Setal armature of appendages has been described from proximal to distal segments in the order of endopod to exopod (Clark *et al*., 1998; Clark and Cuesta, 2015). The long antennular aesthetascs, the long plumose natatory setae of the first and second maxillipeds were drawn truncated. Figures were drawn to scale with the aid of *camera lucida*. The following measurements were made: a) rostrum dorsal length (RDL) from the tip of the rostral spine to the tip of the dorsal spine; b) Cephalothorax length (CL) from the base of the rostral spine to the posterior margin of Cephalothorax; c) Cephalothorax width (CW) measured as the distance between the tips of lateral spines; d) furcal length (FL) deduced from an imaginary line across the base of the outer seta in the posterior margin of the telson to the furcal tip; e) basal telson length (BT), from a line across the anterior margin to the posterior margin of the telson (base of the outer seta) (see Cuesta *et al*., 2011, p. 2); f) Pleon length (ABL) from the first pleonite of the Pleon to the tip of furca. Measurements were done from five larvae of each stage using a micrometer and the averaged values were represented to the nearest 0.01 mm. The female crabs was deposited in the King Abdulaziz University Museum (KAUMM-410).

2. Results

The larvae hatched on 25 Feb. 2012 after 2 days of collection from Farasan Islands, Jizan. Four zoeal stages were obtained within 24 days, which died later. It took 6–7 days for a zoeal stage to successfully moult to the successive zoeal stage. No larvae survived after the fourth stage.

First zoea (Fig. 1–8). Size (given in mean ± Sd): RDL, 0.84±0.2 mm; CW, 0.41±0.06 mm, CL, 0.41±0.12 mm, ABL, 0.9±0.5 mm.

- Cephalothorax (Fig. 1a): Globose. Dorsal spine relatively short with two setae. Rostral spine straight, near equal to dorsal spine. Lateral spines reduced to minute spines. Anterodorsal region, posterior and ventral margin without setae. A pair of dorsolateral setae. Eyes sessile.
- Antennule (Fig. 2a): Endopod absent. Exopod unsegmented with four unequal terminal aesthetascs and 1 simple seta.
- Antenna (Fig. 2e): Well-developed protopod process with distally 2 rows of 11 spinules of increasing size towards the tip, shorter than rostral spine. Endopod absent. Exopod with 1 simple seta.
- Mandible (Fig. 2i): Incisor and molar process present. Palp absent.
- Maxillule (Fig. 3a): Coxal endite with 6 (2 subterminal and 4 terminal) plumodenticulate setae. Basial endite with 5(4 cuspidate, 1 plumodenticulate) setae with 2 small setal buds. Endopod 2-segmented, proximal segment with 1 distal seta; distal segment with 1 subterminal and 4 terminal plumose setae. Exopod setae absent.
- Maxilla (Fig. 4a): Coxal and Basial endite bilobed with 5+4 plumodenticulate setae. Endopod bilobed with 2+2 plumodenticulate setae. Exopod (scaphognathite) margin with 4 plumose setae and 1 distal stout process.
- First maxilliped (Fig. 5a): Coxa without setae. Basis with 8 setae arranged 2,2,2,2. Endopod 5-segmented with 1,2,1,2,5 (2 subterminal denticulate+ 3 terminal sparsely plumose) setae respectively. Exopod 2-segmented, distal segment with 4 terminal plumose natatory setae.
- Second maxilliped (Fig. 6a): Coxa without setae. Basis with 4 setae arranged 1,1,1,1. Endopod 3-segmented, arranged with 0,1,5 (2 subterminal denticulate+ 3 terminal sparsely plumose) setae respectively. Exopod 2-segmented, distal segment with 4 terminal plumose natatory setae.
- Pereiopods: Absent.
- Pleon (Fig. 7a, 8a): Five pleonites, pleonites 2–5 with 1 pair of dorsolateral processes directed ventrally, posterolateral processes in 2–5 pleonites, small in pleonite1, larger but still blunt in pleonite 2, and especially well developed in pleonite 3, pleonites 2–5 with 1 pair of posterodorsal setae, pleonite 4 is wide. Pleopods absent.
- Telson (Fig. 8a): Forks short, slightly divergent without posterior lateral spine. Posterior margin with 3 pairs of stout spinulate setae; length of the medial setae less than half the length of the proximal. BT/FL >1.

Second zoea (Fig. 1–8). Size (given in mean ± Sd): RDL, 1.17±0.03 mm, CW, 0.66±0.002 mm, CL, 0.58±0.02 mm.

- Cephalothorax (Fig. 1b, 1c): Lateral spines increased in size, short and directed downwards. Dorsal spine with paired rows of 7-5 setae; ventral margin with 1 anterior plumose seta.
- Antennule (Fig. 2b): Exopod with 4 terminal aesthetascs (3 long and 1 shorter) and 2 simple setae.
- Antenna (Fig. 2f): Well-developed protopod process with 2 rows of 12 spinules of increasing size towards the tip; otherwise unchanged.
- Mandible: No changes besides size.
- Maxillule (Fig. 3b): Coxal endite with 6 (1 subterminal and 5 terminal) plumodenticulate setae. Basial endite with 7 (5 cuspidate,2 plumodenticulate) setae and a small setal bud. Exopod present as 1 plumose seta, otherwise unchanged.
- Maxilla (Fig. 4b): Exopod (scaphognathite) margin with 11 plumose setae. Distal stout process now much reduced in size.

- First maxilliped (Fig. 5b): Exopod 2-segmented, distal segment with 6 long, terminal plumose natatory setae.
- Second maxilliped (Fig. 6b): Exopod 2-segmented, distal segment with 6 long, terminal plumose natatory setae.
- Pereiopods: Absent.
- Pleon (Fig. 7b, 8b): 2 pair of middorsal seta present in pleonite1. Unchanged besides size.
- Telson (Fig. 7b): Unchanged besides size. BT/FT>1.

Third zoea (Fig. 1 -8). - Size (given in mean ±Sd): RDL, 1.45±0.04 mm, CW, 0.96±0.001 mm, CL, 0.74±0.001 mm.

