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A CHECKLIST AND ILLUSTRATED KEY TO THE
EPIBENTHIC SHRIMPS (DECAPODA : NATANTIA)
OF MORETON BAY, QUEENSLAND

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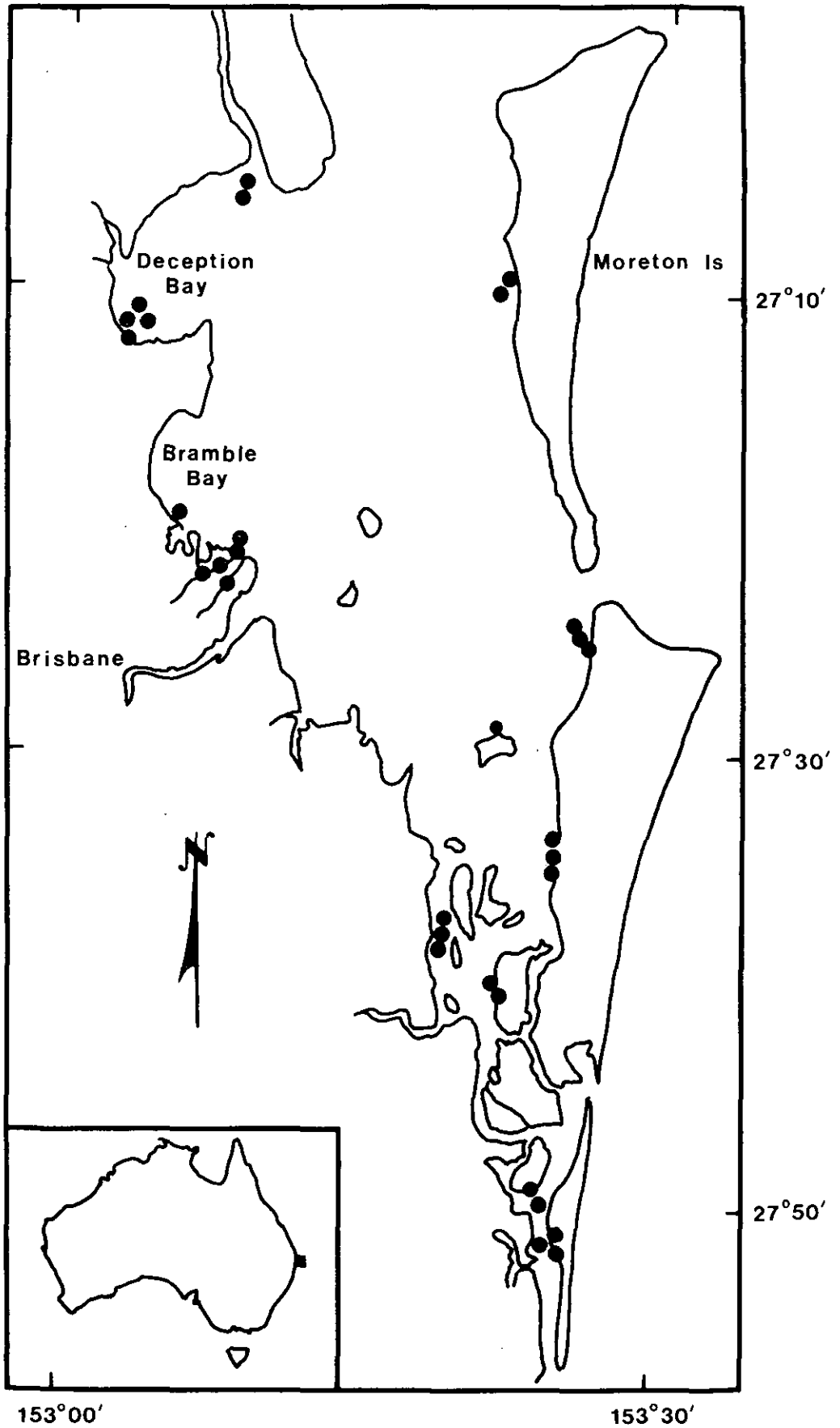


Figure 1. Moreton Bay, showing sampling stations

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ABSTRACT

A checklist is given of 40 species of epibenthic shrimps (Decapoda: Natantia) collected from the shallow and intertidal soft substrates of Moreton Bay, Queensland. An illustrated key is provided for the identification of adults of 29 species of carids and two species of sergestids included in the checklist.

INTRODUCTION

The natant decapods may be divided (Moore 1969) into Infraorder Penaeidea and Infraorder Caridea. This checklist includes Families Penaeidae and Sergestidae of Infraorder Penaeidea and Families Alpheidae, Atyidae, Crangonidae, Hippolytidae, Ogyrididae, Palaemonidae, Pandalidae and Processidae of Infraorder Caridea.

Hale (1927) provided one of the few general guides to the identification of shrimps from Australia. Some families, including Alpheidae and Palaemonidae, are currently receiving comprehensive systematic treatment (Banner and Banner in press; Bruce 1977). However, this process is lengthy and the immediate need for the ecologist or non-specialist taxonomist to identify material is acute. Some of the taxonomic information collected during an ecological survey of Moreton Bay prawn nursery grounds is summarised in this key, as an aid to the identification of the shrimps of the area.

The extent of the natant decapod fauna of Moreton Bay is evident from the 40 species of the present collection, of which at least six are probably new species and a further four are new records for Australia.

METHODS

Shrimps were collected from Moreton Bay, between latitudes 27°02'S and 27°56'S, on the border of the tropical/subtropical (Solanderian) and warm temperate (Peronian) biogeographic provinces of east coast Australia (Knox 1963). The shrimps were obtained from quantitative samples of epibenthic macrofauna taken regularly from areas of mangroves, seagrasses, sand and mud, at the stations shown in Figure 1. Details of vegetation type, sediment composition, salinity, temperature and water depths of the 29 stations sampled, as well as the distribution and abundance of the species collected, are given by Wadley and Young (1978). Most stations were in the littoral or immediately sublittoral zone, in depths of 0-3.8 m at high tide.

At each station the epibenthic macrofauna of a 50 m transect was sampled using a roller beam trawl (Young 1975) of 1 mm mesh codend. Samples were taken monthly from January 1972 to March 1973, resulting in the collection of 2160 samples, from which the species differentiated in this key were obtained.

