

Suborder **REPTANTIA**

Infraorder **ANOMURA**

Family **PAGURIDAE**



Suborder **REPTANTIA** Boas, 1880Infraorder **ANOMURA** H. Milne-Edwards, 1832Family **PAGURIDAE** Latreille, 1803

Gurney, 1942: 257–262, fig. 106–108, key;

McLaughlin and Gore, 1988: 276.

Pike and Williamson, 1960: 52.

The larvae of this family (hermit crabs) have the following characteristics (abstracted from Gurney (1942) and Pike and Williamson (1960)): the posteriolateral margins of the carapace project as short spines, the rostrum is smooth, tapering and long, the abdominal somite 5 has a pair of large ventrolateral spines and other somites may have dorsal, ventral and paired dorsolateral spines, the telson has a small hair-like process following the first lateral spine-like process, the endopod of the maxillule has 3 segments, the tip of the antennal scale bears a spine, the third maxilliped endopod is rudimentary in zoeal Stage I.

Genus **Pagurus** Fabricius, 1775Macdonald *et al.*, 1957: 219.

The larvae of this genus have large lateral spines on the posterior margin of the abdominal somite 5; 4 pairs of pleopods are present in the last zoea and glaucothoe.

***Pagurus acadianus***

No specimens of this species were taken in the survey samples, however, descriptions available from published literature are given in Table 11.

***Pagurus pubescens*** Krøyer, 1838Macdonald *et al.*, 1957: 226, fig. 4 a–f.

The carapace is large, covering some of the abdominal somites, and the posterior corners extend as short spines; the rostrum is long and tapers to a sharp point. Antennal endopod (flagellum) reaches or exceeds the tip of the rostrum; uropod exopod is tipped with two spines and has five inner long lateral setae. Antennule is bifid in zoeal Stage I. In *P. acadianus* the antennule is acute, the uropod exopod is tipped with only one spine, and the antennal endopod is shorter than the rostrum (Roberts, 1973) (Table 11). Total lengths (mm) at the different zoeal Stages were as follows: I. 3.9–4.5, II. 4.3–5.7, III. 5.3–7.5, IV. 6.8–8.4.

Distribution in Ungava Bay: the larvae of this species were taken in plankton hauls at Tuvalik, Hopes Advance Bay, Koksoak River mouth, Beacon Island, Adlorilik and Port Burwell (Fig. 1; Table 1). No. of specimens taken = 1 342 counted (Table 2).

**Description****Stage I Zoea.** Total lengths 3.9–4.5 mm (Fig. 62).



Fig. 62. *Pagurus pubescens*, Stage I Zoea: (a) whole zoea from left side; (b) dorsal carapace; (c) antennule; (d) antenna; (e) mandible; (f) maxillule; (g) maxilla; (h) first maxilliped; (i) second maxilliped; (k) third maxilliped; (l) first pereopod; (m) second pereopod; (n) third pereopod. Broken line = 1 mm.

Carapace (a and b): about as long as rostrum which tapers to a sharp point and is descending; a median carina begins at base of rostrum and extends about halfway towards posterior margin. Eyes are large and fused with carapace.

Abdomen: has two pairs of dorsal and one ventrolateral spine at posterior edge of each somite, the ventrolateral spine of the fifth is conspicuously long; the sixth somite is fused with the seventh or telson.

Antennule (c): unsegmented with 2 apical aesthetes and a long plumose subapical seta.

Antenna (d): scale with long tapering terminal spine and 6 inner lateral setae. Endopod or flagellum about as long as scale and apically bifid for a short distance, at its base is a long curved ventral spine.

Mandible (e): corner tooth of incisor long, followed by small teeth and 2 rounded projections on its edge before joining the molar, the latter with 2 ridges giving appearance of 2 molars.

Maxillule (f): proximal endite with 5 spinous setae, the distal with 2 strong fang-like spines and a small spine between them. The endopod is 3-segmented and has 1 terminal seta.

Maxilla (g): endopod is longer than anterior lobe of scaphognathite, the latter with one outer seta. Endites subequally bilobed and with long terminal setae.

First maxilliped (h): endopod with 5 divisions and 2, 2, 1, 2 and 4 setae from base to tip. Exopod slightly longer, with 4 long apical setae.

Second maxilliped (i): endopod with 4 divisions; exopod slightly longer with 4 long apical setae.

Third maxilliped (k): no sign of endopod. Exopod short and without setae.

Pereopods: unsegmented buds showing first formation of chela in the first pereopod (l). The fifth is very small, behind the third (n) and fourth.

Pleopods: none.

Telson (t): has the first lateral spinous process unsutured but all the others are sutured, and among which the fourth (apparent third) process is longest. The anomuran hair was not present in the preserved specimens examined.

Date of occurrence in plankton hauls: 24 June only (Table 3).

**Stage II Zoea.** Total lengths 4.3–5.7 mm (Fig. 63, 64).

Carapace (a and b): is large in relation to the rest of the body and covers the first 2 abdominal somites; posterior spines are straight and reach as far as somite 4. There is a faint mid-dorsal carina extending from the base of the rostrum and almost reaching the posterior edge of the carapace. Eyes are large, the stalks free from the carapace at this Stage.

Abdomen: is narrow and has 2 dorsal, 2 dorsolateral and 2 ventral spines on the posterior edge of somites 2 to 5, of which the ventrolateral spines on the 5th are the largest by much.

Antennule (c): unsegmented but outer flagellum appears as a rounded cap bearing 2 aesthetes and a seta, the inner is a long plumose seta.