- Cephalothorax (Fig. 1d): Dorsal spine with pair rows of 6–8 setae. Ventral margin with 2 anterior plumose setae.
- Antennule (Fig. 2c): Exopod with 4 terminal aesthetascs (3 long and 1 short) and 3 simple setae.
- Antenna (Fig. 2g): Well-developed protopod process with 2 rows of 13 spinules. Unchanged besides size.
- Mandible (Fig. 2i): Incisor and molar process present. Palp absent.
- Maxillule (Fig. 3c): The base of epipod seta present; basial endite with 8 (5 cuspidate, 3 plumodenticulate) setae; otherwise, unchanged.
- Maxilla (Fig. 4c): Scaphognathite with 19 plumose marginal setae, otherwise unchanged.
- First maxilliped (Fig. 5c): Exopod 2-segmented, distal segment with 8 long, terminalnatatory setae, otherwise unchanged.
- Second maxilliped (Fig. 6c): Exopod 2-segmented, distal segment with 8 long, terminal plumose natatory setae, otherwise unchanged.
- Pereiopods: Absent.
- Pleon (Fig. 7c, 8c): The sixth pleonite present, with a pair of middorsal seta, without posterolateral processes. Pleonite 1 with 3 medial dorsal setae; otherwise, unchanged.
- Telson (Fig. 7c): Posterior margin with 4 pairs of stout plumodenticulated setae. Three rows of minute spines on each arm of furca. BT/FL>1.

Fourth zoea (Fig. 1–8). - Size (given in mean ± Sd): RDL, 3.4±0.01 mm, CW, 1.46±0.1 mm, CL, 1.6±0.01 mm.

- Cephalothorax (Fig.1e): Dorsal spine with rows of 10 setae in pairs, lateral spines developed and directed downwards; ventral margin with 3 anterior plumose setae.
- Antennule (Fig. 2d): Not changed besides size.
- Antenna (Fig. 2h): Not changed besides size.
- Mandible (Fig. 2j): No changes besides size.
- Maxillule (Fig. 3d): Epipod seta present; basial endite with 9 (1 subterminal, 5 terminal cuspidate, 3 terminal plumodenticulate) setae, otherwise unchanged.
- Maxilla (Fig. 4d): Scaphognathite with 21 plumose marginal setae, otherwise not changed.
- First maxilliped (Fig. 5d): Exopod 2-segmented, distal segment with 10 long, terminal plumose natatory setae. Additional dorsal seta in endopod segment 2.
- Second maxilliped (Fig. 6d): Exopod 2-segmented, distal segment with 10 long, terminal plumose natatory setae.
- Pereiopods: Absent.
- Pleon (Fig. 7d, 8d): Not changed besides size.
- Telson (Fig. 7d): Unchanged besides size. BT/FL>1.

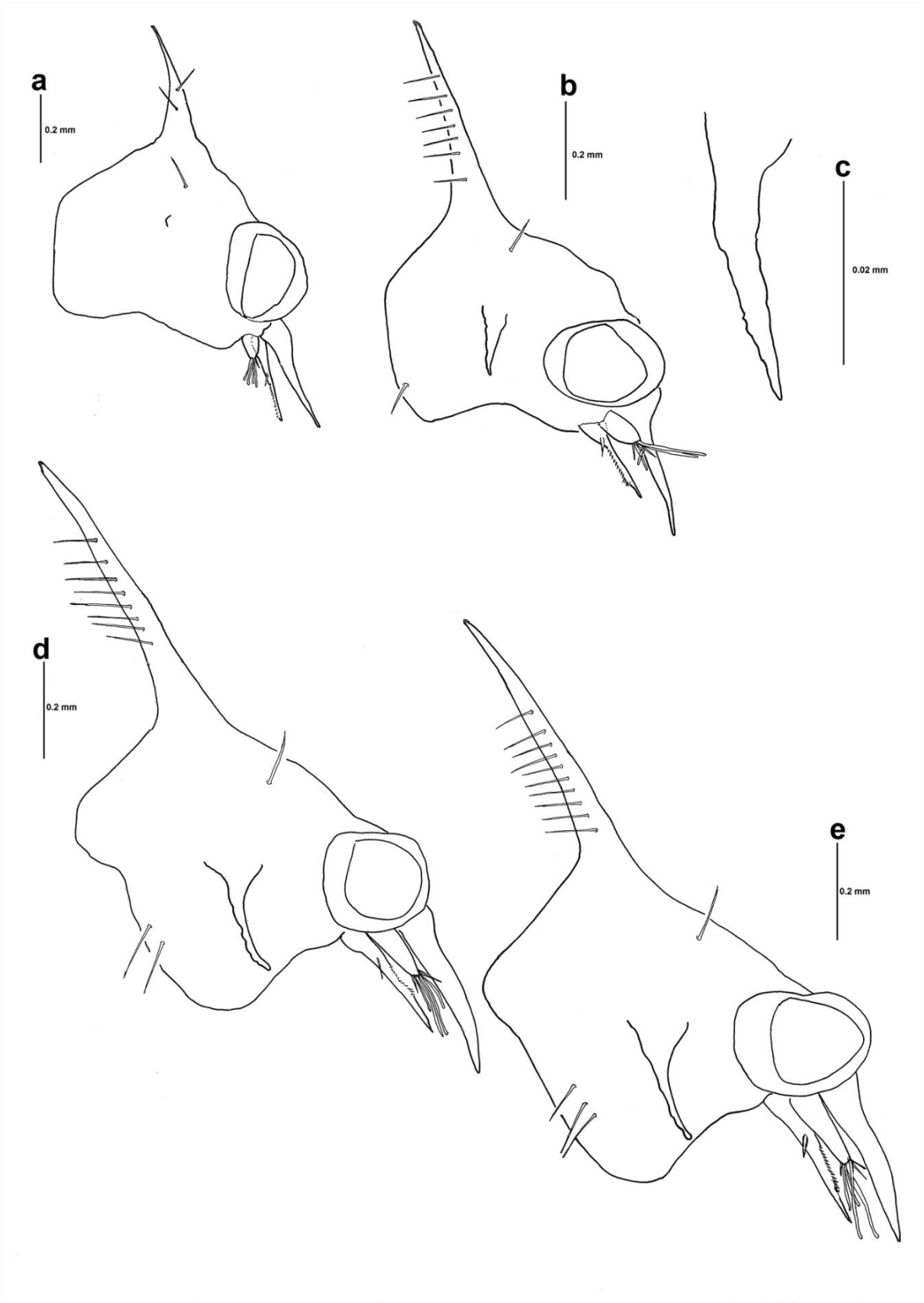

Fig. 1. *Grapsus albolineatus* (Latreille, in Milbert 1812), Cephalothorax; a) first zoea; b) second zoea; lateral spine; c) second zoea, Cephalothorax; d) third zoea; e) fourth zoea.