Carids may go through their entire life-cycle in shallow waters (Kaestner 1967), whilst penaeids grow almost to maturity in the shallows and then migrate to spawn in deeper waters (Dall 1956). Thus, from the shallows sampled in this survey, all stages of postlarval carids but usually only sub-adult prawns were collected. The species of Penaeidae collected are included in the checklist. Keys for their identification have been published elsewhere. (See text under Family Penaeidae.)

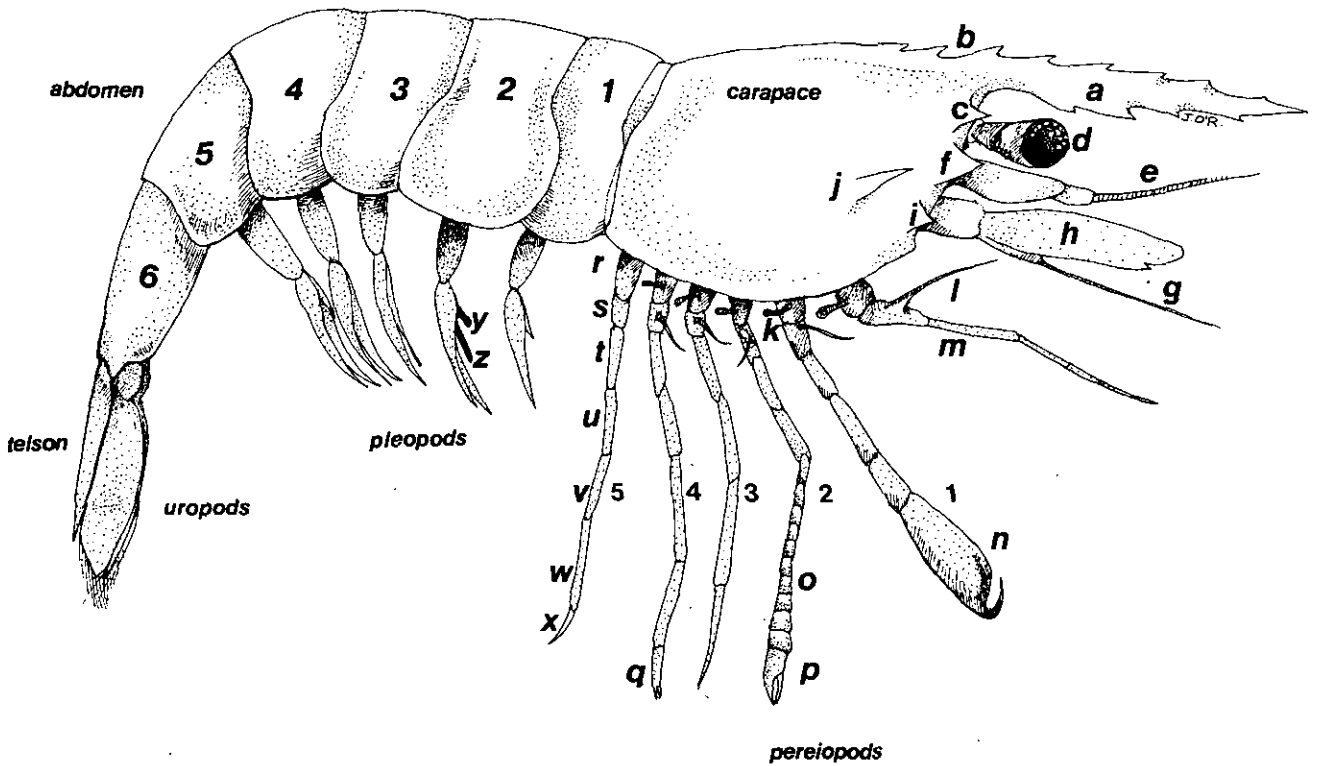


Figure 2. Generalised male carid:

- | | |
|------------------------------|--|
| a- rostrum | n- first pereopod; subchelate |
| b- postrostral spines | o- second pereopod; multiarticulate carpus |
| c- supraorbital spine | p- second pereopod; chelate |
| d- eye | q- fourth pereopod; minutely chelate |
| e- first antenna (antennule) | r- fifth pereopod; coxa |
| f- antennal spine | s- fifth pereopod; basis |
| g- second antenna | t- fifth pereopod; ischium |
| h- scaphocerite | u- fifth pereopod; merus |
| i- branchiostegal spine | v- fifth pereopod; carpus |
| j- hepatic spine | w- fifth pereopod; propodus |
| k- epipod | x- fifth pereopod; simple dactylus |
| l- exopod | y- second pleopod; appendix interna |
| m- third maxilliped | z- second pleopod; appendix masculina |

Terms used in the key are explained in the glossary and in the diagram of a generalised carid (Fig. 2). Figures of characters used in the key are provided where possible, in addition to illustrations of specimens. All scale lines on illustrations are equal to 2 mm.

EXPLANATION OF KEY

The key is designed so an unidentified specimen may be systematically checked through division, family and genus, to species. Specimens from the collection have been used in deriving the key and for the illustrations. The key makes no provision for the identification of similar species which may be found in the future. However, the collection includes nearly all species of epibenthic shrimps and prawns of the stations surveyed because of the method and intensity of sampling.

Characters which have proved useful in the keys of earlier workers to differentiate species have been used where possible. Some of the characters used in this key to differentiate species of alpheids have been taken from Banner and Banner (1966, 1973), pontoniins from Bruce (1969), processids from Hayashi (1975) and palaemonids from Holthuis (1955). General choice of characters has been based on keys by Barnard (1950), Kensley (1972), Richardson and Yaldwyn (1958) and Yaldwyn (1971). Subadult sergestids and subadults of most of the species of carids may be identified using this key but it is based on characters typical of adults.

In labelling the species, reference has been made to species described in the literature wherever possible. For example, *Alpheus* nr *pacificus* is so designated to indicate that, whilst it differs from *A. pacificus* described by Dana (1852) in some important aspects, it is more similar to that species than any other known species. This provides a convenient label until a revision of the group (Banner and Banner in press) is published. Consistently recognisable forms within a genus are designated "species 1,2,3..." if they bear little resemblance to known species. No new species are here erected, although it is apparent in some cases that a previously undescribed taxon is present. Intraspecific variability, especially in hippolytids, often made distinction of specific groups difficult. Specialists were consulted, and often many thousands of specimens examined, in arriving at the final species groupings presented in this key.