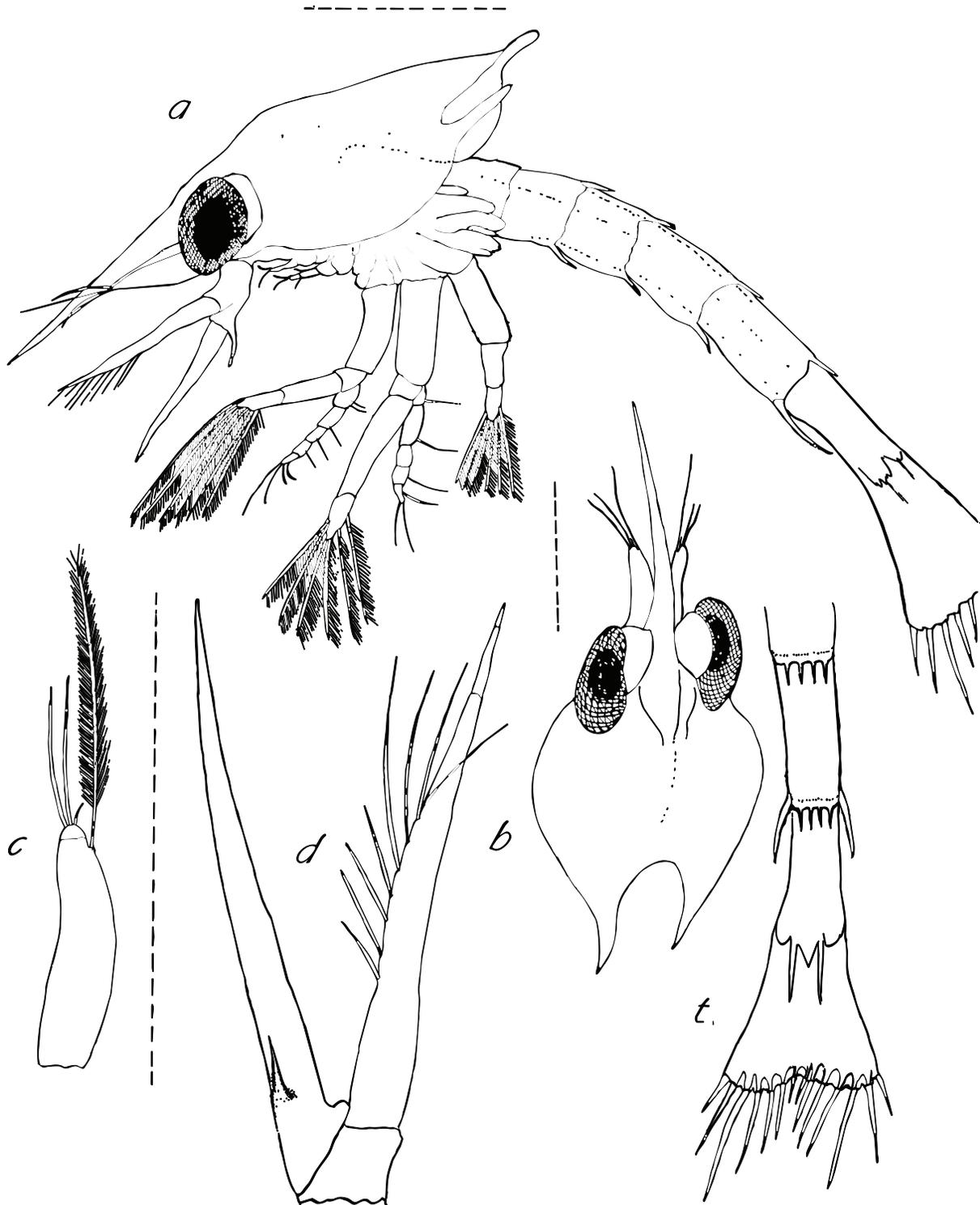


Fig. 63. *Pagurus pubescens*, Stage II Zoea: (a) whole zoea from left side; (b) dorsal carapace; (c) antennule; (d) antenna; (t) telson. Broken line = 1 mm.