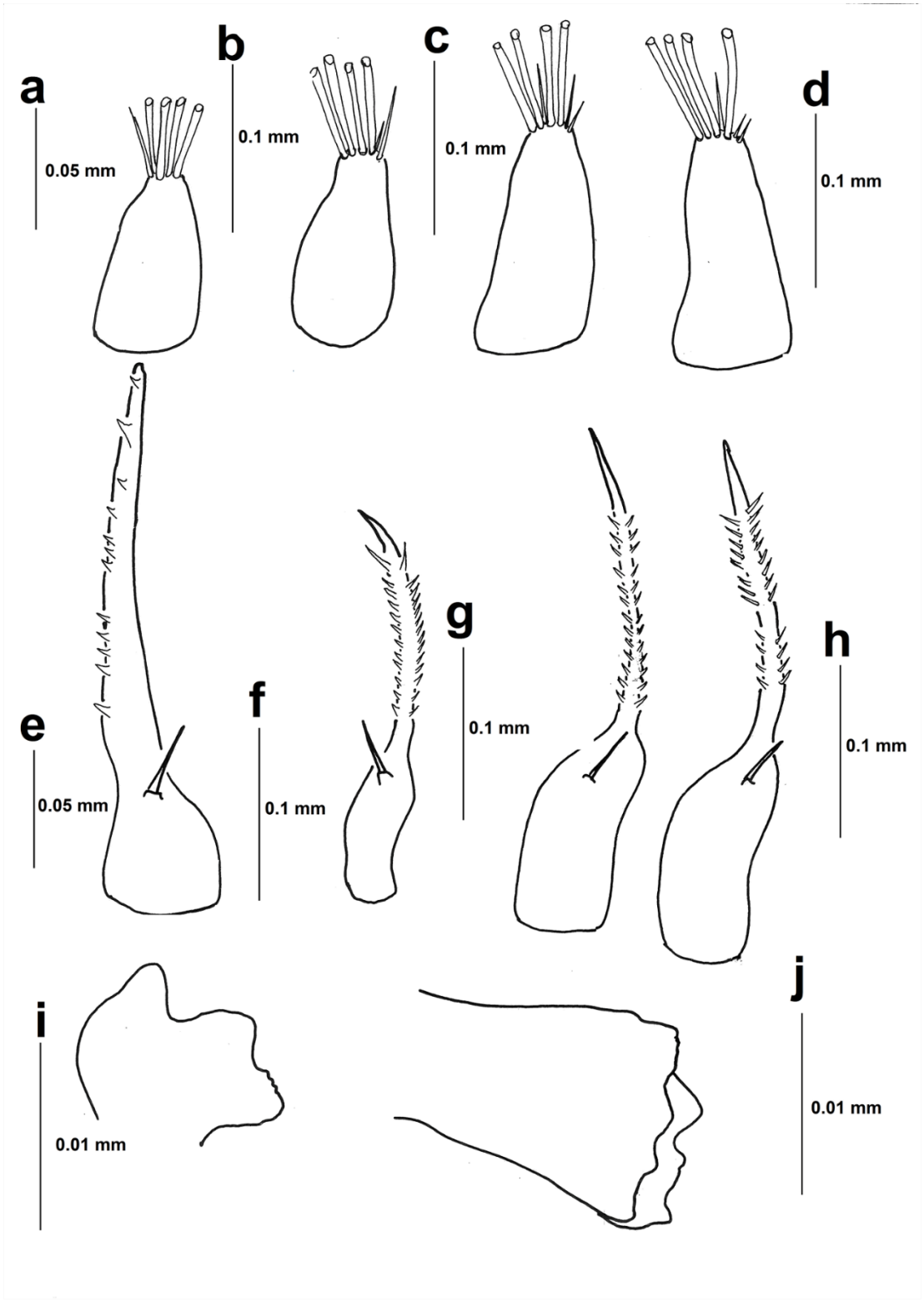

Fig. 2. ***Grapsus albolineatus*** **(Latreille, in Milbert 1812), antennule; a) first zoea; b) second zoea; c) third zoea; d) fourth zoea, antenna; e) first zoea; f) second zoea; g) third zoea; h) fourth zoea, mandible; i) first zoea; j) second zoea.**

