

Larval and post-larval development of the Slender-legged Spider Crab, *Macropodia rostrata* (Linnaeus) (Oxyrhyncha : Majidae : Inachinae), reared in the laboratory

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Introduction

The Slender-legged Spider Crab *Macropodia rostrata* (Linnaeus) occurs northward to about latitude 65° N and southward to the Moroccan coast and Mediterranean (see Christiansen, 1969; Monod, 1932; Zariquiey Alvarez, 1968). West African and Cape Verde Island specimens have been assigned recently to *M. spinulosa* (Miers) (see Manning & Holthius, 1981). *M. rostrata* has been reported also from False Bay, S. Africa (see Barnard, 1950).

Previous descriptions (see p. 207) of larval stages of *M. rostrata* are not sufficiently detailed for comparative studies. In 1974 larvae of this species were reared from crabs collected from Tunisian and Plymouth waters and in 1977 from specimens obtained off the Isle of Man. These rearings provided material for the present detailed description and comparisons of the larvae and first crab stages of *M. rostrata* from three localities within its range of distribution.

Materials and methods

Ovigerous crabs were trawled from the following localities. (1) Off Port Erin, Isle of Man. 20–24 m., 24–25.3.1977. (2) S.W. of Eddystone Lighthouse, nr. Plymouth, Devon, 90 m., 18.6.1974. (3) Off Carthage-Salamambo, Tunisia, 4.5 m., 20.2.1974.

Larvae were reared using methods described by Rice & Ingle (1975 : 104) and Ingle & Clark (1977). Material was fixed in Steedman's fixative (Steedman, 1976 : 148) and later transferred to 70% alcohol. Drawings and measurements were made with the aid of a *camera lucida*. Measurements given are: (a) distance from base to tip of dorsal spine (D.S.); (b) carapace length, from between eyes to postero-lateral carapace margin (C.L.).

All material has been incorporated into the Collections of the British Museum (Natural History), accession no.;– 1981 : 201–225. Drawings and descriptions (unless otherwise indicated) are of specimens from locality (1). Ten specimens of each stage were dissected and examined from each locality except for ZII of Tunisian material of which 20 specimens were dissected to confirm the absence of a seta on the outer margin of the maxillule basis (see p. 210).

Whilst in the rearing laboratory females and larvae were maintained at 15°C. Larvae from locality (1) hatched within 10–12 days and those from (2) within 6–7 days of collecting the females. Both hatchings took an average of 30 days to reach first crab stage. Those from locality (3) hatched within 14 and 63 days respectively from time of collecting and an average of 22 days elapsed before the appearance of first crab stage.

Descriptions

Larval references. *Macropodia phalangium*:– Thompson, 1836 : 371, fig. e (pre-1st zoea), non fig. 2 = ?

Hyas sp. ? *Stenorhynchus rostrata*:—Stuxberg, 1874 : 3 (1st zoea). ? *Stenorhynchus phalangium*:—Cano, 1893 : Tav. 35, figs 70, 72, 74, 77–85 (1st zoea, megal. crab). *Macropodia rostrata*:—Lebour, 1928 : 550, Pl. III, fig. 10 (coloured), Pl. XV, fig 7, Pl. XVI, figs 3, 5, 8 (prezoea, 1st, 2nd zoeae, megal. 1st crab), non *Stenorhynchus phalangium*:—Lo Bianco, 1904 : 439; 1904 : Taf. 12, fig 43 (= ? *Inachus megalopa*).

FIRST ZOEAE

Dimensions: D.S. 1.3–1.4 mm., C.L. 0.7–0.8 mm.

Carapace (Fig. 1a). Dorsal spine long and straight, narrowing distally. Rostral and lateral spines not developed. Dorso-median elevation conspicuous above which there is a small seta on either side; ocular eaves developed; a pair of small dorso-lateral setae near base of dorsal spine; postero-lateral margin of carapace with 'majid' spine and 1–2 additional long thin setae (see inset Fig. 1a). Surface of carapace with minute spinules.

Eyes: Partly fused to carapace.

Antennule: (Fig. 2a). Unsegmented and with 2 terminal aesthetascs and 2 setae.

Antenna: (Fig. 2a). Spinous process without distal spinules: exopod slightly shorter than spinous process and with one small spinule in proximal half; endopod developed as acute bud.

Mandible: (Fig. 2b). Incisor and molar process developed, palp absent.

Maxillule: (Fig. 3a). Endopod 2-segmented (incipiently in some specimens), distal segment long and thin with 3 long distal setae; basal endite with 5 spines and 2 setae, coxal endite with 7 setae/spines.

Maxilla: (Fig. 4a). Endopod narrow, distally truncate and with 4 long setae; basal endite broad, distal margin concave or incipiently bilobed and with 4 + 5 setae; coxal endite incipiently bilobed, outer lobe with acute outer margin, with 3 + 4 setae respectively; scaphognathite with 10 long plumose marginal setae, posterior seta very stout.

First maxilliped: (Fig. 5a). Basis with 9 setae arranged 2, 2, 2, 3; endopod 5-segmented with 3, 2, 1, 2, 4 + 1 setae; exopod with 4 terminal natatory setae.

Second maxilliped: (Fig. 5b). Basis with one proximal seta; endopod 3-segmented with 0, 0, 3–4 + 1 setae; exopod incipiently (in some specimens) segmented with 4 terminal natatory setae.

Third maxilliped and pereopods: Represented as incipient buds.

Abdomen: (Figs 6a, b, e). 5-segmented + telson; 2nd segment with a pair of antero-laterally directed acute dorso-lateral processes; postero-lateral processes on segments 3–5 long and terminally acute; a pair of minute setae near postero-dorsal margins of segments 2–5. Telson furcae long and distally with minute spinules, each furca with a small lateral spine; inner medio-lateral margin of telson with 3 long plumed setae, innermost (in some specimens) noticeably short (see Fig. 6e); incipient pleopod buds on segments 2–5.

SECOND ZOEAE

Dimensions: D.S. 1.1–1.2 mm., C.L. 0.8–0.9 mm.

Carapace (Figs 1b, c). Dorsal spine curved. Dorso-median elevation well developed; ocular eaves conspicuously expanded (Fig. 1c).

Eyes: Moveable.

Antennule: (Fig. 2c). With 6 aesthetascs and 1–2 setae.

Antenna: (Fig. 2c). Exopod with 2 proximal spinules; endopod slightly more than $\frac{1}{3}$ length of exopod.

Mandible: (Fig. 2d). Each half dissimilar.

Maxillule: (Fig. 3b). Outer margin of basal endite with a seta, distal margin with 5 spines and 3 setae; coxal endite with 7 setae/spines.

Maxilla: (Fig. 4b). Endopod setation unchanged; basal endite with 5 + 5 setae; coxal setation unchanged; scaphognathite with 16 setae.

First maxilliped: (Fig. 5c). Setation on basis and endopod unchanged; exopod with 6 terminal natatory setae.

Second maxilliped: (Fig. 5d). Basis without setae; endopod with 0, 0, 3 + 1 setae; exopod with 6 terminal natatory setae.

Third maxilliped and pereopods: Represented as conspicuous incipient buds.

Abdomen: (Fig. 6c, d). Postero-lateral processes on segments 3–5 longer than in first stage; pleopod buds long.

MEGALOPA

Dimensions: C.L. 1.2–1.3 mm.

Carapace: (Figs 1d, e). Longer than broad, with a small obtuse rostrum and obtuse but prominent submedian lobes; frontal region with 2–3 median broad longitudinal tubercles, hepatic regions swollen, each protogastric region with a long anteriorly directed process narrowing distally; cardiac region with a postero-dorsally directed spine.

Eyes: Large, with well developed cornea.

Antennule: (Fig. 2e). Peduncle 3-segmented, terminal segment with a seta on inner margin; exopod 2-segmented, proximal with 2 and distal segment with 4 aesthetascs.

Antenna: (Fig. 2f). Peduncle 3 segmented, proximal segment with a stout ventrally directed process, distal segment with a small ventral seta; flagellum 4-segmented, 2nd segment longest and with 4 setae, 4th segment with 2–3 aesthetascs.

Mandible: (Fig. 2g). Molar process slightly reduced, incisor prominent and broad; palp stout and unsegmented, with a small terminal seta.

Maxillule: (Fig. 3c). Endopod reduced; distal margin of basal endite with 6–7 spines and 6–7 setae, coxa with 6–7 setae/spines.