Sexual dimorphism is pronounced in many species of carids, especially in alpheids and hippolytids, where the chelae of the first pereopods and the rostrum, respectively, may occur in distinct male and female forms. Male carids generally have an appendix masculina on the second pleopod and a reproductive aperture between the bases of the fifth pereopods, as distinct from females, which have no appendix masculina but a reproductive aperture between the third pereopods. Male penaeids have a petasma on the first pleopod, as well as an appendix masculina on the second pleopod, whereas females may be distinguished by the reproductive aperture between the fifth pereopods (Kaestner 1967). In sergestids, the presence of a clasping spine on the lower antennular flagellum is an additional character which distinguishes males (Omori 1975).

ACKNOWLEDGEMENTS

Identification of material from this collection by taxonomists including A.J. Bruce, K.I. Hayashi, L.B. Holthuis, M. Omori and, in particular, J.C. Yaldwyn is gratefully acknowledged. D.E. Brown, F.B. Griffiths, P.C. Young and S.F. Rainer have contributed helpful advice and identifications. J.F. O'Regan illustrated the specimens and assisted with layout.

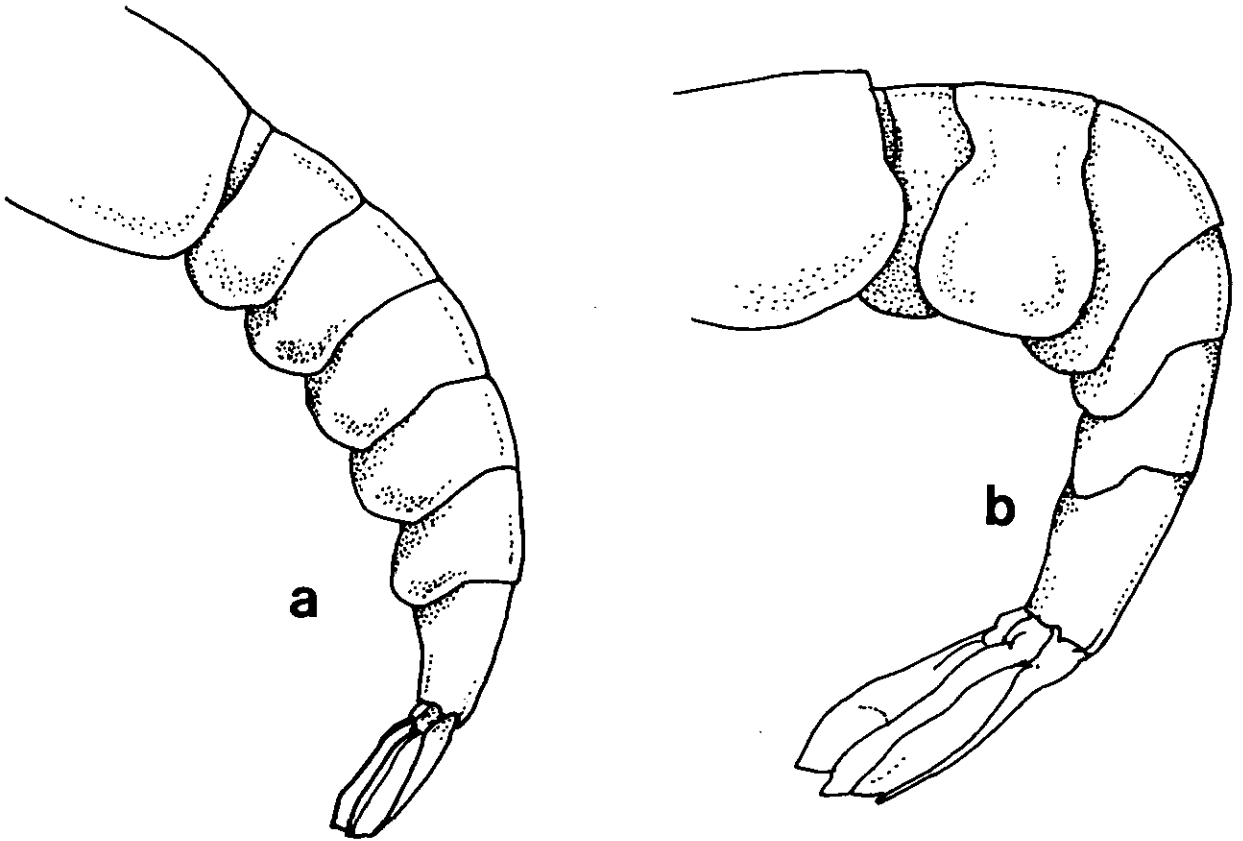


Figure 3. Key to Infraorders of Decapoda: Natantia: *a*- abdomen with second pleurum not overlapping first and third; *b*- abdomen with second pleurum overlapping first and third.

KEY TO INFRAORDERS OF DECAPODA: NATANTIA

1. Third pair of pereopods chelate (Fig. 2*p*). Pleura of second abdominal segment not overlapping those of first and third segments (Fig. 3*a*). Abdomen without a sharp dorsal bend or hump.....Penaeidea
- Third pair of pereopods not chelate (Fig. 2*x*). Pleura of second abdominal segment overlapping those of first and third (Fig. 3*b*). Abdomen usually with an obvious dorsal bend or hump.....Caridea