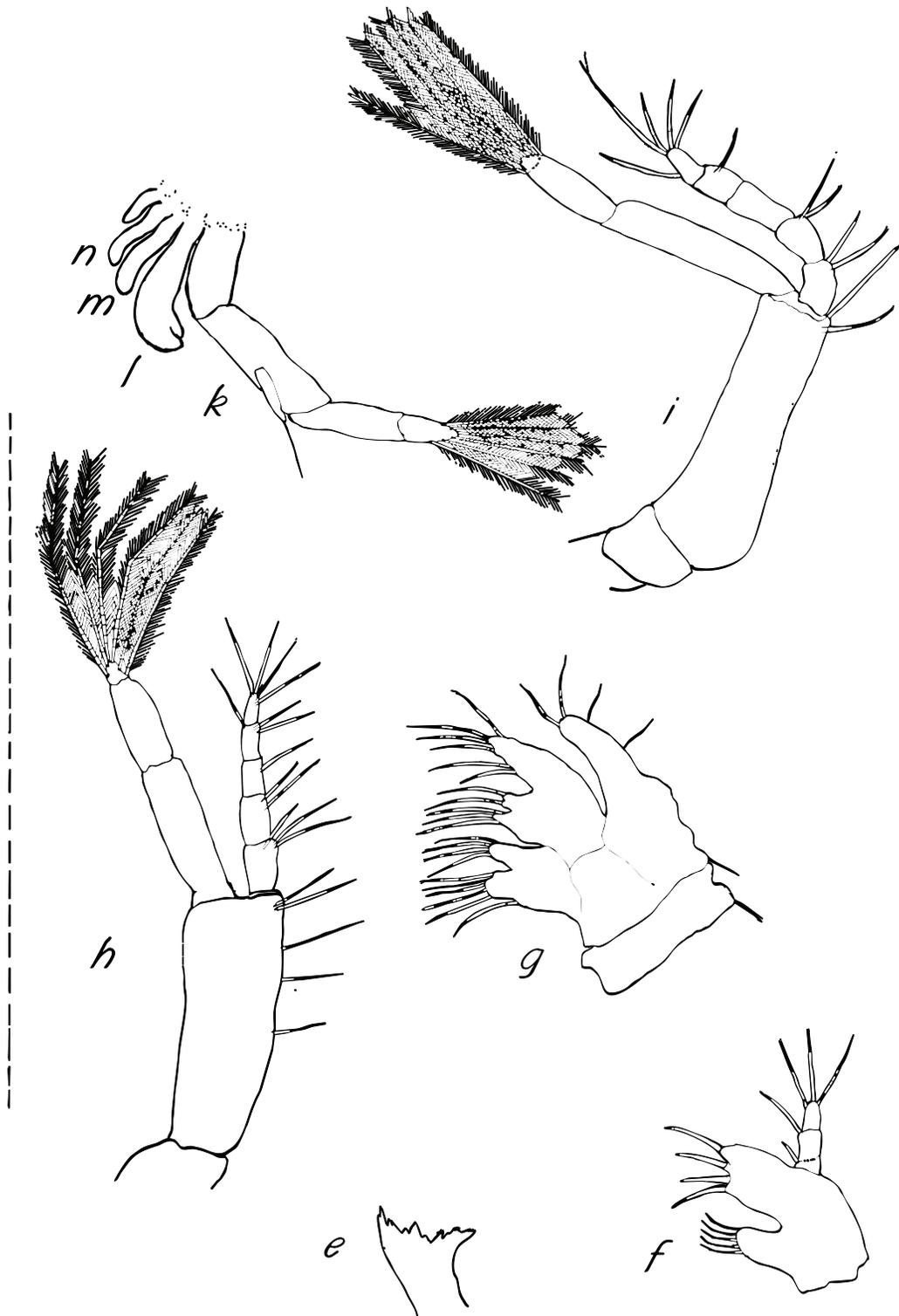


Fig. 64. *Pagurus pubescens*, Stage II Zoa: (e) mandible; (f) maxillule; (g) maxilla; (h) first maxilliped; (i) second maxilliped; (k) third maxilliped; (l) first pereopod; (m) second pereopod; (n) third pereopod. Broken line = 1 mm.

Antenna (d): scale is narrow and tapering to terminal spine and bears about 8 long setae; the flagellum is slightly longer, its base has a strong ventral spine.

Mandible (e): molar is strongly toothed and without palp.

Maxillule (f): proximal endite has 5 strong curved setae and is less than half as large as distal, the latter stout and with 4 slightly curved setae. The endopod appears 3-segmented and has 3 apical setae plus one each at the end of the other segments.

Maxilla (g): proximal endite subequally bilobed somewhat larger than the subequal lobes of the distal. Endopod stout and longer than anterior lobe of scaphognathite, the latter with only about 4 setae, it has no posterior lobe but a proximal spine.

First maxilliped (h): endopod 5-segmented, exopod 2-segmented slightly longer than endopod, with 6 apical long plumose setae.

Second maxilliped (i): endopod with 5 segments, exopod slightly longer and with 2 segments and 6 long plumose setae distally.

Third maxilliped (k): endopod is small and inserted at about distal third of the basis. The exopod smaller than in the other two and with 2 segments and 6 apical setae.

Pereopods: bud-like but the first (l) with preliminary formation of a chela. The fifth is small, hidden behind the fourth.

Pleopods: none.

Telson (t): has 6 + 6 terminal setae plus a lateral spine at each corner (no hair as the second telson process could be found in many specimens examined but may have been lost in pre-servative), the 3rd setae is larger than the others, and there is a small central pair and notch.

Dates of occurrence in plankton hauls: 24 June–20 July (Table 3).

**Stage III Zoea.** Total lengths 5.3–7.5 mm (Fig. 65, 66).

Carapace (a): large, with its posterior spinous processes appearing about half the total length; median carina extending from base of rostrum to posterior edge. The rostrum is long and tapering, reaching just beyond the antennae and almost as long as the carapace.

Abdomen: each of 4 posterior abdominal somites with 2 dorsolateral, 2 dorsal and 2 ventrolateral spines, the latter exceptionally large and long on somite 5 (as in Stage II).

Antennule (c): peduncle still unsegmented; outer flagellum with a long distal aesthete and a shorter lateral one plus a couple of setae, inner conical and shorter than the outer and with 2 long plumose apical setae.

Antenna (d): scale narrow with a long sharp apical spine and a fan of about 8 moderate setae; flagellum unsegmented, slightly longer than scale.

Mandibles (e): incisor with a long corner tooth and a couple of smaller teeth between it and molar.

Maxillule (f): proximal endite small rounded and with a fringe of a few spinous setae, distal endite twice as large and with 4 long spines. Endopod with 3 segments and 3 apical and 1 lateral seta.