Maxilla: (Fig. 4c). Endopod reduced and terminally acute, with one long distal seta; basal endite broadly oval, with 6 + 3–4 setae, coxal endite with 3 + 3 setae; scaphognathite with 18–19 setae.

First maxilliped: (Fig. 7a). Coxa with 4, basis with 9–10 setae; exopod 2-segmented, distal segment with 4 setae; endopod reduced and terminally acute; epipod small.

Second maxilliped: (Fig. 7b). Exopod 2-segmented, proximal segment long, distal with 4 setae; endopod 4-segmented, 2nd (carpus) with one, 3rd (propodus) with 3 setae and 4th (dactylus) with one seta and 3 spines; epipod small (not shown in figure).

Third maxilliped: (Fig. 8a). Endopod 5-segmented, inner margin of ischium with few minute spinules and 7–9 short setae, merus with 4 setae, carpus with 3, propodus with 6 and dactylus with 4 setae; distal segment of exopod with 4 setae, epipod moderately well developed.

Pereopods: (Figs 8c, 9a, 10a–c). Chelipeds moderately stout and sparsely setose, distal parts of propodus and dactylus curved; merus with small obtuse spinule on inner proximal margin; basis/coxa with small obtuse process on lower margin. Pereopods 2–5 slender, setose and minutely spinulate, dactylus terminally acute, ischium of 2nd-3rd pereopods with a prominent curved hook-shaped process.

Abdomen: (Figs 1f, g). 5-segmented + telson; 1st with 4, 2nd-3rd with 2 postero-dorsal setae, 4th with 4 setae, 5th with 6 setae; telson broader than long, posterior margin subtruncate. A pair of well developed pleopods on segments 2–5, 4th pair smallest, exopod of each with 8 long plumose setae; endopod of each with 2 coupling hooks.

FIRST CRAB

Dimensions: C.L. 1.4–1.5 mm.

Carapace: (Fig. 1j). Slightly less than $1\frac{1}{2}$ × longer than broad; frontal region slightly produced, submedian lobes obtuse and with clusters of hook-setae, each protogastric region with a tubercle; orbits long, hepatic regions swollen, epibranchial regions slightly expanded, mesogastric with 2 median cristate tubercles, cardiac region with a prominent tubercle, intestinal with a small median tubercle; dorsal surface and lateral margins of carapace with many hook-setae.

Eyes: Large and with a few hook-setae.

Antennule: (Fig. 2h). First and 3rd segments of peduncle with a seta; exopod indistinctly segmented, with 7–8 aesthetascs and 2–3 setae; endopod 2-segmented, with 2 terminal and 2 sub-terminal setae.

Antenna: (Fig. 2h). Peduncular segments with 2, 1–2, and 5 setae respectively; flagellum usually with 3 or 4 demarcated segments, with 3 subterminal setae as shown.

Mandible: (Fig. 2i). Molar process acute, incisor expanded as a broad cristate lobe; mandibular palp 2-segmented, distal segment with 2 setae.

Maxillule: (Fig. 3d). Endopod very reduced, outer margin of basal endite with a prominent seta, margin with 8 spines and 4 setae; coxal endite with 9 setae/spines.

Maxilla: (Fig. 4d). Endopod very reduced and with one apical seta; basal endite with 10 and coxal with 2–3 setae respectively; scaphognathite with 20–21 short plumose setae.

First maxilliped: (Fig. 7c). Coxa with 10–11 setae, basis with 10 setae; distal segment of exopod with 3 long setae; endopod sub-triangular, with 1–2 small setae on distal margin; epipod well developed and with 6 setae.

Second maxilliped: (Fig. 7d). Merus with 2 setae, propodus with 4 setae and a distal spine, dactylus with 1–2 setae and 4 spines; epipod small.

Third maxilliped: (Fig. 8b). Ischium with numerous setae (18–20) as shown, inner margin with 3–4 processes; merus with 3 setae, inner margin with an acute process; carpus, propodus and dactylus with 2, 4 and 5 setae respectively on outer surface and margins; distal segment of exopod with 3 short plumose setae; a cluster of short setae near coxal/epipod junction; epipod well developed.

Pereiopods: (Figs 8d, 9b, c, 10d, e). Cheliped moderately setose as shown; inner distal propodal margin with 3 acute to sub-acute teeth (see inset to Fig. 8d); distal part of the propodus acute and curved. Pereiopods 2–5 long, thin and with numerous setae; 2nd and 3rd similar in shape, 3rd longest (Fig. 9c); 4th and 5th similar in shape, dactylus curved, inner margin of dactylus of 4th (Fig. 10d) with 4 spines, of 5th with 2–3 spines.

Remarks

Comparisons of larvae and first crab stages of Mediterranean and British material of *M. rostrata* (see p. 207) have revealed only two apparent morphological differences. (1) all zoeae II examined from the Tunisian locality are without a seta on the outer margin of the maxillule basal endite; this seta is present in all zoeae II reared from the Plymouth and Isle of Man crabs. The presence of this seta is considered an important larval brachyuran feature (see Rice, 1980 : 299 as 'exopod' seta), and its absence in the Tunisian specimens cannot be explained. Clark (1980) also reported its absence from the maxillule of zoeae II *Inachus dorsettensis* (Pennant) reared from Isle of Man crabs but found it present in Plymouth material. (2) in the first crab stage of Tunisian specimens the carapace submedian lobes are widely spaced and the outline of the hepatic region is noticeably convex. By comparison, first crab stages from the two British localities are slightly smaller than the Tunisian specimens, the submedian lobes are closer together and the hepatic region outline is relatively straight (Fig. 1, cf j & k). These slight morphological differences observed in the first crab stages may express the extremes of geographical variation of *M. rostrata* since the Mediterranean material probably represents the near southernmost limit of this species (see p. 207). Ingle & Manning (in press) have drawn attention to the noticeable variation of carapace shape among population of pre- and post pubertal crabs of *M. rostrata* from the N.E. Atlantic and Mediterranean regions.

Four species of *Macropodia* are reported from N.E. Atlantic waters: *M. rostrata* (Linnaeus), *M. deflexa* Forest, *M. tenuirostris* (Leach) and *M. linaresi* Forest & Zariquiey Alvarez. Larval stages of the first three species mentioned were described briefly by Lebour (1927, 1928); larvae of *M. linaresi* are unknown.

Lebour (1927, 1928) recognized that the zoeae of *M. rostrata* and *M. deflexa* (= *egyptia*) has a longer and more straight dorsal spine, and longer antennae than *M. tenuirostris* (= *longirostris*); she also noted that the antennae of *M. deflexa* are longer than *M. rostrata*. Lebour remarked that the megalope of *M. rostrata* has shorter legs and a less deflected rostrum than *M. tenuirostris*, and that the 'central lobe' of the rostrum of *M. deflexa*

protrudes more than that of *M. rostrata* but that otherwise the megalop of both species are 'hardly to be distinguished'.

Larval material of *M. deflexa* has not been available for examination during this study but it has been possible to compare the larvae of *M. rostrata* with those of *M. tenuirostris* reared from females collected off the Isle of Man during March 1977. These comparisons are listed in Table 1.

Table 1

Character	<i>M. rostrata</i>	<i>M. tenuirostris</i>
Zoea I		
Carapace length:	0.7–0.8 mm	0.9–1.0 mm
Dorsal spine length:	1.3–1.4 mm	1.0–1.1 mm
shape:	relatively straight	noticeably curved
Antenna, total length:	1.2–1.2 mm	0.9–1.0 mm
Second mxpd endop. 3rd sgmt:	4 + 1 setae	3 + 1 setae
Zoea II		
Carapace length:	0.8–0.9 mm	1.1–1.2 mm
Antenna, total length:	1.3–1.4 mm (exceeding C.L.)	1.1–1.2 mm (not exceeding C.L.)
Carapace dorso-median elevation:	pronounced	not pronounced
Maxilla, coxal endite:	average of 7 setae	average of 8 setae
scaphognathite:	average of 16 setae	average of 17 setae
Abdomen postero-lateral spines:	long	longer than <i>rostrata</i>
Second mxpd endop. 3rd sgmt:	3–4 + 1 setae	3 + 1 setae
Megalopa		
Carapace length:	average 1.2 mm	average 1.5 mm
Carapace frontal region:	2–3 median longit. tubercles	continuous median carina
Carapace protogastric processes:	forming moderately wide U-shape	forming wide U-shape
Cheliped merus:	with a small spine but without secondary posterior spinule	with large spine and secondary posterior spinule

Lebour (1928) provided a key to the larvae of five oxyrhynch genera that occur in British waters; Bourdillon-Casanova (1960) extended this number to seven genera in her key to Mediterranean brachyuran larvae. From a study of reared material and of published accounts (see footnote to Table 2), it has been possible to tabulate a sufficient number of comparative larval features from which a provisional key has been constructed to facilitate the identification of larvae of all those oxyrhynch genera represented in the North East Atlantic Ocean north of about 48° 30' N.