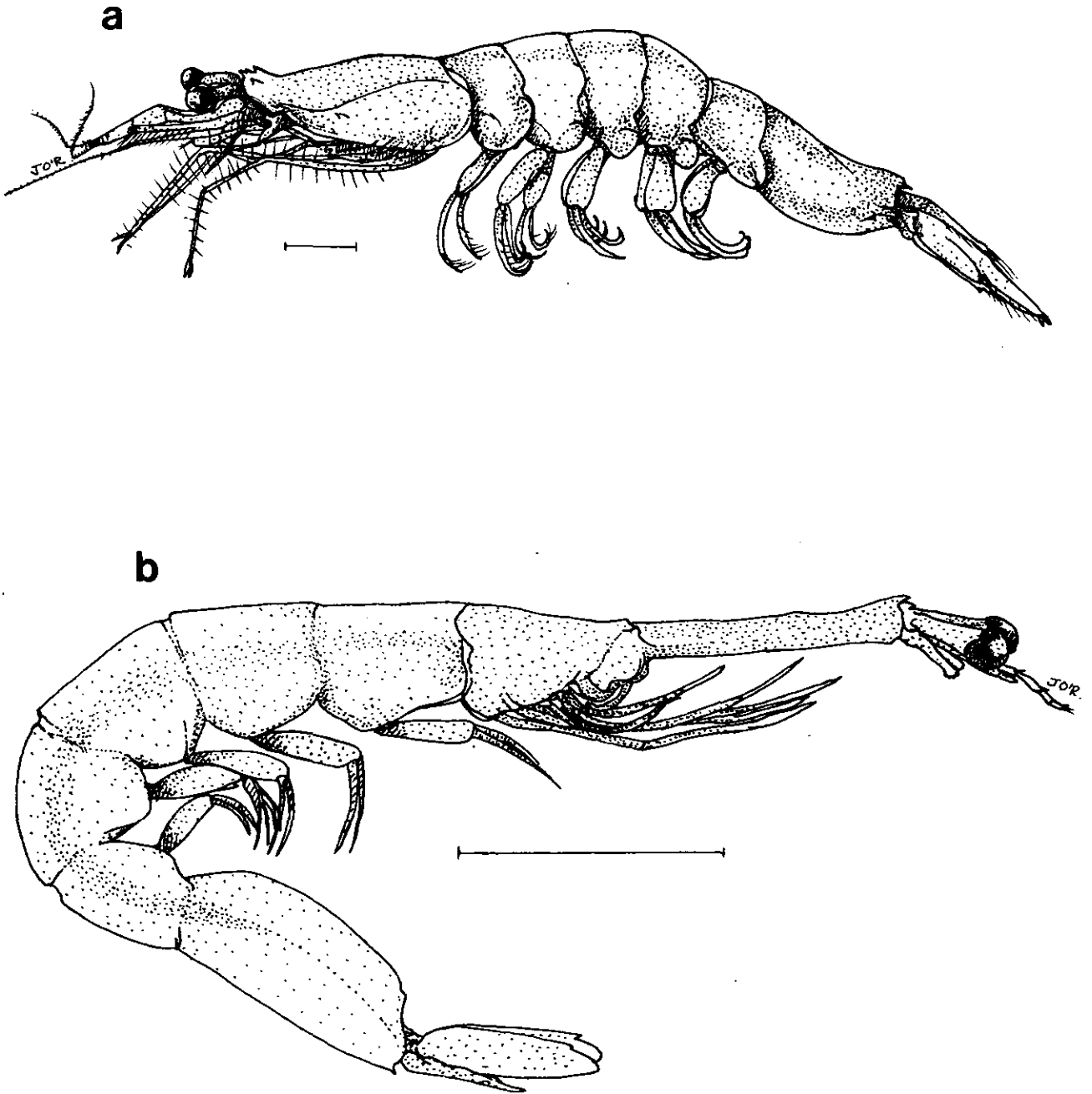


Figure 4. Family Sergestidae: a- *Acetes sibogae australis*, lateral;
b- *Lucifer hanseni* female, lateral.

INFRAORDER PENAEIDEA

Key to Families

1. First pair of pereopods chelate. Fourth and fifth pairs of pereopods well developed.....Penaeidae
- First pair of pereopods not chelate. Fourth and fifth pairs of pereopods reduced or absent.....Sergestidae

Family Penaeidae

- Metapenaeus bennettiae* (Racek and Dall, 1965)
M. endeavouri (Schmitt, 1926)
M. ensis (de Haan, 1850)
M. macleayi (Haswell, 1879)
M. novaeguineae (Haswell, 1879)
Penaeus esculentus (Haswell, 1879)
P. plebejus Hess, 1865
Trachypenaeus anchoralis (Bate, 1888)
T. fulvus Dall, 1956

Adult penaeid prawns of the Moreton Bay area have been differentiated to species level (Dall 1957) largely on the basis of reproductive morphology. Penaeids taken in this collection from the littoral and sublittoral banks were predominantly postlarvae and juveniles (1.1 to 13.0 mm carapace length) and may be differentiated by the form of rostrum and telson using the key of Young (1977).

Family Sergestidae

Subfamily Sergestinae

Acetes sibogae australis Omori, 1976

Subfamily Luciferinae

Lucifer hanseni Nobili, 1905

1. Gills present. First pair of legs non-chelate, others minutely chelate. Head not elongate (Fig. 4a).....*Acetes sibogae australis*
- Gills absent. First two pairs of legs non-chelate, others minutely chelate. Head greatly elongate. (Fig. 4b).....*Lucifer hanseni*