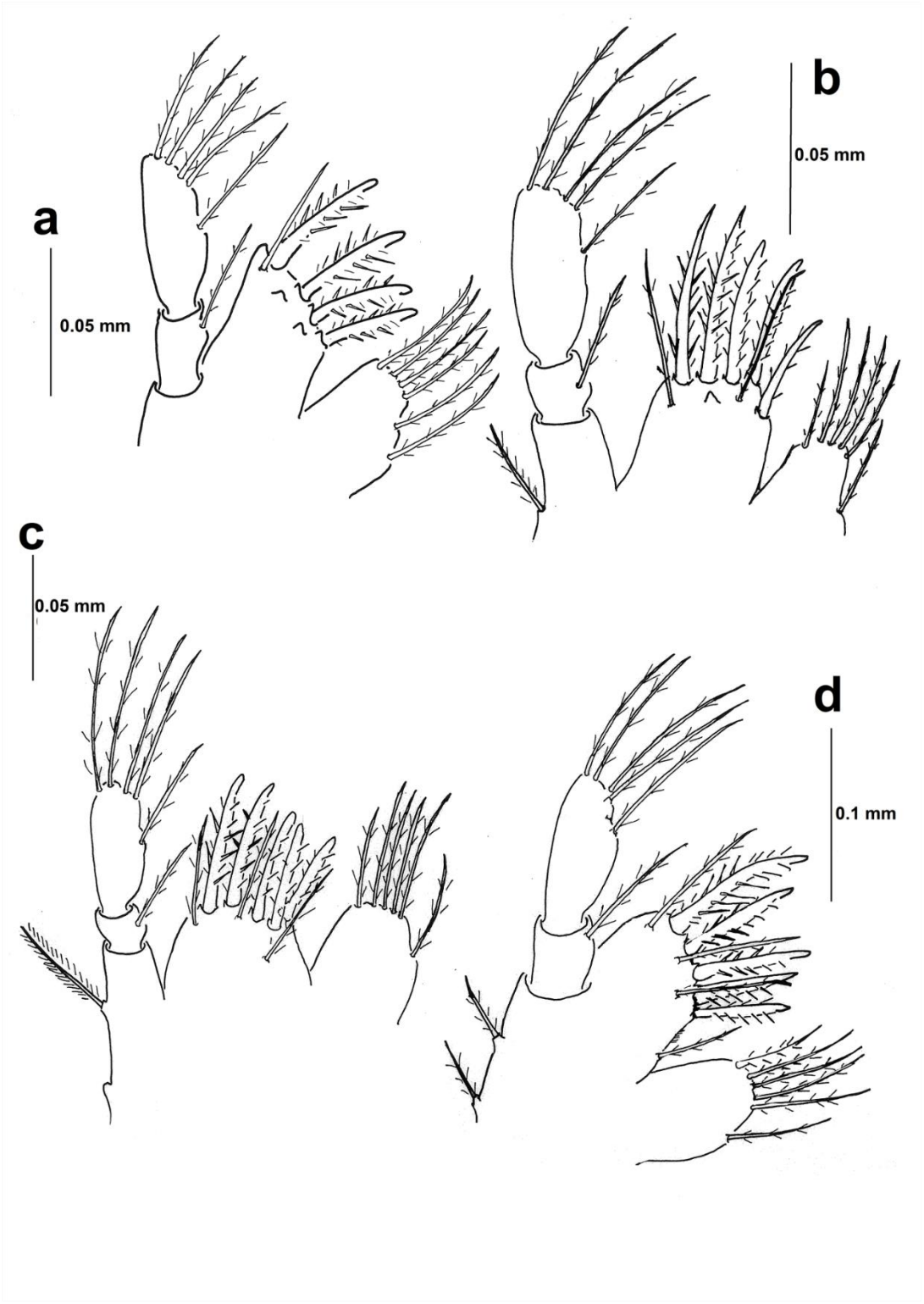

Fig. 3. ***Grapsus albolineatus*** **(Latreille, in Milbert 1812), mandible; a) third zoea, b) fourth zoea, maxillule; c) first zoea; d) second zoea; e) third zoea; f) fourth zoea.**

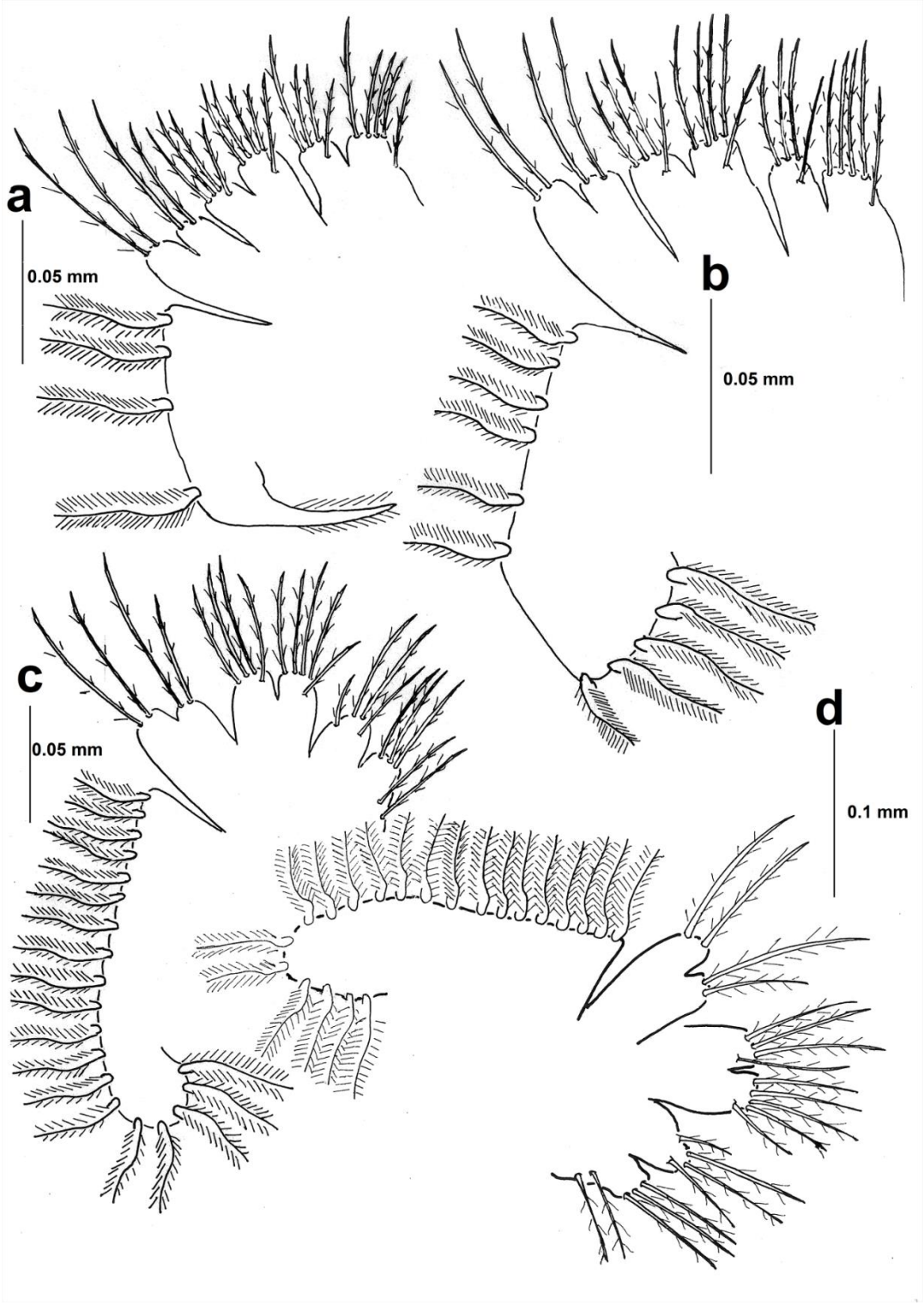

Fig. 4. ***Grapsus albolineatus*** **(Latreille, in Milbert 1812), maxillule; a) first zoea; b) second zoea; c) third zoea; d) fourth zoea.**