Detailed studies of larval stages of *Achaeus cranchii*, *Pisa tetraodon*, *Maja squinado*, *Macropodia linaresi* and *M. deflexa* are still required whilst the positive identity (see Rice, 1980 : 308) of the plankton caught zoea II attributed to *Dorynchus thomsoni* still remains to be established.

Table 2

Character	zoea	<i>Hyas</i> ¹	<i>Rochinia</i>	<i>Maja</i> ²	<i>Inachus</i>	<i>Macropodia</i> ⁴	<i>Achaeus</i> ⁵	<i>Eurynome</i> ⁶	<i>Pisa</i> ⁷	<i>?Dorynchus</i> ¹⁵
Lateral spines on carapace + or -:										
Carapace dorsal spine/carapace length:	+ longer	+ as long as	+ longer (ZI) shorter (ZII)	- slightly longer	- longer (ZI) shorter (ZII) <i>tenuirostris</i>	- as long as	- as long as	- as long as	- shorter	+ shorter than
Carapace rostral spine + or - & size:	+ very long	+ long	+ long	-	-	-	+ long	+ long	+ very short	+ long
Telson median cleft + or -:	+ +	-	+ +	+ +	+ +	+ +	+ +	+ +	- ⁸	+ +
Telson lateral spines + or - & size:	+ long	+ long	+ 2 present (1 long)	+ long	+ short	+ very long	+ long + 1 setule	+ long + middle longest	+ small	+ very long
Telson medio-lateral spines lengths:	middle longest	about equal	middle longest	about equal	middle longest	middle longest	middle longest	middle longest	about equal ⁹ (ZI); outer- most longest (ZII)	outermost longest
Abdomen postero-lateral spines:	long	long	short	long	long	long	obtuse (ZI) short (ZII)	obtuse (ZI) short (ZII)	short	long
2 setae on 1st abdominal segment:	+ +	+ +	- ³	+ <i>leptochirus</i> - <i>dorsettensis</i> & <i>phalangium</i>	-	+ +	+ +	+ +	+ ¹⁰	+ +
Setae on 2nd abdominal segment:	1 pr (ZI) 2 prs (ZII)	1 pr (ZI) 2 prs (ZII)	1 pr	1 pr	1 pr	1 pr	1 pr	1 pr	1 pr (ZI) 2 prs (ZII)	1 pair
Dorso-lateral proc. on 3rd abd. sgmt:	+ +	-	+ +	-	-	-	-	-	-	+ 4th-5th
Setal formula basis 1st maxilliped:	2,2,3,3 4	2,2,3,3, 3	2,2,3,3 3	2,2,3,3 1 <i>leptochirus</i> 0 <i>dorsettensis</i> & <i>phalangium</i>	2,2,2,3 1 (ZI) 0 (ZII)	2,2,2,3 1 (ZI) 0 (ZII)	2,2,3,3 3	2,2,3,3 3	2,2,3,3 ¹¹ 3 ¹²	.
No. setae basis of 2nd maxilliped:										1
Setal formula endopod 2nd maxilliped:	1,1,4+1	0,1,4+1	1,1,4+1	0,1,3+1	0,0,4+1 (<i>ros- trata</i> : 0,0,3+1 (<i>tenuirostris</i>)	0,0,4+1 (<i>ros- trata</i> : 0,0,3+1 (<i>tenuirostris</i>)	1,1,4+1	1,1,4+1	1,2,2+1 ¹³	0,3+1
Setal formula endopod maxillule:	1+6	1+6	1+6	0+4	0+3	0+3	1+6	1+6	1+6 ¹⁴	0+5
Telson dorsal spine + or -:	+ +	-	+ +	-	-	-	+ +	+ +	-	-
megalopa										
No. abdominal segments (incl. telson):	7	7	7	6	6	6	7	7	7	.
No. pairs of pleopods (incl. uropods):	5	5	5	4	4	4	5	5	5	.
No. setae on each terminal pleopod:	3-4	5	5	8	8	8	3	3	5	.
Frontal region of carapace-submedian:	spines long	lobes round.	lobes round.	spines long	lobes promnt.	spines long	lobes round.	lobes round.	lobes round.	.
-rostrum:	long, horiz.	long, horiz.	short, deflect.	obtuse	obtuse	obtuse	long, deflect.	long, deflect.	long, deflect.	.
Carapace, each protogastric region with:	spine	cristate tubercle	?tubercle	-	long proc.	setae	-	-	carina	.
orbital region with:	-	-	-	a spine	-	setae	-	-	-	.
cardiac region with:	long spine	long spine	obtuse process	-	long spine	-	high tubercle	-	-	.
Spines on abdominal segments:	-	-	?-	+ +	-	+ +	-	-	-	.
Processes or spine, 1st ped. sgmt ant:	-	+ +	?-	+ +	-	-	-	-	+ +	.

1 Christiansen, 1973; 2 ZII and megalopa after Lebour, 1927, 1928; 3 Lebour (1927) states these are present; they have not been detected in material examined; 4 based on *M. rostrata* and *M. tenuirostris* material; 5 after Bocquet, 1954; 6 based on *E. spinosa* material; 7 based on *P. armata* material; 8-14 Mediterranean ZI *P. tetraodon* figured by Heegaard (1963) with 8: a cleft; 9: innermost longest; 10: absent; 11: 1,2,1; 12: 0; 13: 0; 2 + 1; 14: 2 + 3; 15 known only from ZII after Rice, 1980.

Provisional key to the larvae of N.E. Atlantic Oxyrhyncha

Zoeae

- 1 Carapace lateral spines present 2
- Carapace lateral spines absent 5
- 2 Carapace with a group of 5 lateral spines on each side
 ?*Dorynchus thomsoni* Thomson, (Williamson, 1960).
- Carapace with one lateral spine on each side 3
- 3 Telson medio-lateral margin strongly concave or medially cleft; middle pair of medio-lateral setae longest; each telson furca with one dorsal and one (rarely 2) lateral spines; 3rd abdominal segment with dorso-lateral process 4
- Telson medio-lateral margin not concave or cleft; medio-lateral setae of equal length; each telson furca without a dorsal spine, one lateral spine present; 3rd abdominal segment without dorso-lateral process *Rochinia carpenteri* Thomson, (Ingle, 1979).
- 4 Carapace dorsal spine much longer than carapace length; abdominal postero-lateral process very long; 2nd maxilliped basis with 4 setae; each furca of telson with one lateral spine
 *Hyas coarctatus* (Leach), *H. araneus* (Linnaeus), (Christiansen, 1973).
- Carapace dorsal spine, at the most, slightly longer than carapace length; abdominal postero-lateral processes short; 2nd maxilliped basis with 3 setae; each furca of telson with 2 lateral spines *Maja squinado* (Herbst), (Lebour, 1927, 1928).
- 5 Carapace rostral spine long; each telson furca with a dorsal spine
 *Eurynome aspera* (Pennant), (Lebour, 1928). *E. spinosa* Hailstone, (see Table 2, footnote).
- Carapace rostral spine small or absent; each telson furca without a dorsal spine 6
- 6 Telson medio-lateral margin strongly cleft, marginal setae in 2 groups; maxillule endopod* with 0 + 3-4 setae; abdominal postero-lateral spines long 7
- Telson medio-lateral margin not cleft, marginal setae not in 2 groups; maxillule endopod with 1 + 6 setae; abdominal postero-lateral spines short
 †*Pisa armata* (Latreille), (Ingle & Clark, 1980).
- 7 Lateral spine of each telson furca very long (about $\frac{1}{3}$ length of furca and exceeding $\frac{1}{2}$ maximum width of telson) *Achaeus cranchii* Leach, (Bocquet, 1954).
- Lateral spine of each telson furca short, never reaching $\frac{1}{3}$ length of furca 8
- 8 Lateral spine of each telson furca large; middle medio-lateral seta of telson not longest; maxillule endopod with 0 + 4 setae
 *Inachus dorsettensis* (Pennant), *I. phalangium* (Fabricius), *I. leptochirus* Leach, (Clark, 1980).
- Lateral spine of each telson furca small; middle medio-lateral seta of telson longest; maxillule endopod with 0 + 3 setae
 *Macropodia rostrata* (Linnaeus), *M. tenuirostris* (Leach), (see p. 211), *M. deflexa* Forest (Lebour, 1928).