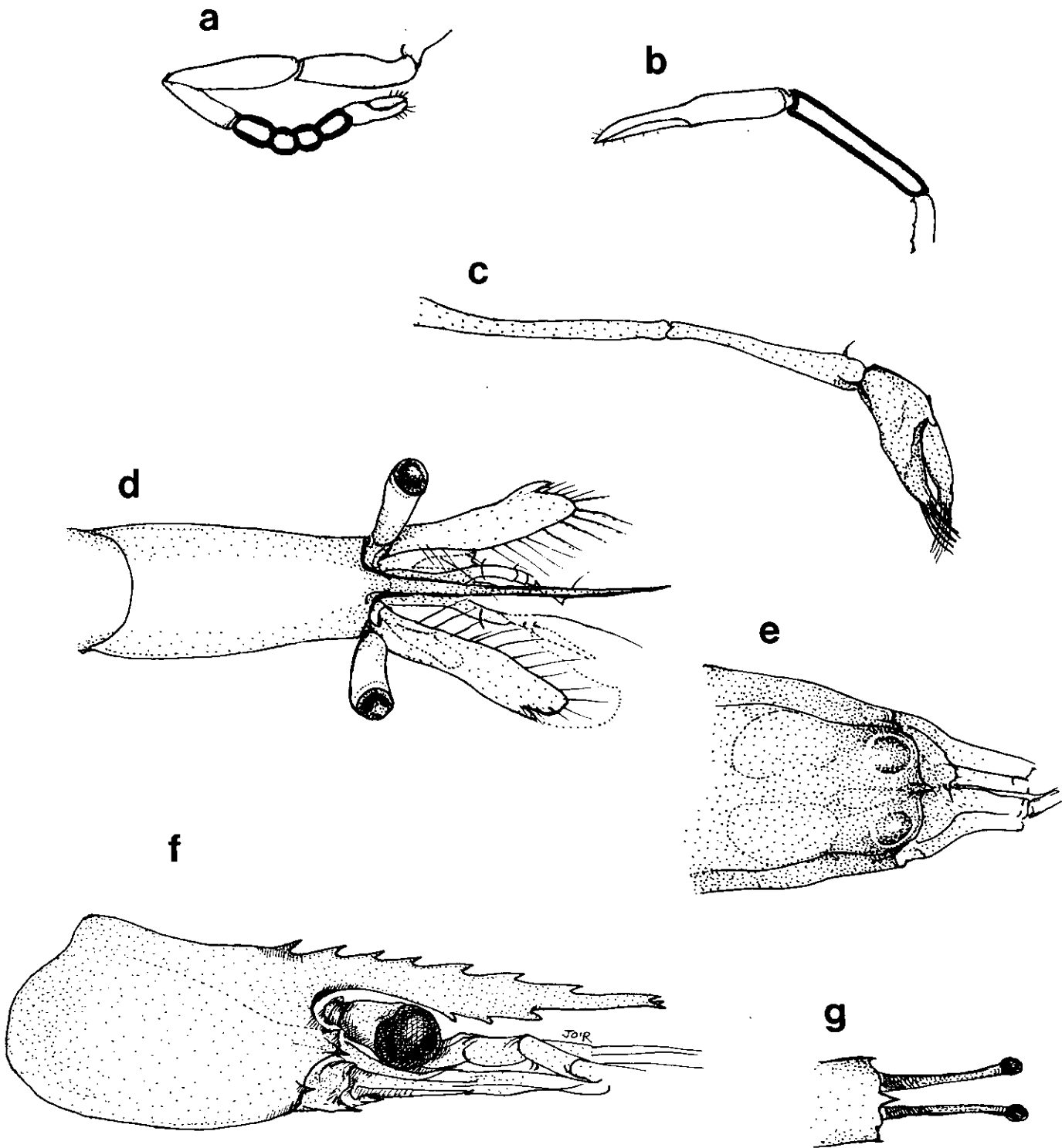


Figure 5. Key to Families of Infraorder Caridea: *a*- first pereopod with subdivided carpus in heavy lines; *b*- first pereopod with entire carpus in heavy lines; *c*- chela with conspicuous terminal brushes; *d*- carapace and appendages with free eyes, dorsal; *e*- carapace and appendages with hooded eyes, dorsal; *f*- carapace and appendages with eyestalks not extremely elongate, lateral; *g*- carapace with extremely elongate eyestalks, dorsal.

INFRAORDER CARIDEA

Key to Families represented in this collection from Moreton Bay

1. First pair of pereiopods either chelate (Fig. 2*p*) or simple (Fig. 6*d*)..... 2
 - First pair of pereiopods subchelate (Fig. 2*n*).....Crangonidae (p.15)
2. Carpus of second pair of pereiopods entire (Fig. 5*b*).
First pereiopods with well-developed chelae..... 3
 - Carpus of second pair of pereiopods subdivided into two or more segments (Fig. 5*a*). Otherwise, first pereiopods not chelate..... 4
3. Chelae with conspicuous terminal brushes (Fig. 5*c*).....Atyidae (p.15)
 - Chelae without terminal brushes.....Palaemonidae (p.19)
4. Chelae of first pereiopods distinct..... 5
 - Chelae of first pereiopods minute or absent (Fig. 2*q*).....Pandalidae (p.21)
5. Both pereiopods of the first pair chelate..... 6
 - One pereiopod of the first pair chelate, the other simple.....Processidae (p.21)
6. Eyes free (Fig. 5*d*)..... 7
 - Eyes partly or entirely covered by hood-like extension of the dorsal anterior carapace (Fig. 5*e*).
First pereiopods longer than second pereiopods.
Chelae of first pereiopods often unequal in size, one being swollen and enlarged.....Alpheidae (p.13)
7. Eyestalks not extremely elongate; eyestalk less than three times as long as cornea (Fig. 5*f*).....Hippolytidae (p.17)
 - Eyestalks extremely elongate; eyestalk at least five times as long as cornea (Fig. 5*g*).....Ogyrididae (p.19)