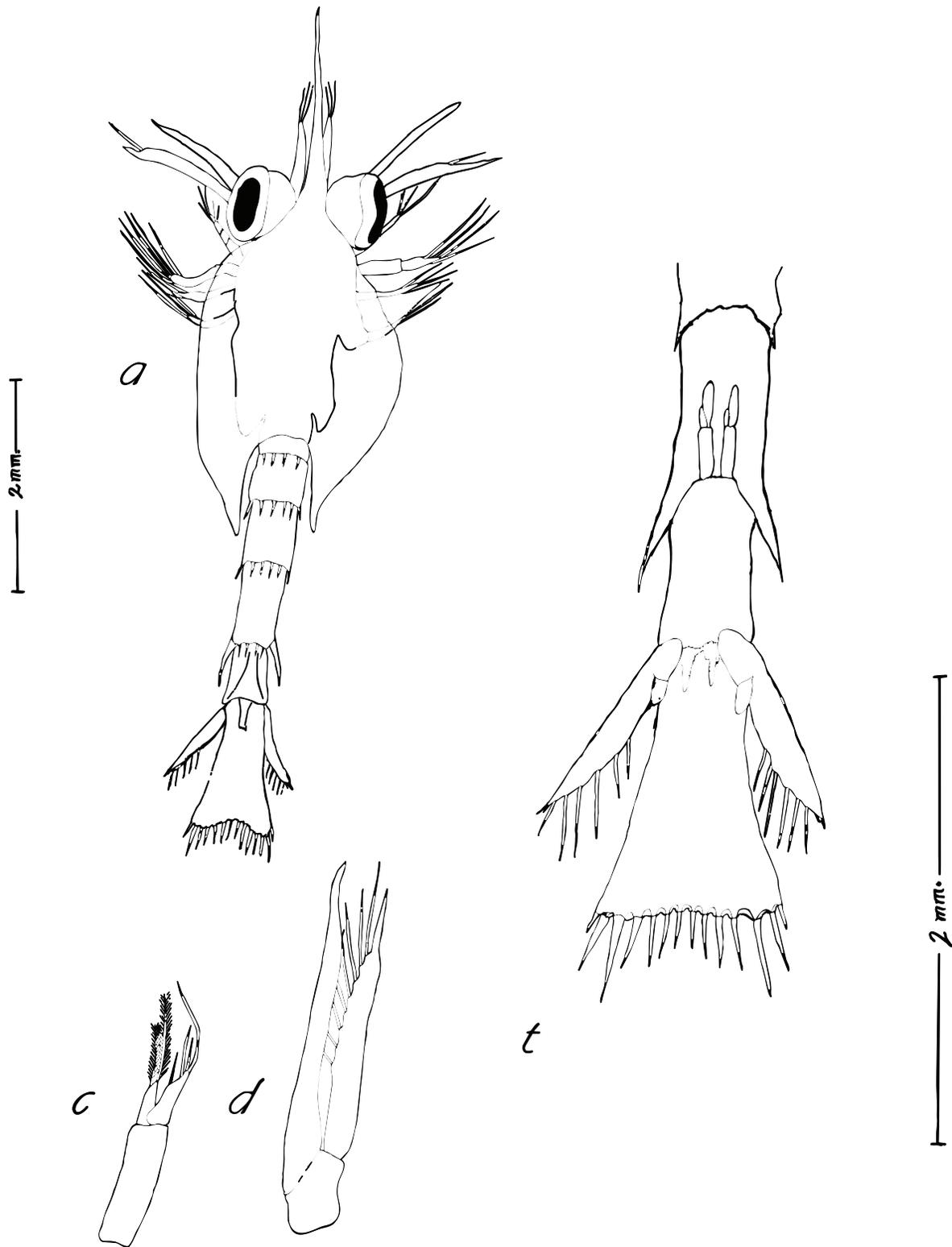


Fig. 65. *Pagurus pubescens*, Stage III Zoea: (a) whole zoea in dorsal aspect; (c) antennule; (d) antenna; (t) telson. Scales as indicated.

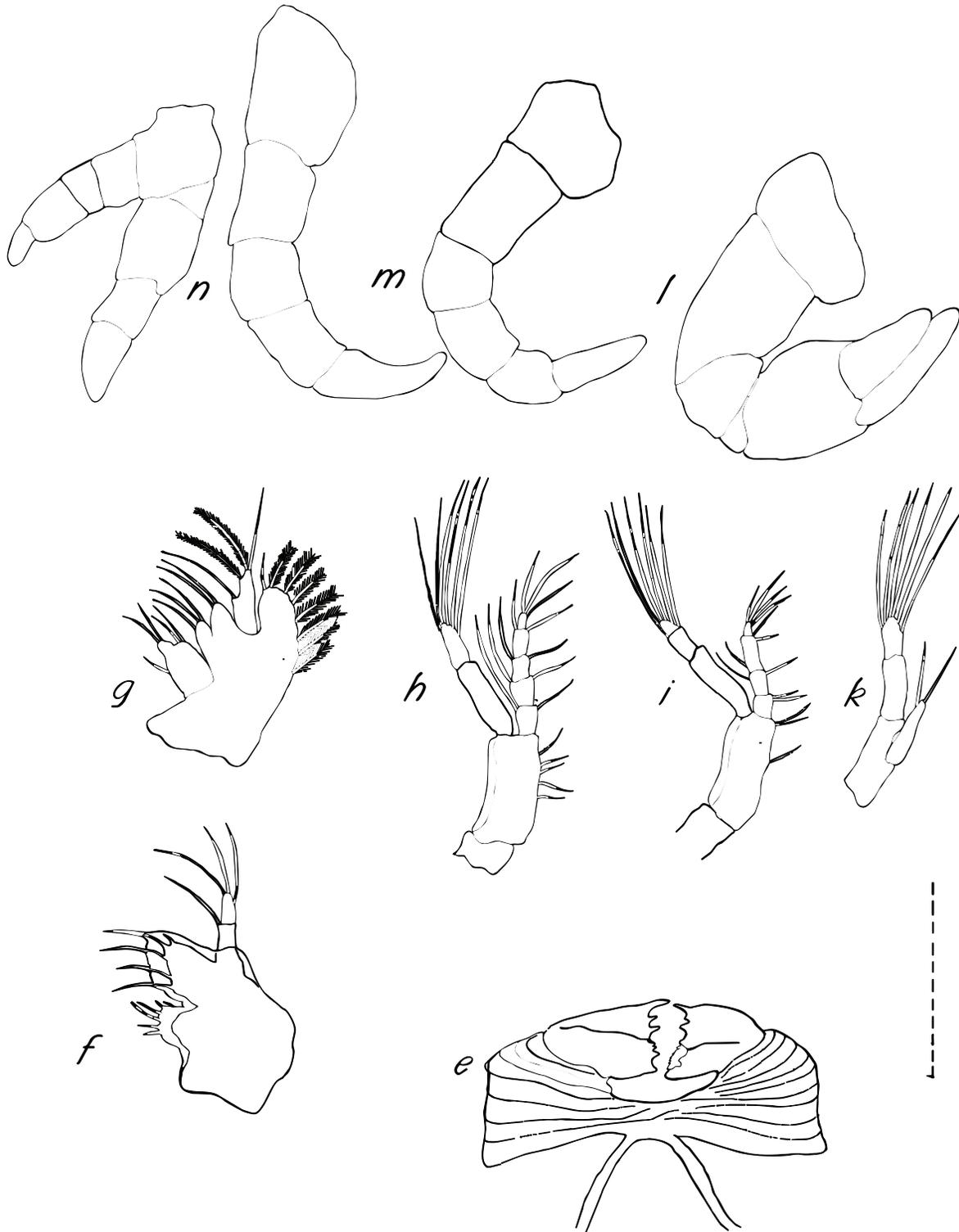


Fig. 66. *Pagurus pubescens*, Stage III Zoa: **(e)** mandibles; **(f)** maxillule; **(g)** maxilla; **(h)** first maxilliped; **(i)** second maxilliped; **(k)** third maxilliped; **(l)** first pereopod; **(m)** second pereopod; **(n)** third pereopod. Broken line = 1 mm.