Megalops

- 1 Abdomen composed of 5 segments (excluding telson); 4 pairs of pleopods, terminal pair with 8 setae on exopod 2
- Abdomen composed of 6 segments (excluding telson); 5 pairs of pleopods, terminal pair with 3-5 setae on exopod 4
- 2 Dorsal margins of abdominal segments without spinules; carapace submedian spines not developed
 *Macropodia rostrata* (Linnaeus), *M. tenuirostris* (Leach) (see p. 211), *M. deflexa* Forest (Lebour, 1928).
- Dorsal margins of abdominal segments with small spinules; carapace submedian spines well developed 3
- 3 Orbital spines present
 *Inachus dorsettensis* (Pennant), *I. phalangium* (Fabricius), *I. leptochirus* Leach, (Clark, 1980).
- Orbital spines absent *Achaeus cranchii* Leach, (Bocquet, 1954).

*Not known for *Achaeus cranchii*; †Heegaard's (1963) description of zoea I of *Pisa tetraodon* differs considerably from that of *P. armata* (see Table 2, footnote) and is excluded from this present key.

- 4 Carapace submedian spines present
 Hyas coarctatus (Leach), *H. araneus* (Linnaeus), (Christiansen, 1973).
 – Carapace submedian spines absent 5
- 5 First peduncular segment of antenna without a distal process; exopod of each terminal pleopod with 3 setae
 Eurynome aspera (Pennant), (Lebour, 1928), *E. spinosa* Hailstone, (see Table 2, footnote).
 – First peduncular segment of antenna with an obtuse process or spine; exopod of each terminal pleopod with 5 setae. 6
- 6 A stout cardiac spine on carapace *Rochinia carpenteri* (Thomson), (Ingle, 1979).
 – Without a cardiac spine on carapace. 7
- 7 Rostral spine well developed; each protogastric region with a carina; exopods of 1st–4th pereopods with 10 setae *Pisa armata* (Latreille), (Ingle & Clark, 1980).
 – Rostral spine minute; each protogastric region with (at the most) a tubercle; exopods of 1st–4th pereopods with 8 setae *Maja squinado* (Herbst), (Lebour, 1927, 1928).

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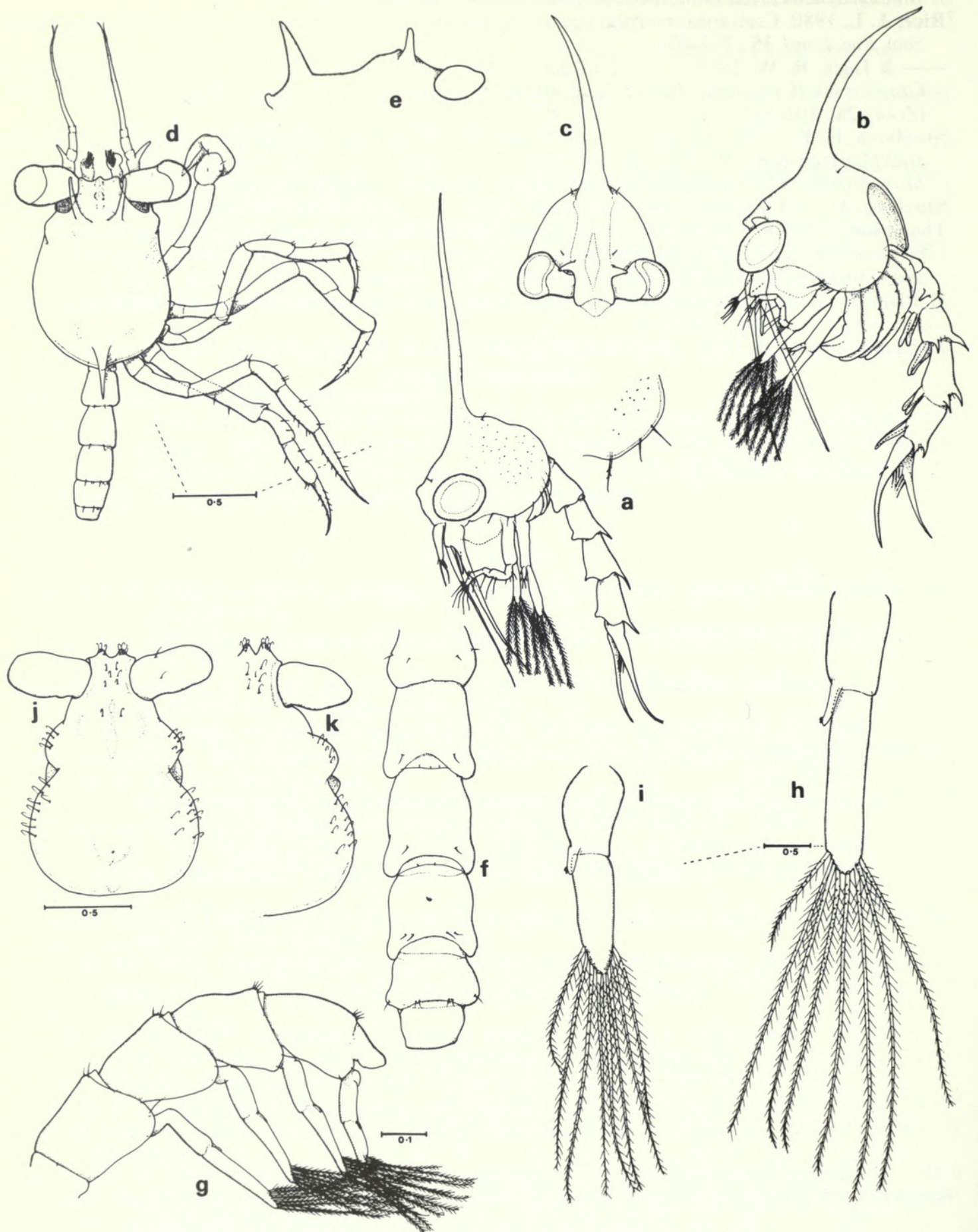


Fig. 1 *Macropodia rostrata* (L.): a, b zoea I & II respectively from lateral aspects; c zoea II carapace and eyes from frontal aspect; d megalopa from dorsal aspect and e lateral aspect of carapace and eye; f dorsal and g lateral aspect of megalopal abdomen; h first and i fourth left megalopal pleopods; carapace of the first crab from j—Isle of man cf. with k—Tunisian waters.