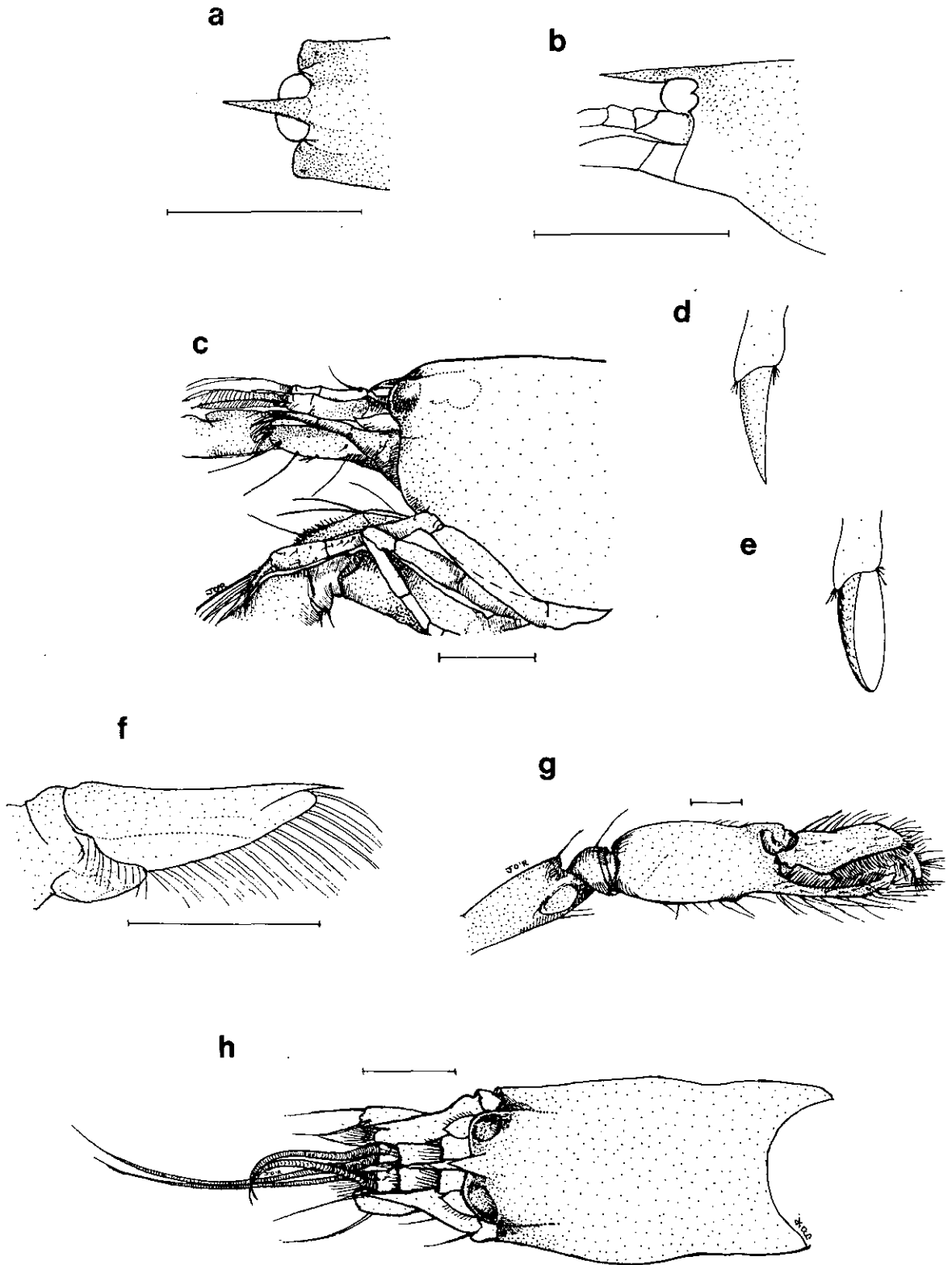


Figure 6. Family Alpheidae: *a*- *Athanas japonicus* anterior carapace and appendages, dorsal; *b*- *A. japonicus* anterior carapace and appendages, lateral; *c*- *Alpheus* nr *pacificus* anterior carapace and appendages, lateral; *d*- hypothetical simple dactylus; *e*- hypothetical spathulate dactylus; *f*- *A.* nr *pacificus* scaphocerite, dorsal; *g*- *A. richardsoni* small chela of male, outer face, lateral view, showing balaeniceps dactylus; *h*- *A. richardsoni* anterior carapace and appendages, dorsal.

Family Alpheidae

Alpheus richardsoni Yaldwyn, 1971*A. nr pacificus* Dana, 1852*Athanas japonicus* Kubo, 1936

1. Cornea of eye fully exposed in dorsal and lateral view except for anterior teeth of carapace (Fig. 6a, 6b).....*Athanas japonicus*
- Cornea of eye concealed in dorsal view and partially to completely concealed in lateral view by hood-like anterior extension of carapace (Fig. 6c).....*Alpheus* ... 2
2. Third pereopod with simple dactylus (Fig. 6d). Stylocerite moderately narrow, reaching to end of first article of attenule. Scaphocerite with outer margin slightly concave (Fig. 6f). Small chela of male bearing non-balaeniceps dactylus. Lateral margin of rostrum often armed with sparse, short setae. (Fig. 6e).....*A. nr pacificus*
- Third pereopod with spatulate dactylus (Fig. 6e). Stylocerite broad, usually with short, stiff setae on its lateral margin; stylocerite not reaching as far as end of first antennular article. Scaphocerite with outer margin concave. Small chela of male bearing typical balaeniceps dactylus (Fig. 6g). Lateral margin of rostrum without setae (Fig. 6h).....*A. richardsoni*