Maxilla (g): proximal endite obscurely bilobate, distal endite unequally bilobed. Endopod exceeding anterior lobe of scaphognathite, the latter with a fringe of about 8 plumose setae, no posterior lobe.

First maxilliped (h): five-segmented endopod not as long as exopod, the latter with 5 long apical setae.

Second maxilliped (i): four-segmented endopod about as long as exopod, the latter with 6 long apical setae.

Third maxilliped (k): smaller than others, endopod inserted at about half the basis and short and unsegmented, with two apical setae, much shorter than exopod, the latter with 6 long apical setae.

Pereopods: the first (l) stout and chelate, second (m) and third (n) more slender and about equal, fourth and fifth smaller and close together, all partly segmented.

Pleopods: none.

Telson (t): with 7 + 7 processes, lateral pair unsutured, the third pair largest, anomuran hair possibly lost in preservative; outer branch of uropod much more developed than very small inner branch, and with about 6 long inner setae.

Dates of occurrence in plankton hauls: 13 July–4 August (Table 3).

**Stage IV Zoea:** Total lengths 6.8–8.4 mm (Fig. 67).

Carapace (a and b): has a pronounced mid-dorsal carina from base of rostrum, forming a crest over the gastric area and reaching the posterior edge, an antennal spine is present.

Abdomen: is as in other Stages but 4 pairs of biramous pleopods are now present.

Antennule (c): with slight outer protrusion proximally and faint segmentation; outer flagellum with 3 apical spines and 2 lateral bunches of aesthetes or setae; the shorter inner flagellum has 2 setae apically and 1 long adjacent seta.

Antenna (d): scale with strong apical spine and about 9 lateral long setae, strong spine at base ventrally; flagellum showing faint segmentation, longer than scale, with very strong sharp spine at base ventrally.

Mandible (e): incisor a long sharp tooth followed by several small teeth on edge with gap at strongly toothed molar (appearing as 2 unequal molars). Palp is present as a small rounded bud proximally inside.

Maxillule (f): proximal or coxal endite small, rounded, with 6 curved setae; distal or basal endite with 6 strong uneven teeth; endopod with 2 setae on apical segment and 1 seta on proximal or third segment.

Maxilla (g): both proximal and distal endites equally bilobed and with few setae. Endopod slightly longer than anterior lobe of scaphognathite, the latter with about 12 very fine setae; posterior lobe narrow and almost as long as anterior lobe, without setae.

First maxilliped (h): has a 5-segmented endopod shorter than the exopod, the latter with 8 long apical setae.