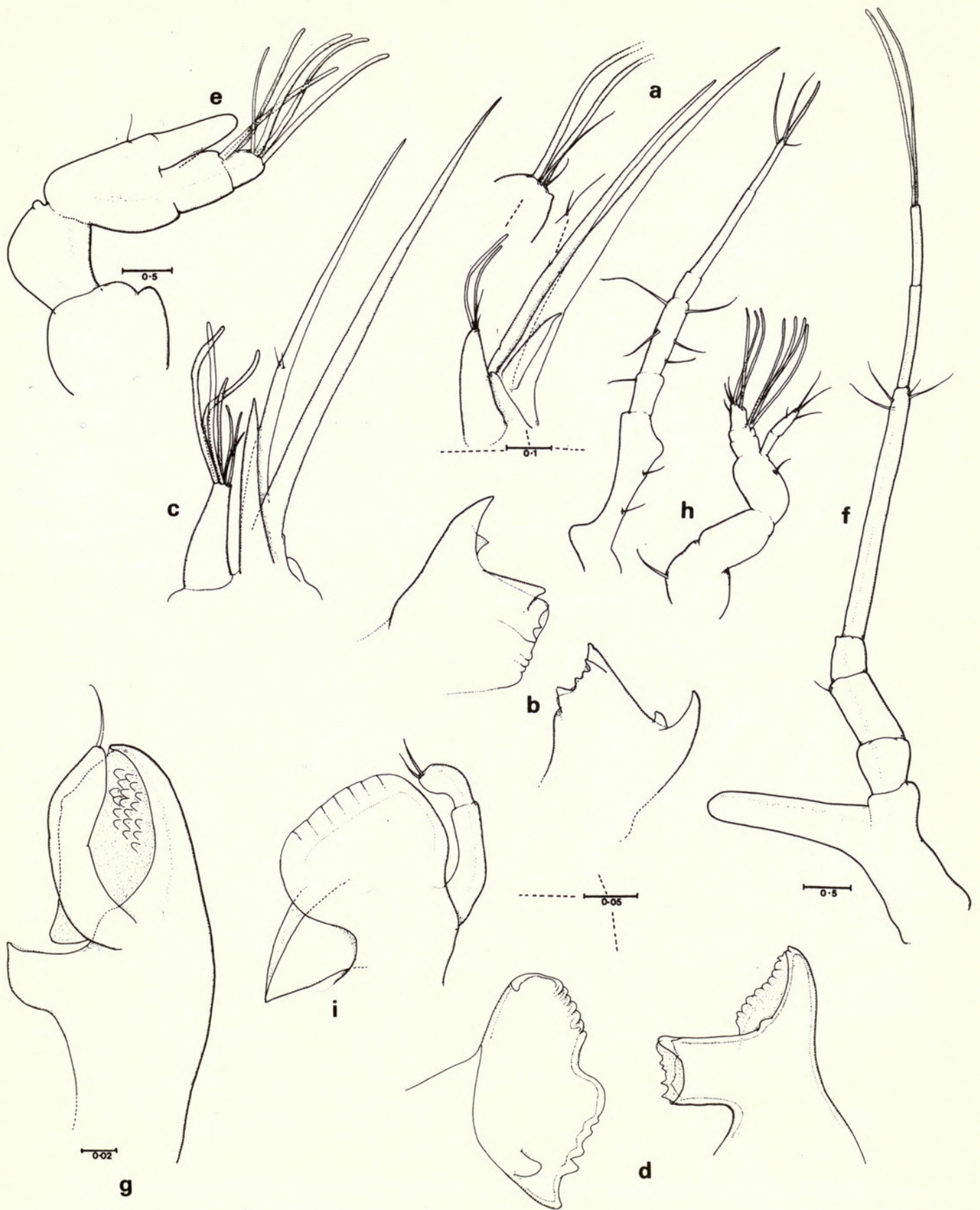


Fig. 2 *Macropodia rostrata* (L.): zoea I, a antennule and antenna, b mandible; zoea II, c antennule and antenna, d mandible; megalopa, e antennule, f antenna, g mandible; first crab, h antennule & antenna, i mandible.

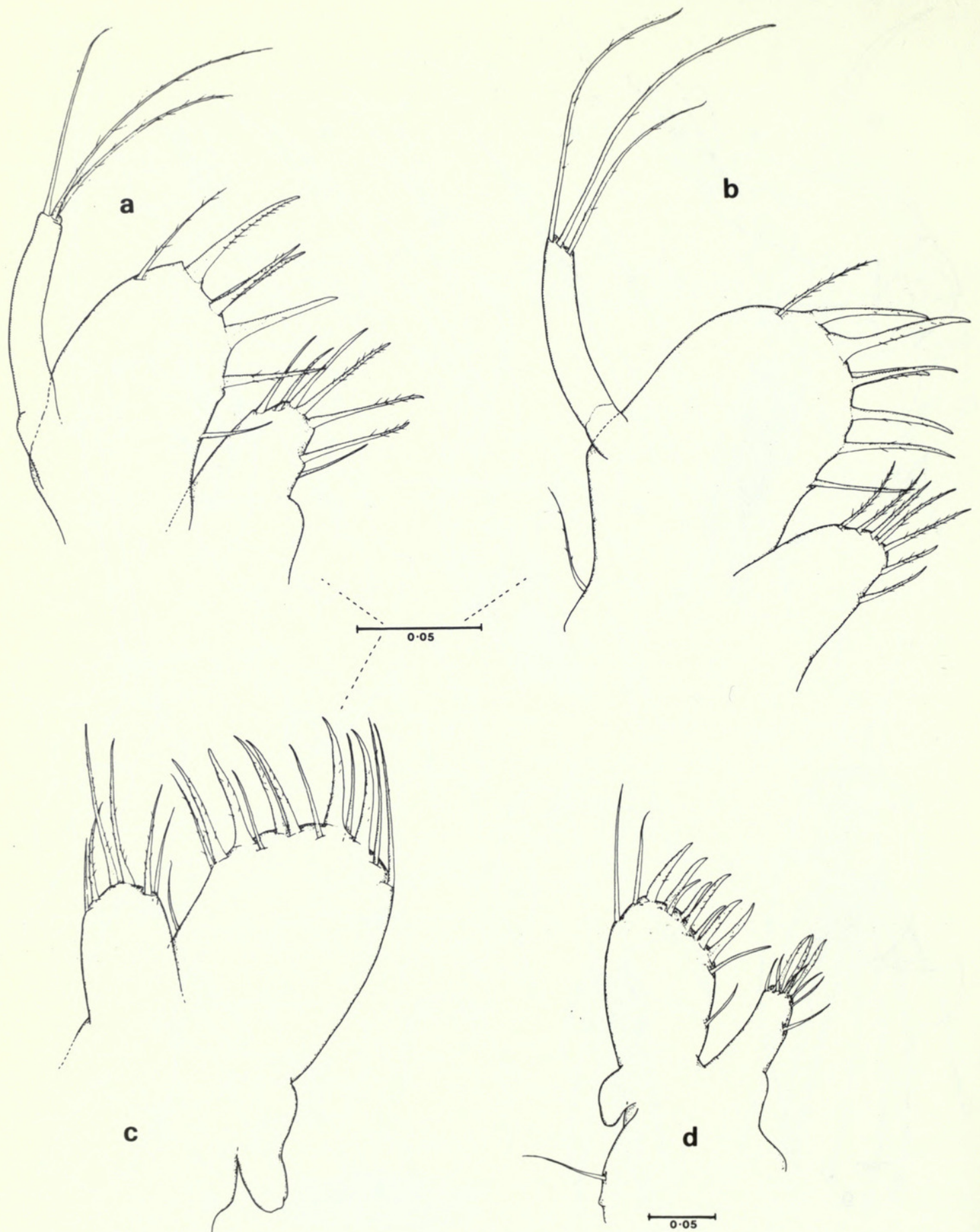


Fig. 3 *Macropodia rostrata* (L.): maxillule of— a zoea I; b zoea II; c megalopa; d first crab.