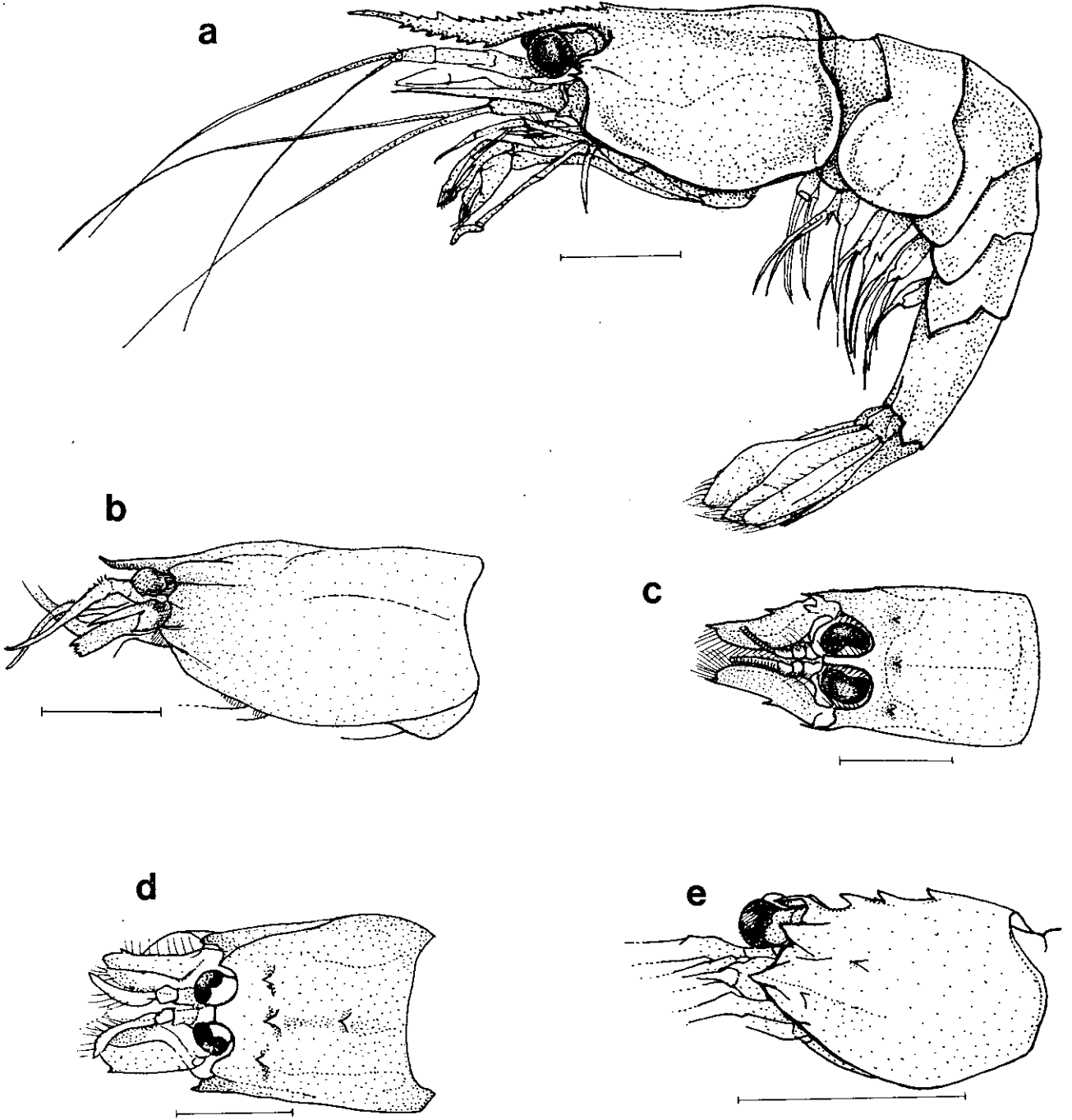


Figure 7. Family Atyidae: *a- Caradina maccullochi*, lateral; Family Crangonidae: *b- Pontophilus* sp. 1 carapace and appendages, lateral; *c- Pontophilus angustirostris* carapace and appendages, dorsal; *d- Pontophilus* sp. 3 carapace and appendages, dorsal; *e- Pontophilus* sp. 2 carapace and appendages, lateral.

Family Atyidae

Caradina maccullochi Rouse, 1926
(Fig. 7a).

Family Crangonidae

Pontophilus angustirostris de Man, 1918
Pontophilus sp. 1
Pontophilus sp. 2
Pontophilus sp. 3

1. Spines present along longitudinal mid-dorsal line of carapace posterior to rostrum.....2
- Spines absent along longitudinal mid-dorsal line of carapace posterior to rostrum (Fig. 7b).....*Pontophilus* sp. 1
2. One spine on mid-dorsal line of carapace (Fig. 7c).
Lateral spine on proximal half of scaphocerite...*Pontophilus angustirostris*
- Two or more spines along mid-dorsal line of carapace..... 3
3. Two spines on mid-dorsal line of carapace. Lateral spine on distal half of scaphocerite (Fig. 7d).....*Pontophilus* sp. 3
- Three spines on mid-dorsal line of carapace (Fig. 7e).....*Pontophilus* sp. 2

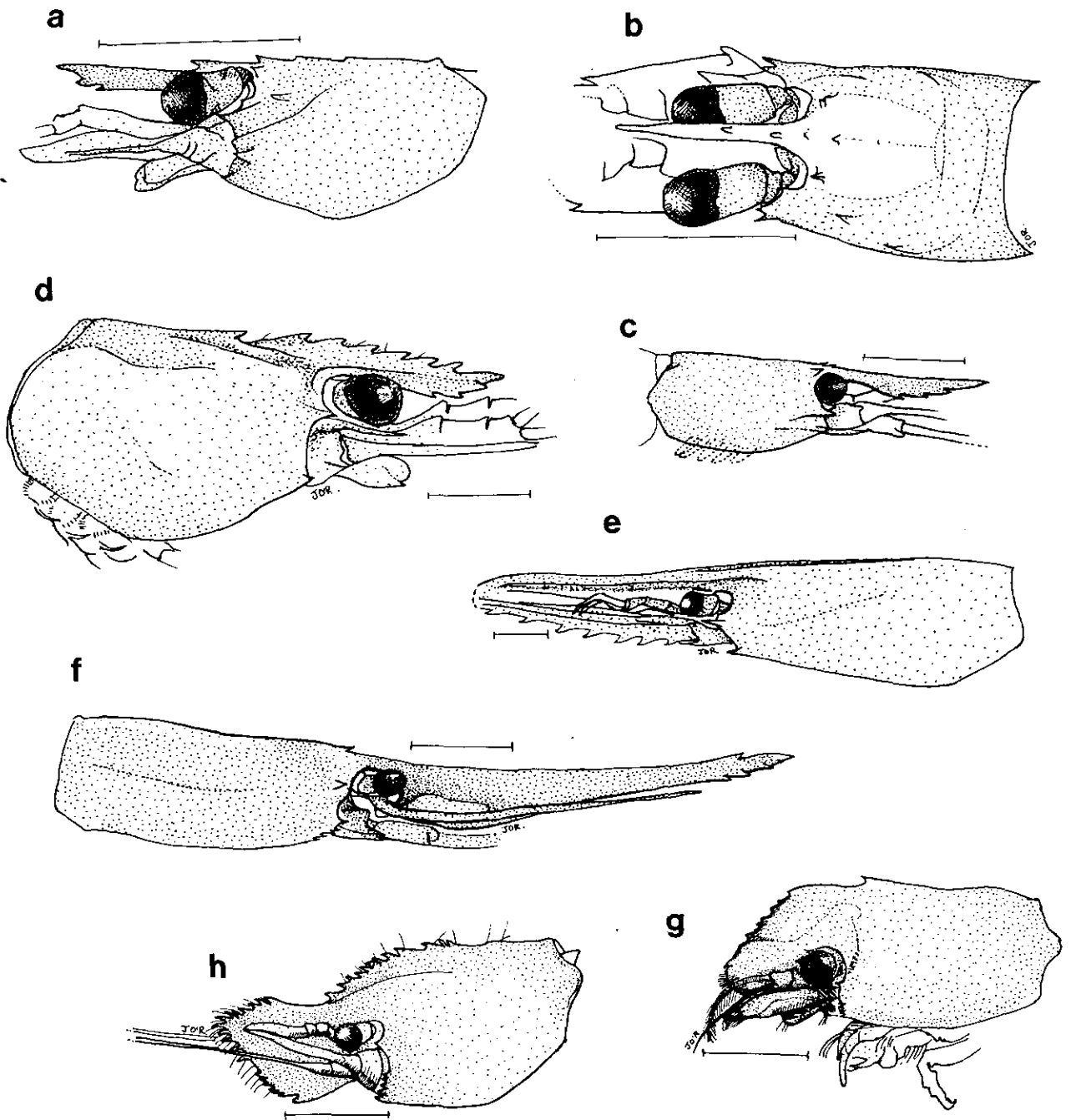


Figure 8. Family Hippolytidae: a- *Hippolyte caradina* carapace and appendages, lateral; b- *H. caradina* carapace and appendages, dorsal; c- *H. nr ventricosus* carapace and appendages, lateral; d- *Hippolysmata (H.) vittata* carapace and appendages, lateral; e- *Angasia nr pavoninum* carapace and appendages, anterior tip of rostrum damaged, lateral; f- *Latreutes pygmaeus* carapace and appendages, lateral; g- *L. compressus* carapace and appendages, lateral; h- *L. nr porcinius* carapace and appendages, lateral.