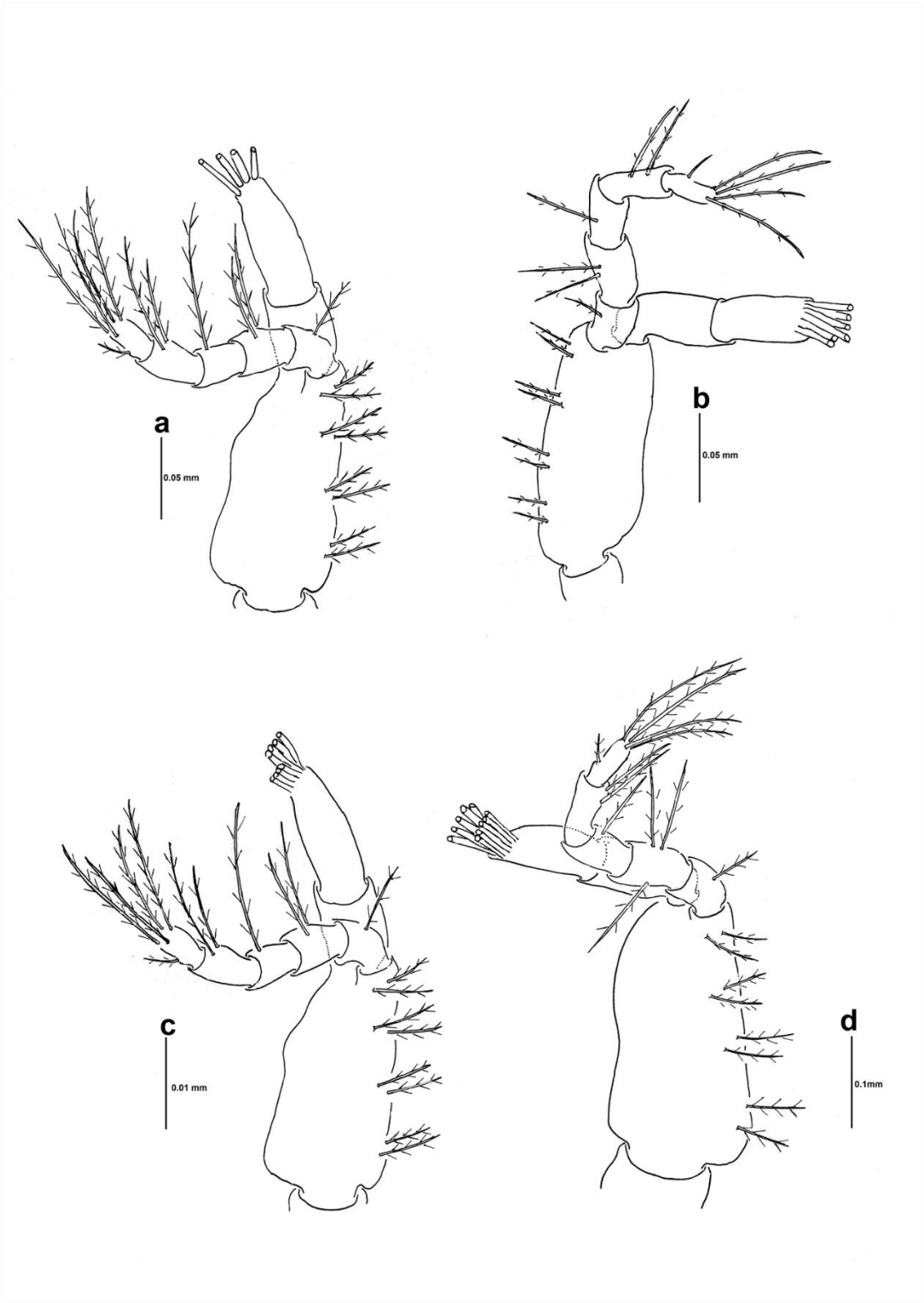

Fig. 5. *Grapsus albolineatus* (Latreille, in Milbert 1812), maxilla; a) first zoea; b) second zoea; c) third zoea; d) fourth zoea.

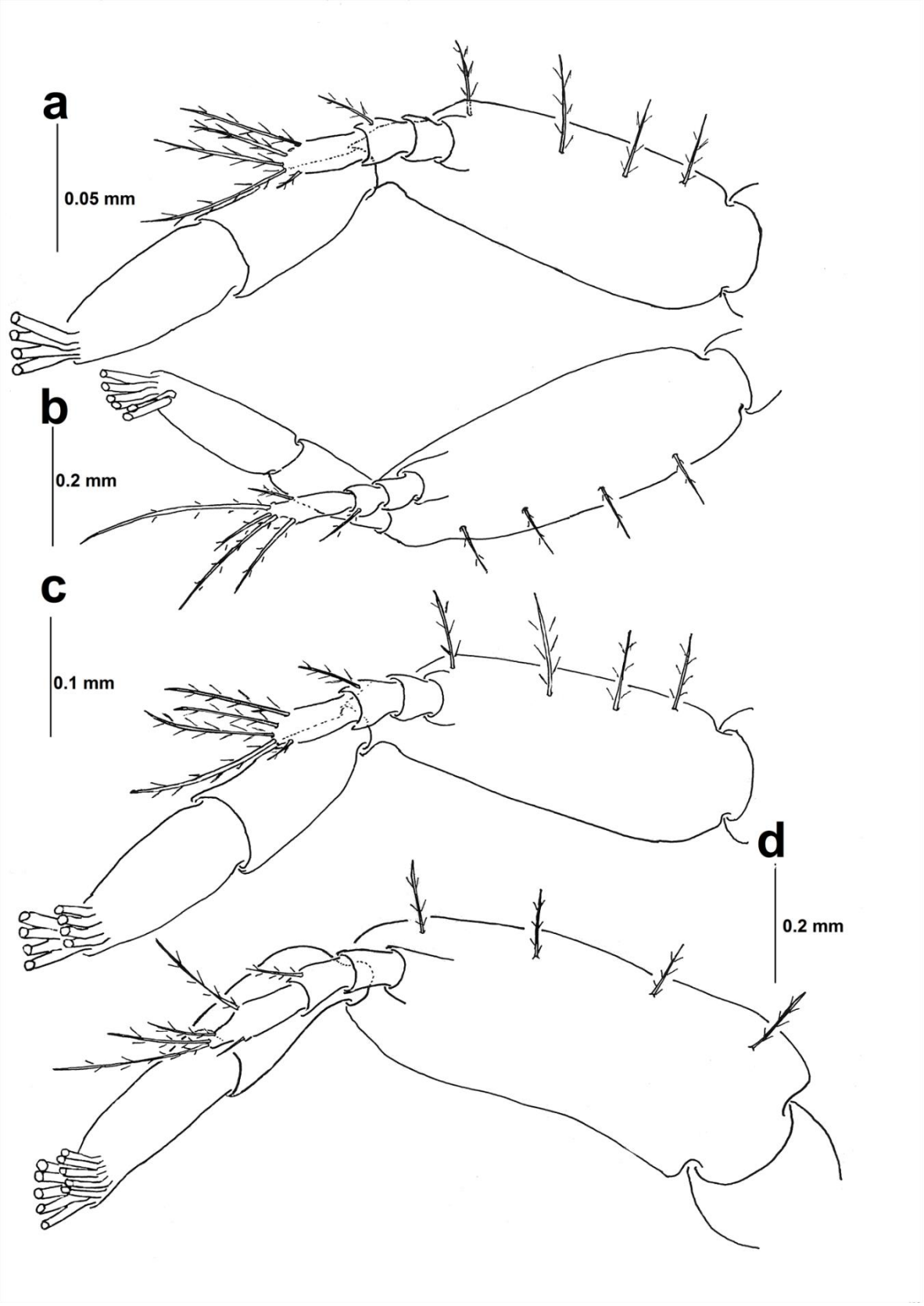

Fig. 6. ***Grapsus albolineatus*** **(Latreille, in Milbert 1812), first maxilliped; a) first zoea; b) second zoea; c) third zoea; d) fourth zoea.**