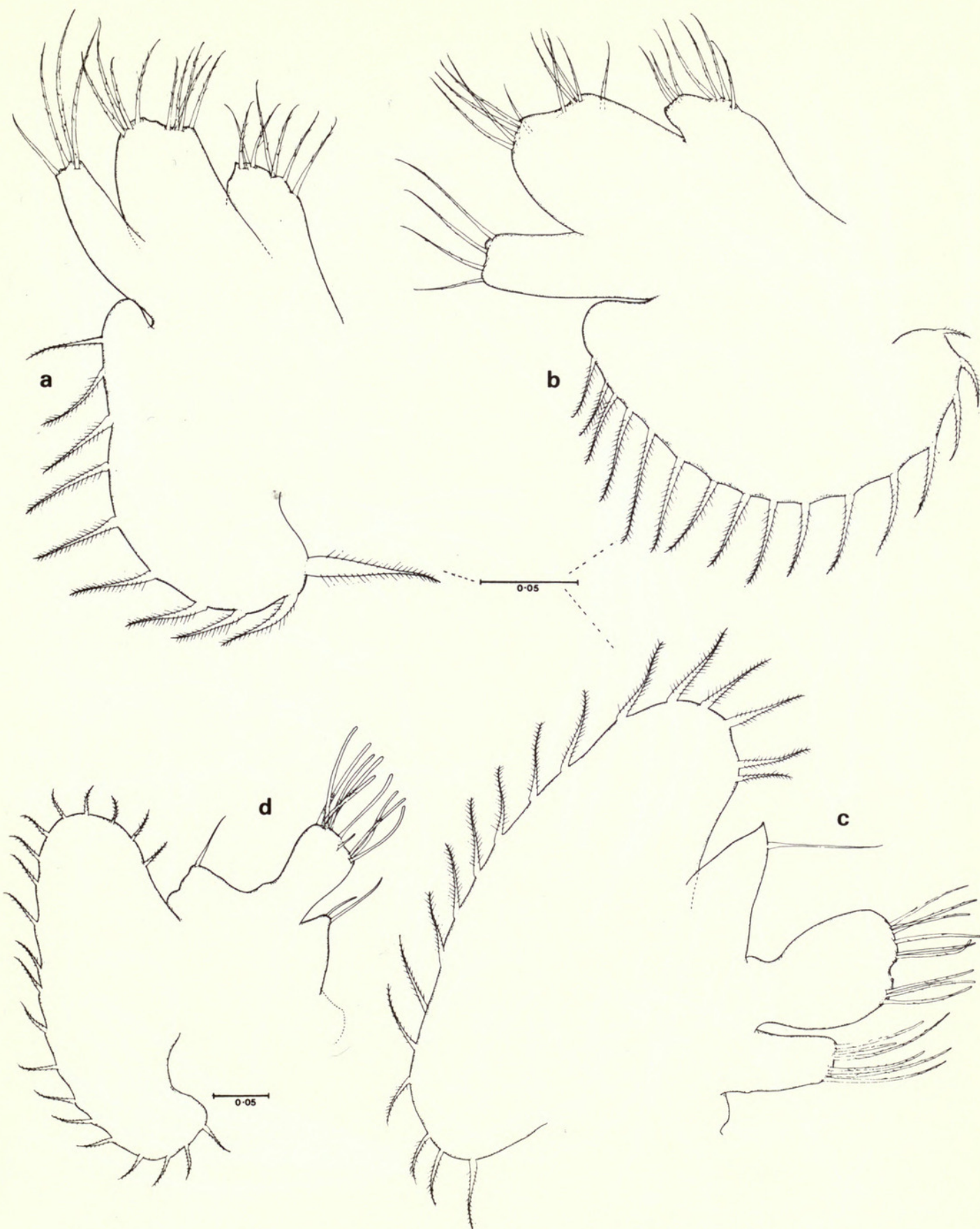


Fig. 4 *Macropodia rostrata* (L.): Maxilla of— a zoea I; b zoea II; c megalopa; d first crab.

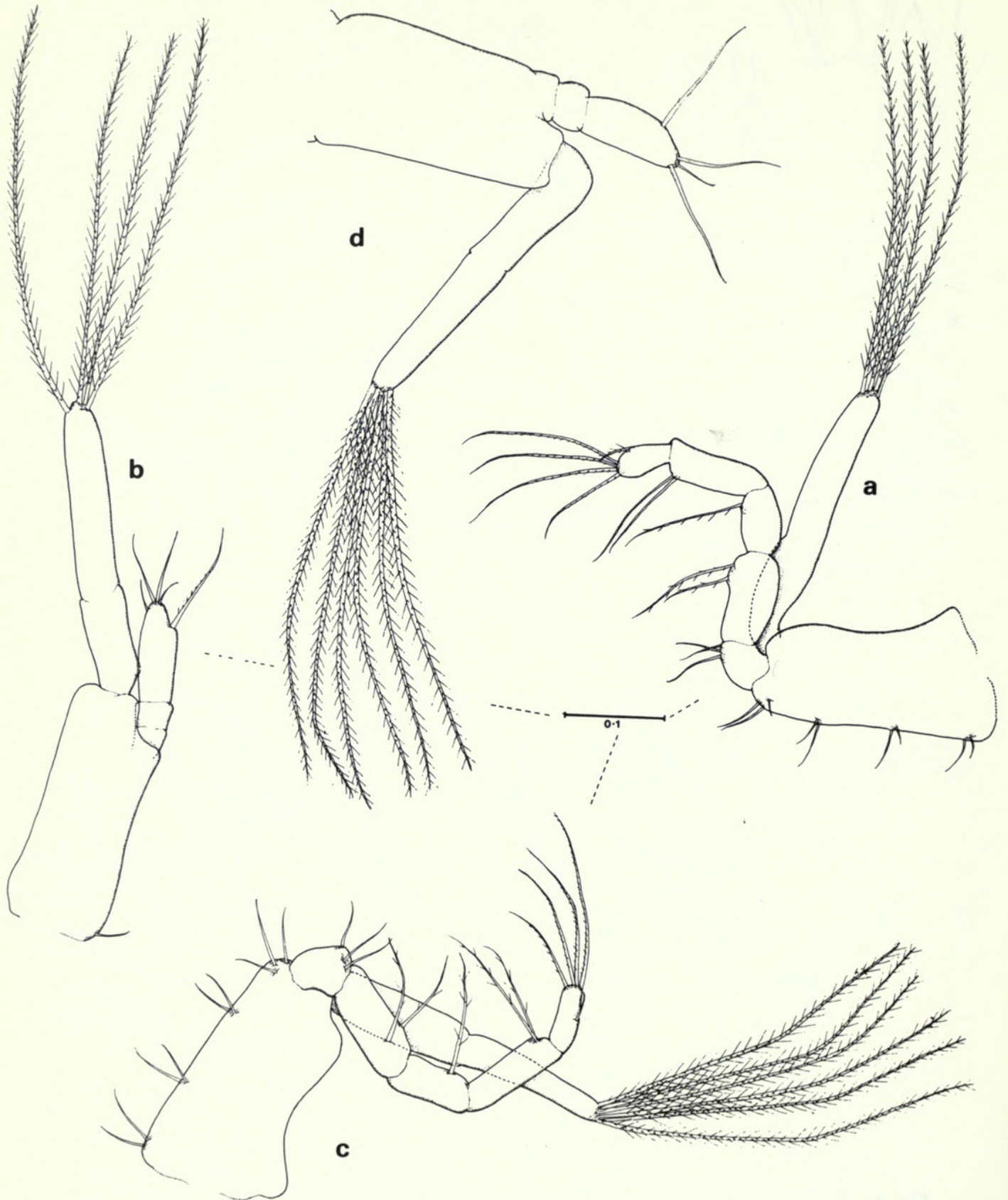


Fig. 5 *Macropodia rostrata* (L.): a & b 1st & 2nd maxillipeds of zoea I; c & d 1st & 2nd maxillipeds of zoea II.

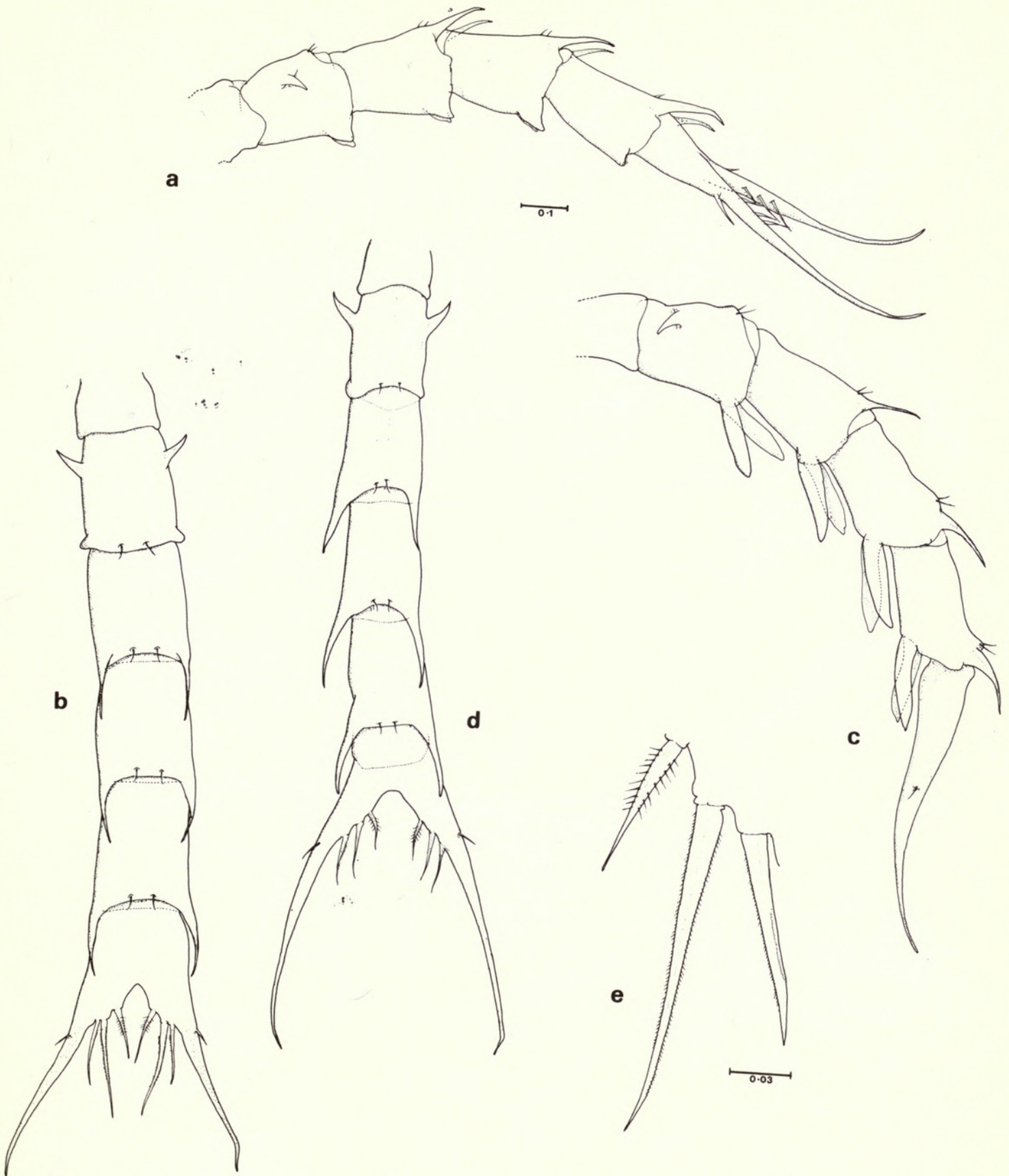


Fig. 6 *Macropodia rostrata* (L.): abdominal segments and telson a & c lateral, b & d dorsal aspects of— a, b zoea I; c, d zoea II; e spines on right medio-lateral margin of telson of zoea I.