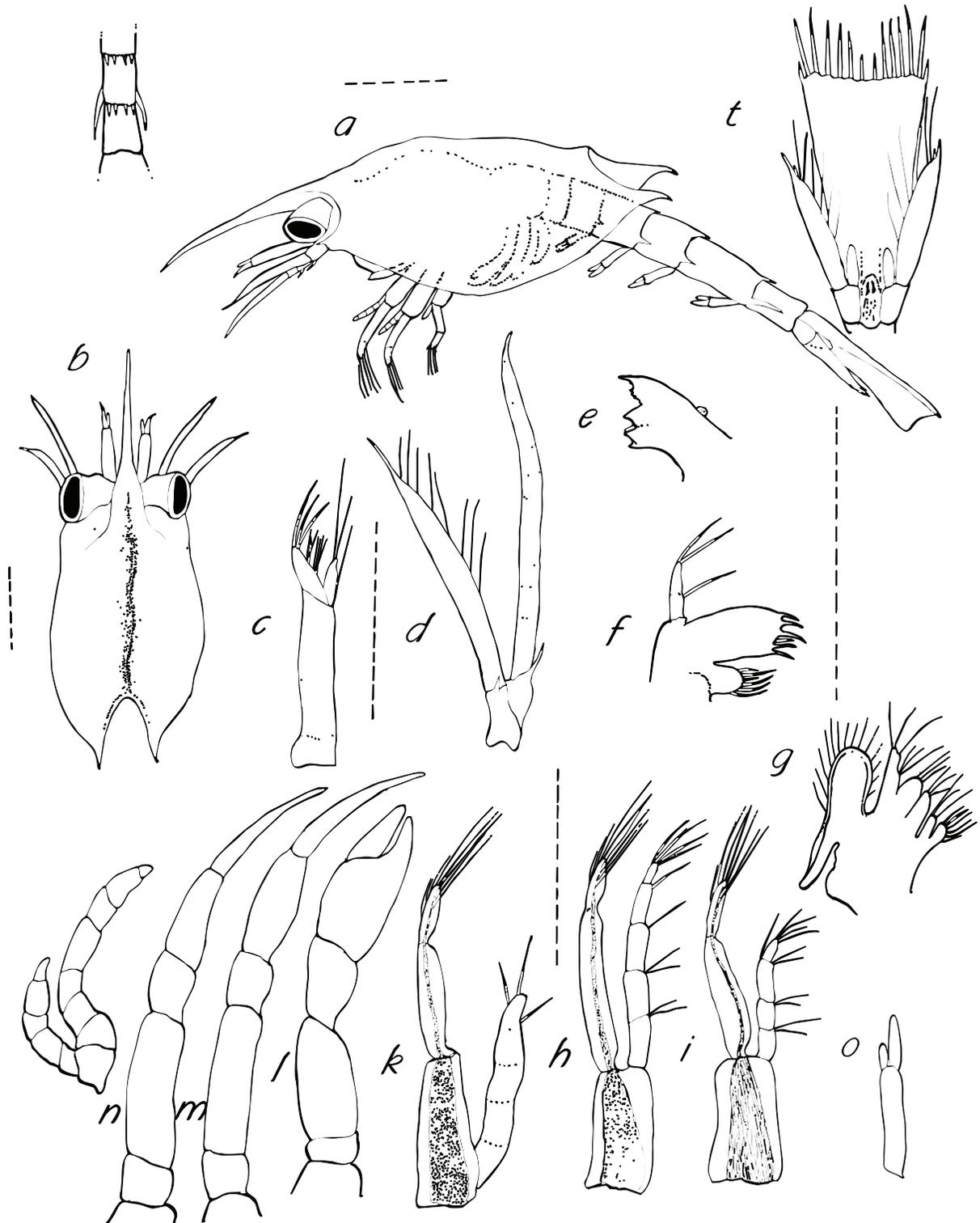


Fig. 67. *Pagurus pubescens*, Stage IV Zoea: (a) whole zoea from left side; (b) dorsal carapace; (c) antennule; (d) antenna; (e) mandible; (f) maxillule; (g) maxilla; (h) first maxilliped; (i) second maxilliped; (k) third maxilliped; (l) first pereopod; (m) second pereopod; (n) third pereopod; (o) pleopod. Broken line = 1 mm.

Second maxilliped (j): has a 4-segmented endopod about as long as the exopod, the latter with about 8 long apical setae.

Third maxilliped (k): endopod about as long as exopod but inserted proximally on base, faintly 5-segmented. Exopod with 8 long apical setae.

Pereopods: the first (l) very stout, strongly chelate. The second (m) and third (n) similar slightly longer than the first and with very long dactyl. The fourth is small and the fifth smaller, appearing to be attached to each other at coxa. The fifth with 6 indistinct segments.

Pleopods (o): 4 pairs only, similar, biramous.

Telson (t): has 7 + 7 terminal processes (no evidence of hair in second position), the outer small spines seemingly fused with the edge and possibly unsutured but others are all sutured. Outer branch of the uropod with strong apical and small accessory spine and inner fringe of about 6 long setae; inner branch small, about one-quarter the length of the outer.

Dates of occurrence in plankton hauls: 14–27 August (Table 3).

Infraorder **BRACHYURA**

Family **MAJIDAE**



Infraorder **BRACHYURA** Latreille, 1803

Family **MAJIDAE** Samouelle, 1819

Lebour, 1928: 541–551. fig. 4 (14, 15),

As in the majority of the Brachyura, the typical crab Zoea has long rostral, dorsal and lateral spines on the carapace, a slender curved abdomen and a bifurcate telson (Gurney, 1942). Antennal exopod about one-half as long as spinous process; lateral spines on abdominal somites 2 and/or 3; telson with 2 or 3 lateral setae in zoeal Stages I and II. Only two zoeal stages.

Genus ***Hyas*** Leach, 1814

Lebour, 1928: 486, key; 544; fig. 2 (1,2),

5 (29,30); Lebour, 1931: 95;

Christiansen, 1973.

Large spines on carapace covered with spinules on distal two-thirds; antennal exopod less than half spinous process; lateral spines or horns on second and third abdominal somites; telson with three lateral setae in Stage I and four in Stage II; long lateral spines on abdominal somites 2 to 5 in both zoeal stages.

***Hyas araneus***

This species does not occur in Ungava Bay, however, descriptions available from published literature are given in Table 12.

***Hyas coarctatus*** Leach, 1815

Lebour, 1928: 544, Pl. II, 9; Pl. XIV, 8–10.

Christiansen, 1973: 63–89, fig. 1–17.

***Hyas coarctatus alutaceus***, Pohle, 1991: 2717–2737, fig. 1–6.

Spinous process of antenna almost as long as rostral spine, exopod less than a third of its length. Long setae at ventral margin of carapace. Colour brownish. Compared with *H. araneus* the zoeal stages of this spider crab are smaller when taken from the same area, the rostral spines in the Zoea are more spinulose and the spinules are larger, also the colour is less distinct (Christiansen, 1973) (Table 13). Zoea from Ungava Bay described in the present work are larger than those of specimens of both species from Norway described by Christiansen (*H. araneus* does not occur in Ungava Bay). Pohle 1991 believes that these larvae belong to the subspecies *H. c. alutaceus*. Total lengths (mm) at the zoeal Stages are as follows: I. 4.0–4.7, II. 5.0–6.0.

Distribution in Ungava Bay. The larvae of this species were the most ubiquitous of decapods in the bay and present at almost all plankton stations from Koaktuk, Diana Bay in the west to Port Burwell and the Button Islands in the east (Fig. 1; Table 1). No. of specimens taken = 5 618 (Table 2).

**Description**

**Stage I Zoea.** Total lengths 4.0–4.7 mm (Fig. 68, 69).

(Measurements of total length were from tip of rostrum to tip of dorsal spine; Lebour (1928) measured from the front of the head to the tip of the telson fork (p. 507). A "spine to spine" measurement mentioned by Lebour (1928) equals from the tip of the rostrum to the tip of the dorsal spine: in *H. coarctatus* of Britain = 3 mm).

Carapace lengths 0.5–0.7 mm (from eye socket to posterior edge of carapace in mid-line).

Carapace (a and b): sub-globular, rostral and dorsal spines conspicuous, long and with spinules from the tip to more than half their length; lateral spines are less than half as long as dorsal but are covered with spinules. Ventro-laterally are 3 setae increasing in size posteriorly. Eyes are large, globular and attached along one side.

Abdomen: with dorsolateral horns on somites 2 and 3 and long posterolateral spines on somites 3 to 5; somite 6 is fused with telson at this Stage.

Antennule (c): stout and somewhat conical in shape with 2 long aesthetes and 2 short setae distally.

Antenna (d): endopod is only a bud, the protopod has a long pointed process which is almost as long as the rostrum and has many spinules on the distal half, the exopod is slender, less than half the protopodal process and has 3 small apical setae. Over most of its length are many small setae.

Mandible (e): molar stout and flattened distally, with 2 prominent lateral incisors.