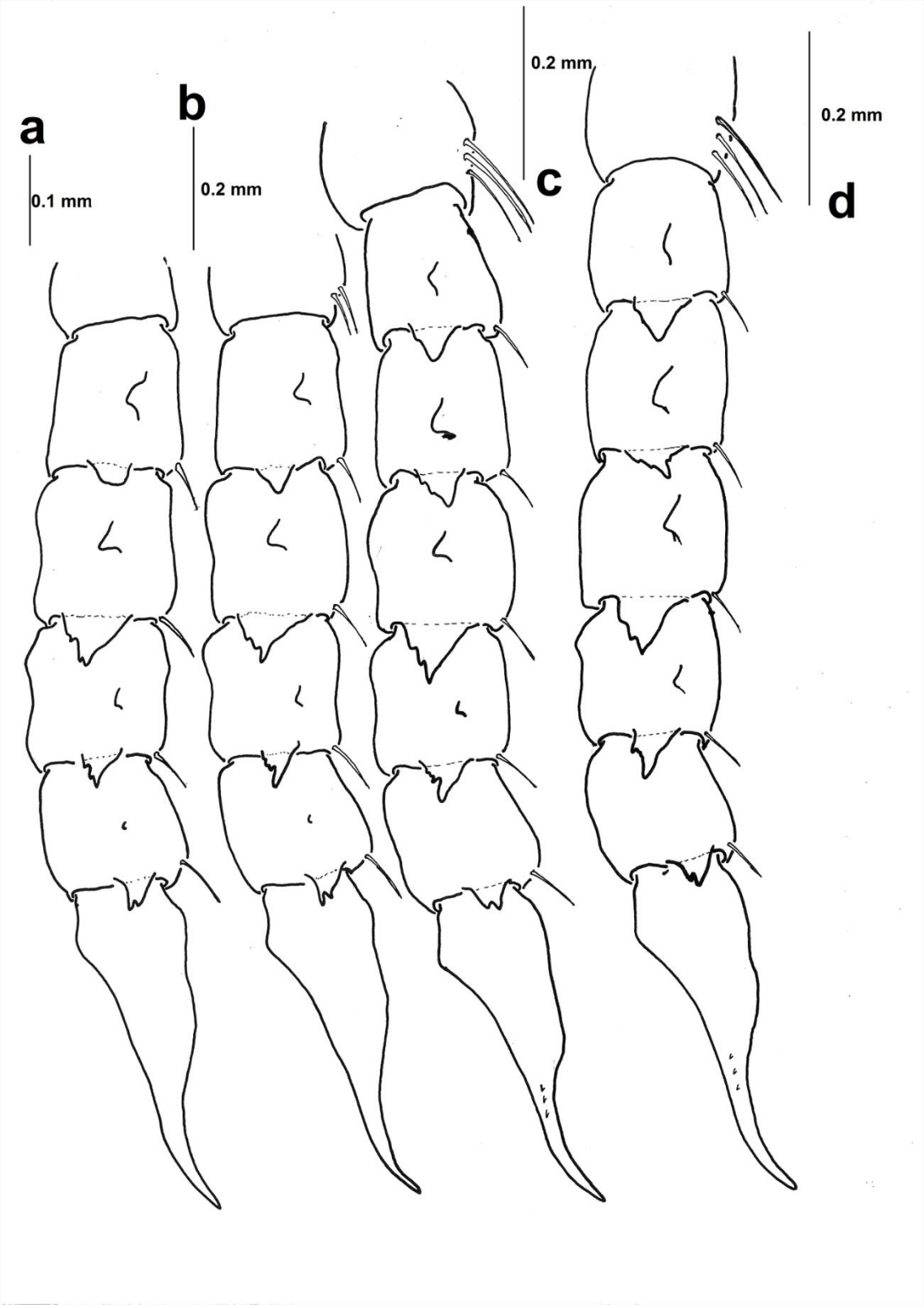

Fig. 7. ***Grapsus albolineatus*** **(Latreille, in Milbert 1812), second maxilliped; a) first zoea; b) second zoea; c) third zoea; d) fourth zoea.**