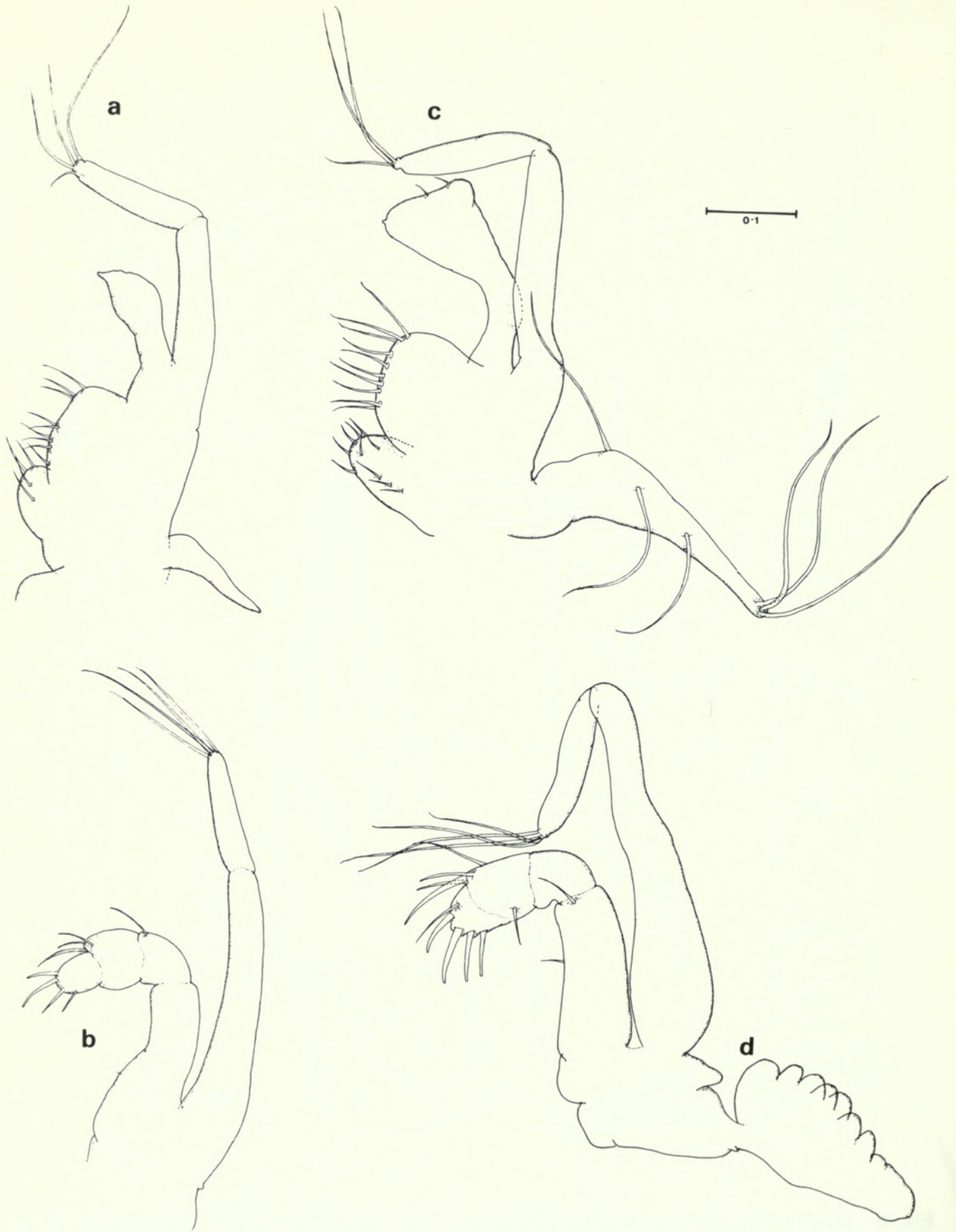


Fig. 7 *Macropodia rostrata* (L.): 1st (a, c) & 2nd (b, d) maxillipeds a, b megalopa; c, d first crab.

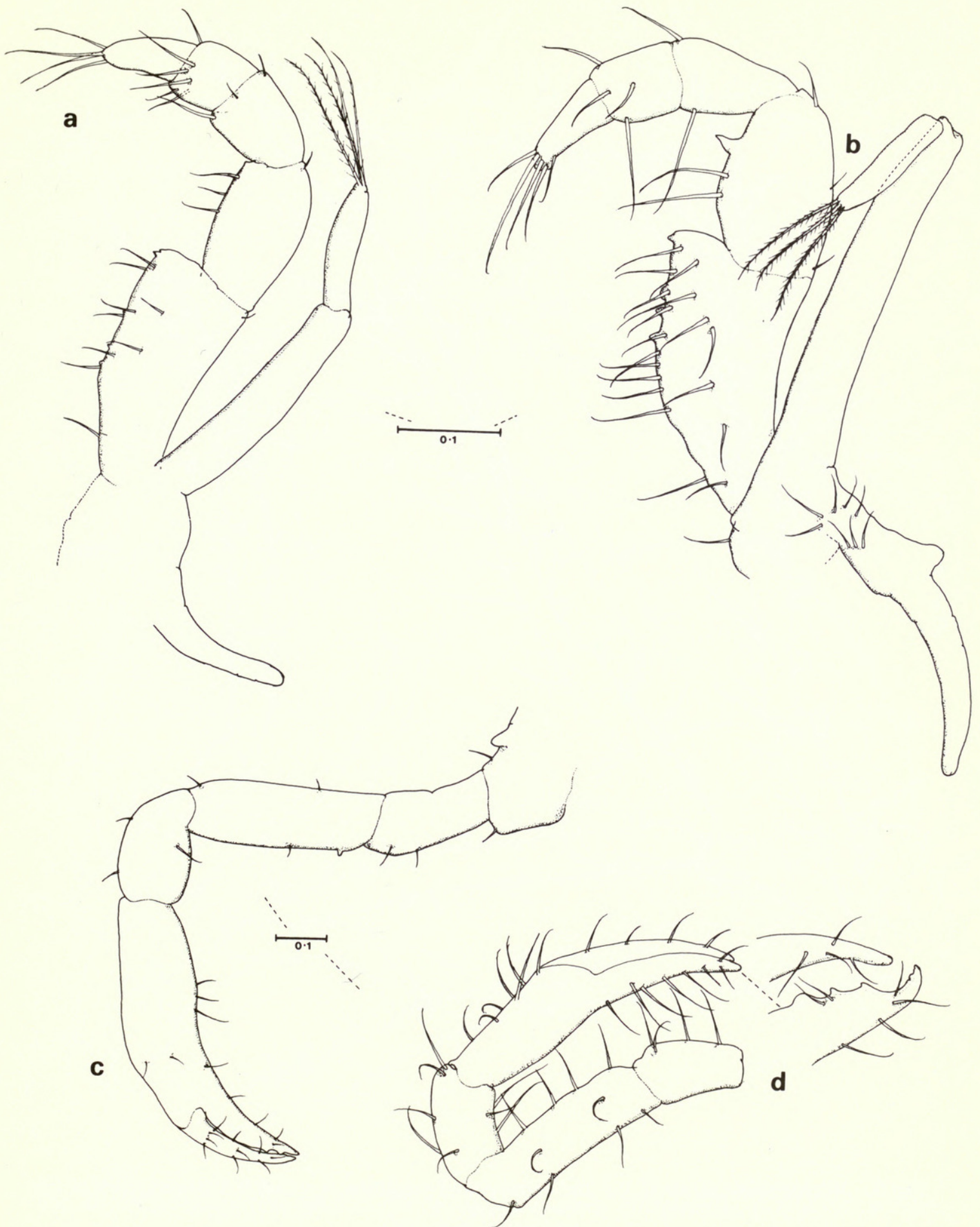


Fig. 8 *Macropodia rostrata* (L.): 3rd maxilliped— a megalopa; b first crab; cheliped— c megalopa; d first crab.