Maxillule (f): proximal endite small, rounded, with 5 distal setae or spines; distal endite about twice as large, rounded, with 6 setae. Endopod longer than endites, with 2 main segments and distally 6 setae, 2 of which may be lateral.

Maxilla (g): proximal endite smaller than distal, both obscurely bilobed. Endopod stout, rounded, with 5 setae distally, larger than anterior lobe of scaphognathite, the latter somewhat pointed at the apex, with a short posterior lobe and terminal spine and about 12 fringing setae.

First maxilliped (h): endopod with 5 segments, not quite as long as the exopod, the latter with 2 segments and 4 long plumose apical setae.

Second maxilliped (i): endopod with 3 segments, about half as long as the 2-segmented exopod, the latter with 4 long plumose apical setae.

Third maxilliped (k): tiny, budlike with a short exopod.

Pereopods: first (l) with few divisions and incipient chela. The second (m) to the fifth are smaller than the first.

Pleopods: none.

Telson (t): bifurcate, long narrow forks at the base of which are 2 outer spines and 3 inner setae on each fork.

Dates of occurrence in plankton hauls: 24 June–20 August (Table 3).

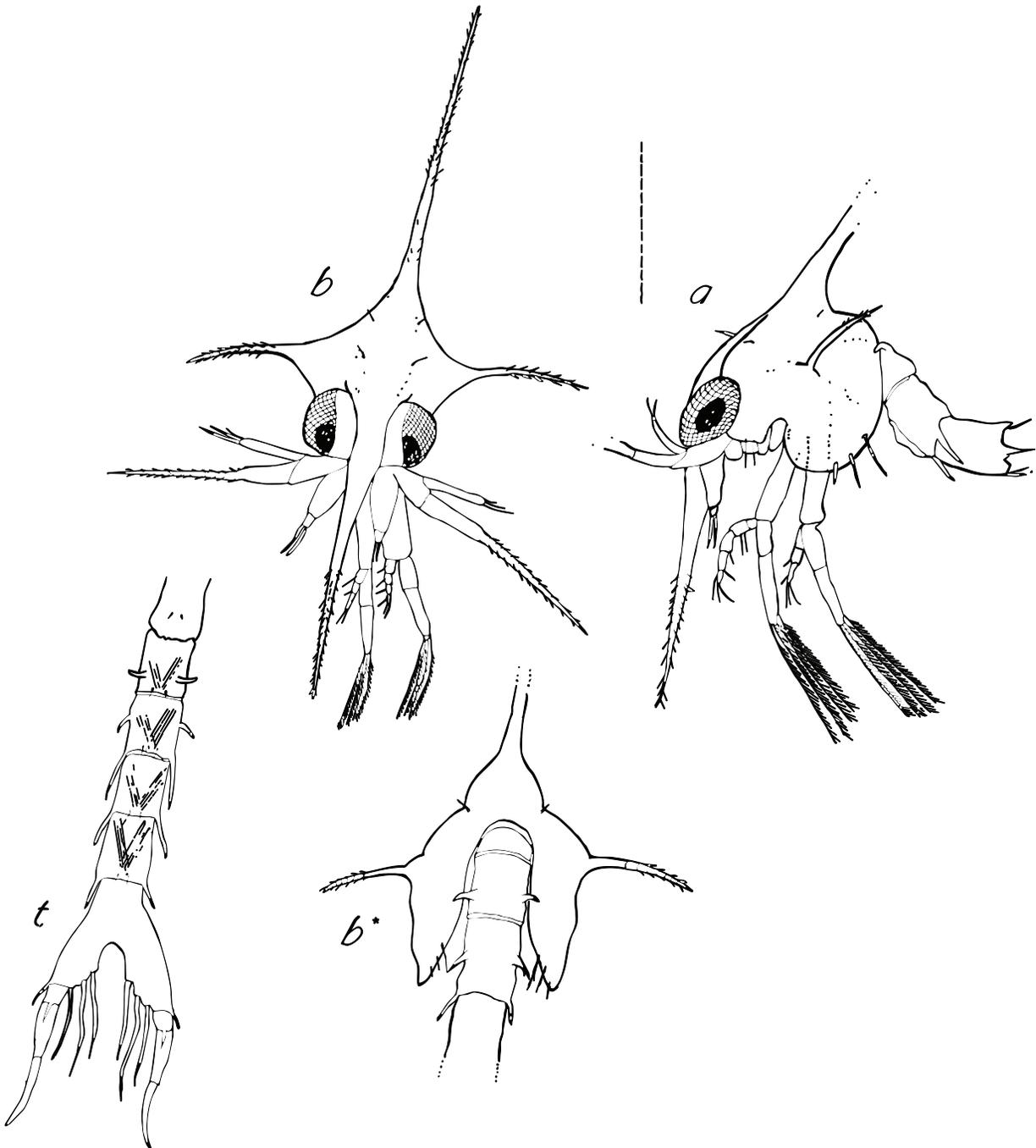


Fig. 68. *Hyas coarctatus*, Stage I Zoea: (a) carapace from left side; (b) carapace from in front; (b\*) carapace from behind; (t) telson. Broken line = 1 mm.

**Stage II Zoea.** Total lengths 5.0–6.0 mm (Fig. 70).

Carapace (a and b): with supraorbital spines, long slender lateral spines and very long posterior spine, the latter slightly longer than rostral spine and both with many small spinules, less prominent than in Stage I.

Abdomen: abdominal somites 2 and 3 with fixed lateral horns, somites 3–5 with very long postero-lateral slender fixed spines, somite 6 with short ventro-lateral processes posteriorly.



Fig. 69. *Hyas coarctatus*, Stage I Zoea: (c) antennule; (d) antenna; (e) mandible; (f) maxillule; (g) maxilla; (h) first maxilliped; (i) second maxilliped; (k) third maxilliped; (l) first pereopod; (m) second pereopod. Broken line = 1 mm.

Antennule (c): short and stout with 2 distolateral projections, the first of which has a short seta, the other is possibly a bud of the ventromesial flagellum; apically 3 aesthetes.