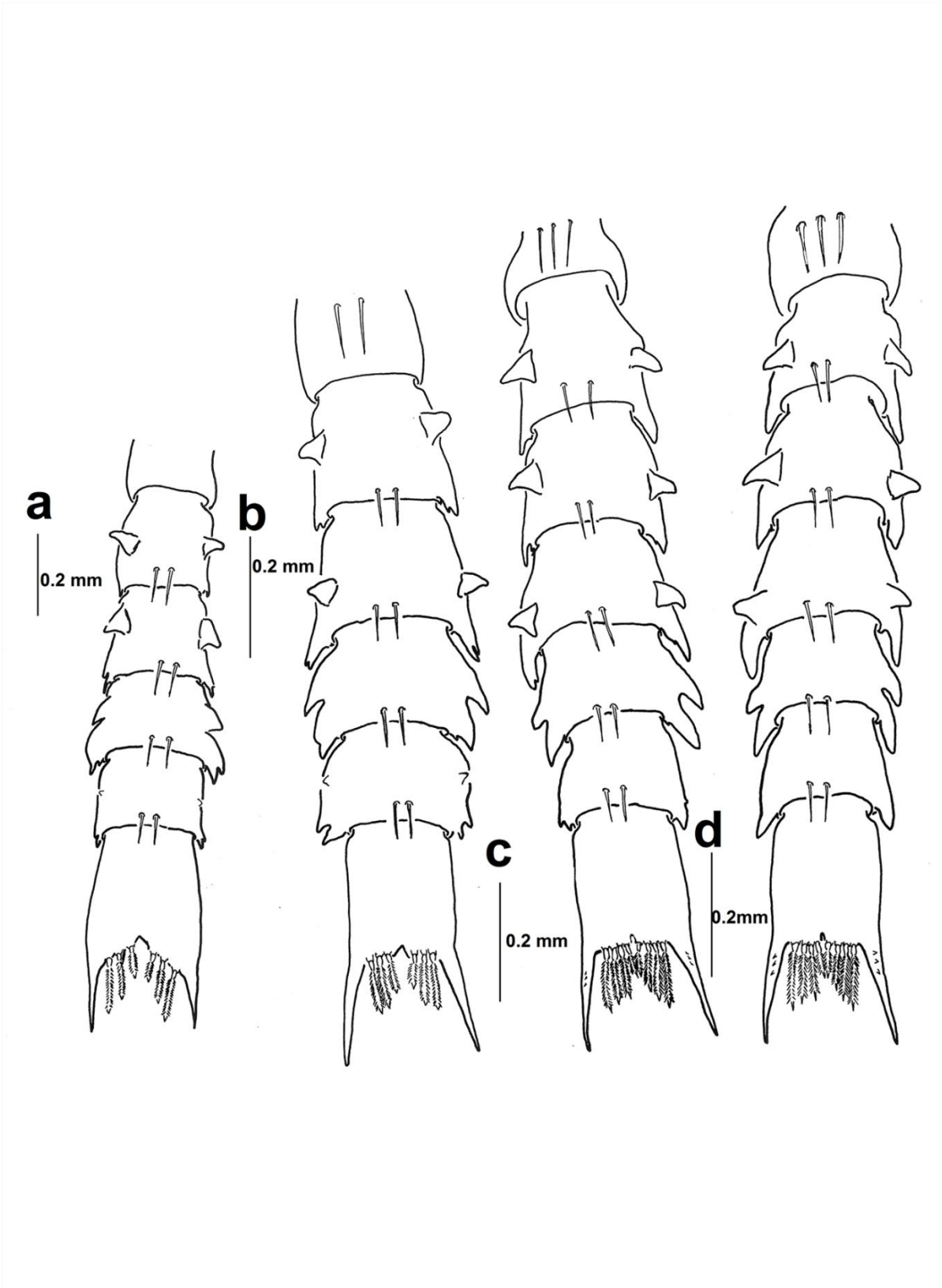

Fig. 8. ***Grapsus albolineatus*** **(Latreille, in Milbert 1812), dorsal view of Pleon; a) first zoea; b) second zoea; c) third zoea; d) fourth zoea.**

Discussion

Four zoeal stages of *G. albolineatus* have been described for the first time in this study (Table 1). It took about 6 or 7 days for one zoeal stage to moult to the next stage. The fourth zoeal stage was attained after 24 days and after that all larvae died; the reason for larval death could not be predicted. Data on grapsidae larval development and growth are poor, and most larval descriptions deal only with the first zoeal stages because of the difficulties encountered in appropriately feeding of the small early zoeal stages (Ingle, 1987; Cuesta and Rodríguez, 2000).

The first zoea of *G. albolineatus* is comparatively smaller than those of other species (Table 2). However, Guerao *et al*. (2001) are of the view that sizes of the same species of brachyuran larvae vary corresponding to geographical isolation, water temperature and food availability. Four characteristic features have diagnostic value for identifying different zoeal stages of this species, for they vary from one stage to another: i) setae on dorsal spine of Cephalothorax (2 for zoea 1, 5–7 for zoea 2, 6–8 for zoea 3 and 10 for zoea 4), ii) number of the exopod scaphognathite of maxilla (4 for zoea 1, 10 for zoea 2, 19 for zoea 3 and 21 for zoea 4), iii) basial setal number of maxillule (5 for zoea 1, 7 for zoea 2, 8 for zoea 3 and 9 for zoea 4), iv) terminal plumose natatory setae of exopod of first and second maxilliped (4 for zoea 1, 6 for zoea 2, 8 for zoea 3 and 10 for zoea 4) (Table 1).

For zoea 1 of this species, (i) the lateral spines are underdeveloped, knob-like; (ii) antennal exopod is type C; (iii) setal arrangement of maxillar endopod is 2,2; (iv) setal pattern on the basis of first maxilliped is 2,2,2,2; (v) only one seta is present on the proximal segment of the endopod of first maxilliped; (vi) endopodal setal pattern of second maxilliped is 0,1,5; and (vii) the basal part of telson is elongated and longer than furcal arms; all these seven characters are typical of grapsid larvae (Cuesta *et al*., 1997; Cuesta and Schubart, 1999). This study is one more evidence that the seven features of grapsid larvae can serve to be definitive diagnostic basis for this family. The knob-like projections present indicates that the later stages may possess lateral spines and this character can be used to identify and quantify later-stage larvae from plankton samples (Cuesta and Schubart, 1999; Landeria and Cuesta, 2012).

Table 2 indicates that the characteristic features of *G. albolineatus* are not unique as at least one of its character is shared by its congeneric species; hence, the combination of characteristics listed in this table can only be used to identify the zoeae of this species from meroplanktons. Only after the description of the larvae of *G. albolineatus* from other parts of the world can comparisons be made with the larvae of this study to check the consistency of larval characteristics reported here for setal patterns and other features; these features vary within the same species collected from different geographical areas (as shown in Table 2, the antennal setal patterns and the propodal spines of the larvae of *G. grapsus* and *G. tenuicrustatus* collected from different geographical regions vary). Although postero-lateral projections of abdominal pleonites differentiate *G. albolineatus* from *G. strigosu* (Table 2), Cuesta and Schubart (1999) were of the view that lateral lobe projections of abdominal pleonites have no diagnostic value as this feature is not consistent in grapsid larvae. Second zoeal stages of *G. albolineatus* and *G. adscensionis* can be differentiated by the number of setae on the dorsal spine of cephalothorax, number of spines of antennal protopd, scaphognathite setal number of maxilla, outer spine number of telson and the number of setae present on the first segment of pleon. A noteworthy feature observed in the larvae of the fourth stage of *G. albolineatus* in this study is the presence of 3 setae in the second segment of the endopod of the first maxilliped of fourth zoea; this character is not found in grapsid genera such as *Metopograpsus*, *Pachygrapsus* and

*Geograpsu*s (Randall, 1840) but seen in the second zoea of Gecarcinidae (MacLeay, 1838) such as *Gecarcinus* (Leach, 1814) and *Johngarthia* (Tükay, 1970) (see Cuesta *et al*., 2007), and in the third zoea of sesarmid crabs such as *Perisesarma* (De Man, 1895), *Aratus* (H. Milne Edwards, 1853) and *Armases* (Abele, 1992) as described by Guerao *et al*. (2007), and in the third and fourth zoea of varunid crabs such as *Hemigrapsus* and *Eriocheir* as described by Terada (1981).

Likewise, fourth zoeal stages of *G. albolineatus* and *G. strigosu* can be differentiated by the basial setal number and pattern of maxilla, coxal and basial setal numbers of maxillule, basial and endopodal setal numbers of first two maxillipeds (Table 1).