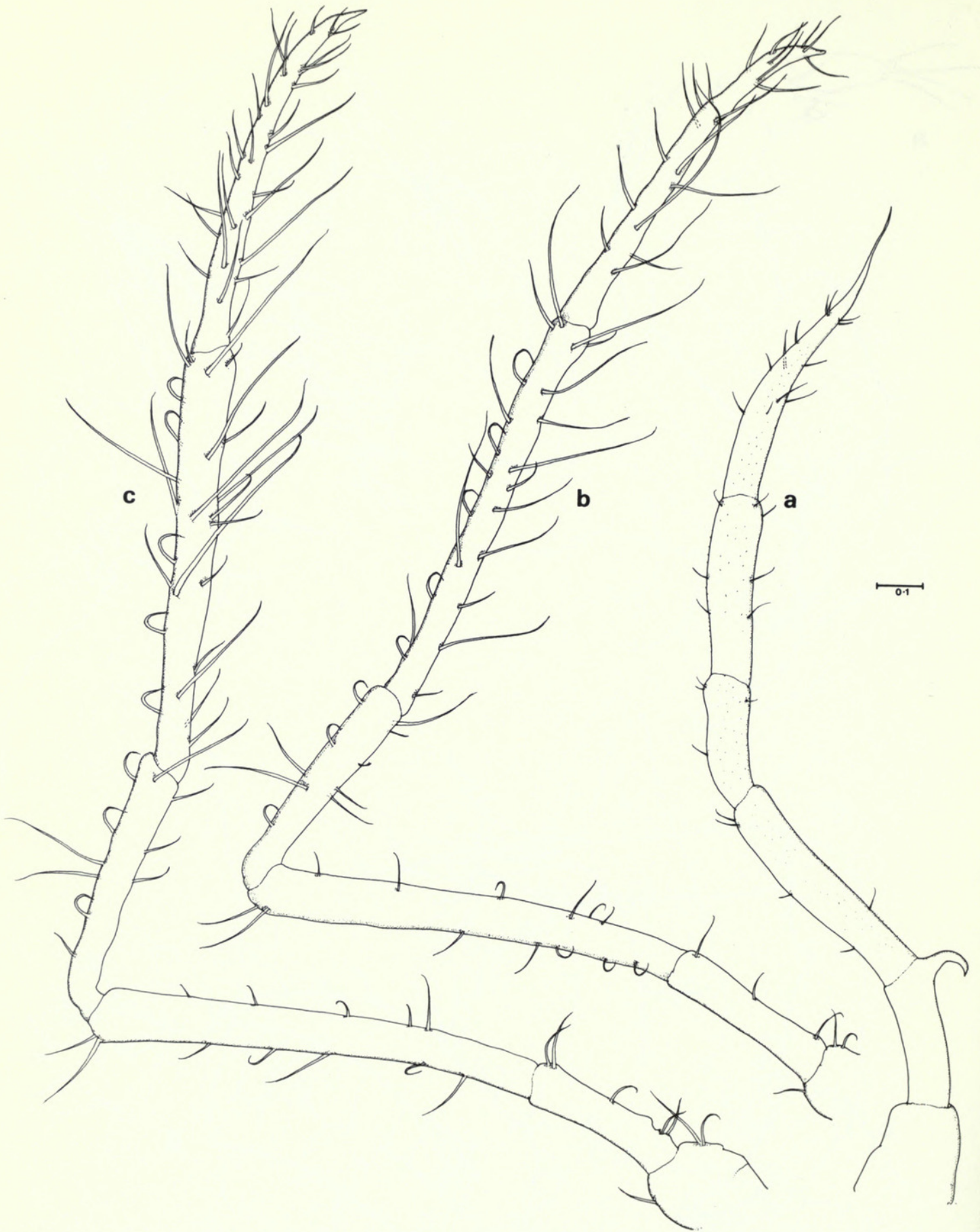


Fig. 9 *Macropodia rostrata* (L.): a 2nd pereopod of megalopa; b, c 2nd & 3rd pereopods of 1st crab.

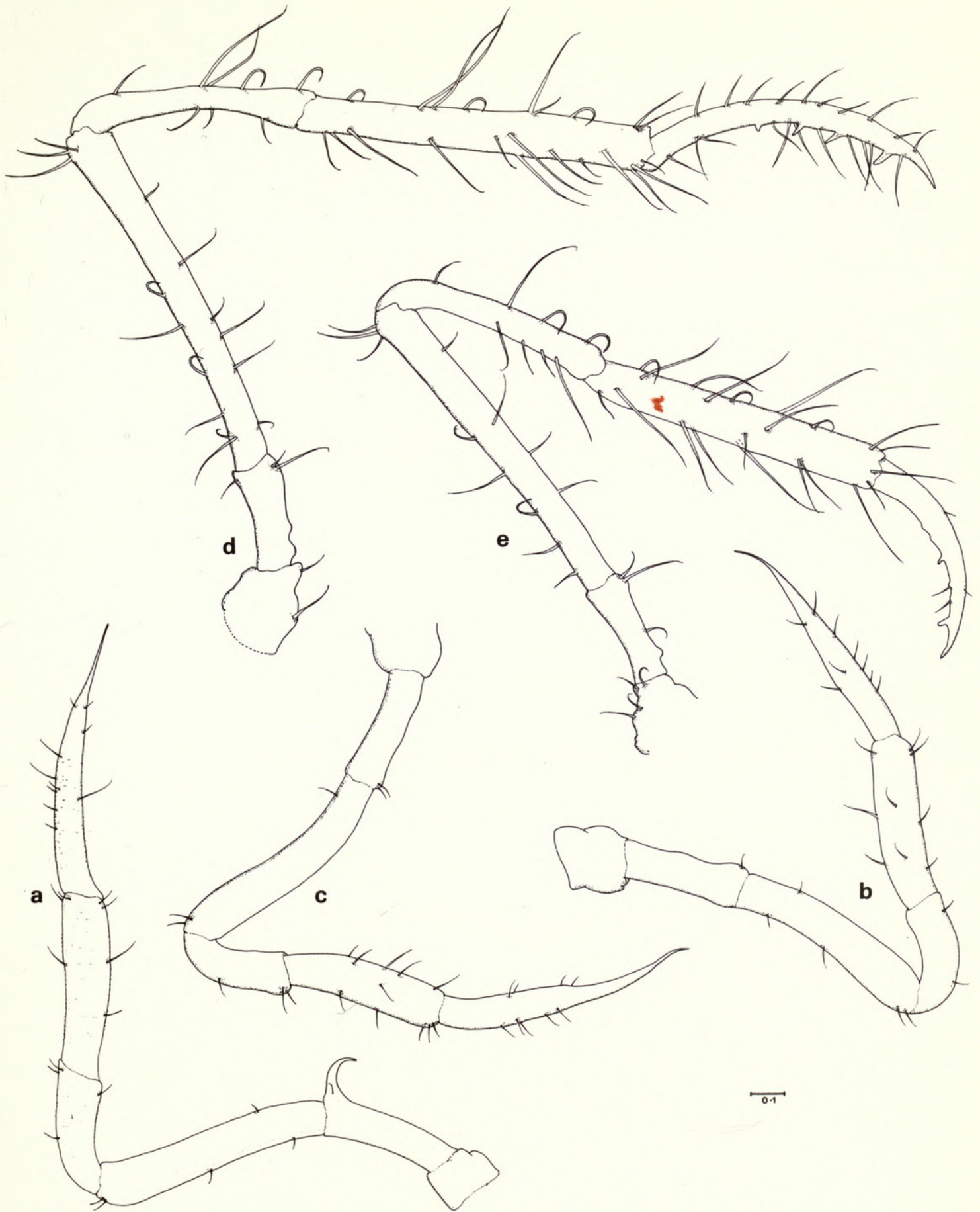


Fig. 10 *Macropodia rostrata* (L.): a-c 3rd-5th pereopods of megalopa; d & e 4th & 5th pereopods of first crab.