Antenna (d): endopod is almost as long as exopod, the latter with an apical and 2 subapical spines. The protopodal process has fewer and smaller spinules than in Stage I and is almost as long as the rostrum.

Mandible (e): incisor is molar-like with two unequal cusps and separated from the molar which seems to lie behind it, a short one-segmented palp is present.

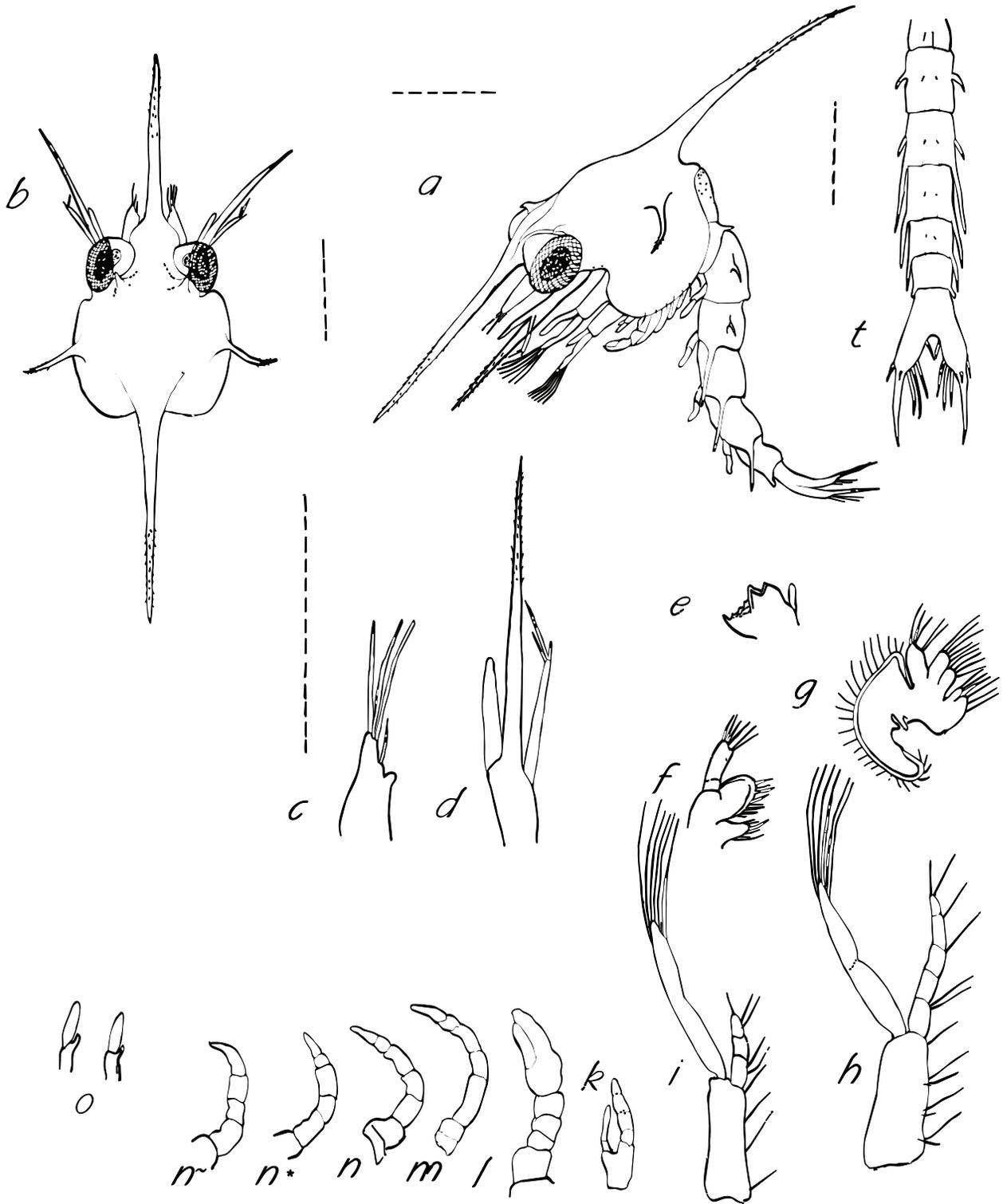


Fig. 70. *Hyas coarctatus*, Stage II Zoea: (a) whole zoea from left side; (b) dorsal carapace; (c) antennule; (d) antenna; (e) mandible; (f) maxillule; (g) maxilla; (h) first maxilliped; (i) second maxilliped; (k) third maxilliped; (l) first pereopod; (m) second pereopod; (n) 3rd-5th pereopods; (o) pleopod. Broken line = 1 mm.

Maxillule (f): proximal endite has about 6 spinous setae and is more slender than distal endite which bears about 4 strong and 3 lighter spines. Endopod is 2-segmented and has 4 apical and 2 subapical setae.

Maxilla (g): proximal endite with subequal and distal endite equal lobes. Endopod slightly longer than anterior lobe of scaphognathite, the latter subtriangular and shorter than curved posterior lobe, both fringed with about 25 setae.

First maxilliped (h): endopod with 5 divisions, exopod slightly longer and with 6 apical long setae.

Second maxilliped (i): endopod with 3 divisions and much shorter than exopod, the latter with 6 apical long setae.

Third maxilliped (k): much smaller than second with endopod obscurely divided and a short exopod.

Pereopods: first (l) stout and strongly chelate. The second to the fifth (m–n) are non-chelate, segmentation present but not clear.

Pleopods (o): uniramous, the endopod about as long as protopod, the latter with a distal projection laterally.

Telson (t): with a single short inner setae at each side near the fork and 3 long inner setae in a group at each side just before the fork narrows into a long spinous process, a single sutured outer spine is opposite the group of 3 at each side.

Date of occurrence in plankton hauls: infrequent, only on 19 August (Table 3).

### **Megalopa**

No specimens of the megalopa were taken by the Calanus expeditions possibly because it may be the settling stage of this crab and would not be present in the plankton.

Pohle (1991) gives a description of the megalopa reared from the eggs of *Hyas coarctatus alutaceus*.