Based on the morphology of the antennules, antenna, pereiopods and pleopods of the fourth zoea of *G. albolineatus*, it appears that this stage is not the last stage preceding the megalopa because the antennal endopod, pereiopods and pleopods are absent. Landeria and Cuesta (2012) opine that crabs of the genus *Grapsus* have six or more zoeal stages.

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Table 1. Differences between zoea (four stages) of G. albolineatus (present study), the second stage of G. adscensionis (see Landeria and Cuesta (2012) and fourth stage zoea of G. strigosu (see Gohar and Al-Kholy, 1957).

	G. albolineatus				*G.ad*	*G. strigosu*
	Z1	**Z2**	**Z3**	**Z4**	**Z2**	**Z4**
Setae of dorsal spine	2	5-7	6-8	10	3	-
Lateral spine	Knob-like	Present	Present	Present	Present	Absent
Ventral setae	0	1	2	3		
Antennule						
Type	C	C	C	C	A	C
Setal pattern	2,2,1	2,2,2	2,2,3	2,2,3		
Antenna						
No of small spines protopod	11	11	11	13	9	Nd
Maxilla						
Basial setal pattern	5+4	5+4	5+4	5+4	5+4	5+7
Scaphognathite seta	4	10	19	31	8	Nd
Maxillule						
Coxal setal number	6	6	6	6	6	4
Basial setal number	5	7	8	9	7	7+1
Endopod setal pattern	1+5	1+5	1+5	1+5	1+5	
	0	1	1	2		
Maxilliped 1						
Basis setal number	8	8	8	8	8	3
Endopod setal pattern	1,2,1,2,5	1,2,1,2,5	1,2,1,2,5	1,3,1,2,5	1,2,1,2,5	0, 1, 1, 1, 3
Exopod setal number	4	6	8	10	6	10

Maxilliped 2						
Endopod setal pattern	0,1,5	0,1,5	0,1,5	0,1,5	0,1,5	3
Basis setal number	4	4	4	4	4	3
Telson						
Outer spine	0	0	3	3	3	Nd
Inner spines	3+3	3+3	4+4	4+4	3+3	4 +4
Pleon						
No of segments	5	5	6	6	5	6
Posterolateral projections in pleonites	All	All	All	All	J	Nd
Setae in 1st segment	0	2	3	3	1	Nd

Abbreviation: Nd, not detected; *G.ad*, *Grapsus adscensionis.*

Table 2. Comparison of the first zoeal larval morphological features of *Grapsus albolineatus* with the known larval features of some *Grapsus* species.

	G. adscensionis	***G. strigosu***	***G. fourmanoiri***	***G. grapsus***	***G. tenuicrustatus***		***G. albolineatus***
Cephalothorax					1.05±Nd	0.92±0. 01	
Rdl (in mm)	1. 2±0.03	0.9±Nd	0.9±0.02	0.92±0.01	Nd	0. 5±0. 01	0.84±0.2
Cw (in mm)	0.44±0.09	Nd	0.52±0.07	0.5±0.01	0. 61±Nd	0.38±0. 01	0.41±0.06
Cl (in mm)	0. 58±0.08	Nd	0.5±0.01	0.37±0.01	Absent	Absent	0.41±0. 12
Lateral spine	Knob-like	Absent	Absent	Knob-like			Knob-like
Antennule					B4	C	
Type	C	C	C	C	3, 2	3, 2	C
Setal pattern	2, 2, 1	3	3, 2	2, 2, 1			2, 2,1
Antenna					=Rs		
Size relationship with Rostral spine (Rs)	=Rs	~ Rs	<Rs	> Rs	11	6	> Rs
Protopod small spines	8	Nd	10	6			11
Maxilla					Nd	5+4	
Coxal setal pattern	5+5	5+3	5+4	5+4	Nd	5+4	5+4
Basial setal pattern	5+4	4+4	5+4	5+4	2+3	2+2	5+4
Endopod setal pattern	2+2	2+2	2+2	2+2	Nd	4	2+2
Exopod	4	3	4	3			4
Maxillule					Nd	5	
Coxal setal number	6	3	6	6	Nd	5	6
Basial setal number	5	4	5	5	1+5	1+5	5
Endopod setal pattern	1+5	4	1+5	1+5			1+5
Maxilliped 1					Nd	1,2,1,2,5	
Endopod setal pattern	1,2,1,2,5	0,1,1,2,3	1,2,1,2,5	1,2,1,2,5			1,2,1,2,5
Maxilliped 2					0,1,5	0,1,5	
Endopod setal pattern	0,1,5	4	0.1,5	0,1,5	Nd	4	0,1,5
Basial setal number	4	2	4	4	Nd	2	4
Outer spine	3	0	2	2	B	B	0
Telson (Type)	A	B	B	B	Nd	All	B
Pleon (Plp)	2–5	3–5	All pleonites	2–5	Aikawa,	Flores *et al.*,	2–5
References	Cuesta *et al.*, 1997	Gohar and AL-Kholy, 1957	Flores *et al.*, 2003	Guerao *et al.*, 2001			Present study

Abbreviation: Rdl, rostrum dorsal length; Cw, Cephalothorax width; Cl, Cephalothorax length; Nd, not detected; Rs, rostral spine; Plp, postero-lateral projection.

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وصف المراحل الحيوانية الأربعة الأولى من *Grapsus albolineatus* (عشرية الأقدام: السرطانات الحقيقية: القرابسيدا) من البحر الأحمر التي تمت تربيتها تحت ظروف معملية

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المستخلص. تمت تربية يرقات *Grapsus albolineatus* (Latreille, in Milbert, 1812) من البحر الأحمر في المختبر لمدة ٢٤ يومًا، وتم الحصول على أربع مراحل يرقية. في هذا البحث، تم وصف المراحل اليرقية الأربعة الأولى من *G. albolineatus* لأول مرة. تساعد هذه الأوصاف في مقارنة هذه الأنواع مع الأنواع الأخرى المشابة لها، وإظهار أن سماتها المظهرية مطابقة بشكل أساسي لتلك المحددة ليرقات القرابسيدا. وتظهر الشوكة الجانبية على الدرقة في المرحلة اليرقية الثانية، ومع ذلك، يُعد ظهور شعيرة ثالثة على القطعة الثانية من القدم الفكية للفك العلوي الأول في الطور اليرقي الرابع، ولأول مرة، وهي صفة تشخيصية فريدة مميزة، وتحتاج المزيد من التحقيق.

الكلمات المفتاحية: *Grapsus albolineatus*، السرطانات قصيرة الذنب، يرقة، البحر الأحمر.