Family Hippolytidae

Angasia nr *pavonium* (Bate, 1863)
Alope orientalis (de Man, 1890)
Hippolysmata (*Hippolysmata*) *vittata* Stimpson, 1860
Hippolyte caradina Holthuis, 1947
H. nr *ventricosus* Milne-Edwards, 1837
Latreutes compressus (Stimpson, 1860)
L. nr *porcinus* Kemp, 1916
L. pygmaeus Nobili, 1904

1. Mandible with palp of three segments. Carpus of second pereopods with at least seven segments. Supraorbital spines of carapace very large *Alope orientalis* (no figure)
- Mandible without palp..... 2
2. Supraorbital spine present. Mandible with incisor process..... *Hippolyte* ... 3
- Supraorbital spine absent. Mandible without incisor process..... 4
3. Rostrum with (usually) three dorsal teeth and, near the apex, one or two ventral teeth (Fig. 8a, 8b). Third abdominal segment markedly humped..... *H. caradina*
- Rostrum with two dorsal teeth and produced ventrally into a thin keel bearing two to six teeth (Fig. 8c)..... *H.* nr *ventricosus*
4. Carpus of second pereopod with more than three segments (Fig. 5a). Small pterygostomial spine present on carapace (Fig. 8d)..... *Hippolysmata* (*H.*) *vittata*
- Carpus of second pereopod with three segments..... 5
5. Third maxilliped without exopod. Single well-developed pterygostomial spine. Dorsal margin of carapace and rostrum without teeth (Fig. 8e)..... *Angasia* nr *pavonium*
- Third maxilliped with exopod (like Fig. 9a). Series of small spines on anterolateral margin of carapace..... *Latreutes* ... 6
6. Rostrum toothed only near apex and a single tooth above the posterior orbit. Body slender. Distal tip of second pereopod not extending as far as anterior cornea (Fig. 8f)..... *L. pygmaeus*
- Rostrum toothed on most of its margin. Body stout. Distal tip of second pereopod extending as far as anterior surface of cornea..... 7
7. Carapace with a single stout dorsal tooth posterior to orbit (Fig. 8g)..... *L. compressus*
- Carapace with series of dorsal teeth posterior to orbit (Fig. 8h)..... *L.* nr *porcinus*

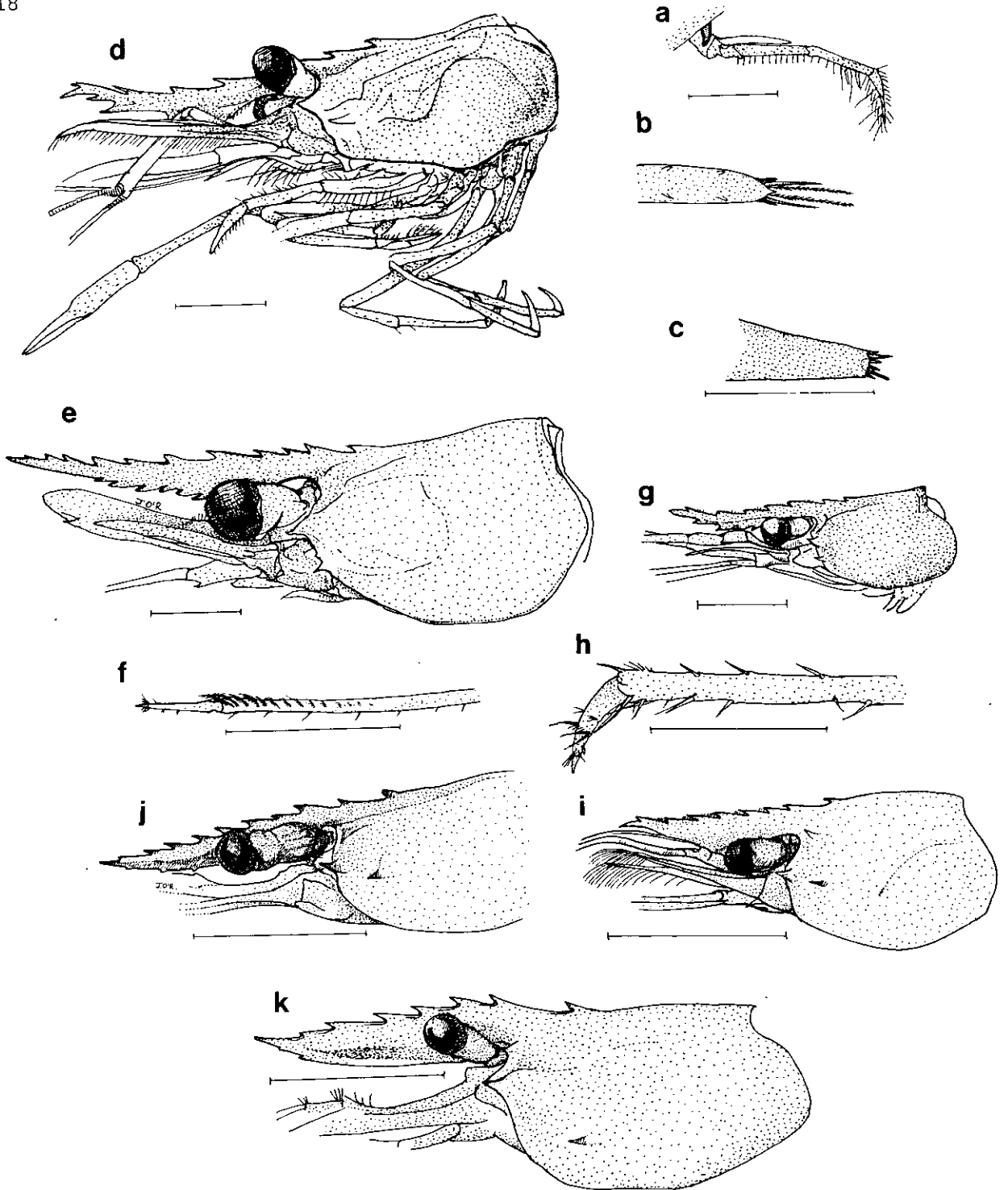


Figure 9. Family Palaemonidae: *a*- *Macrobrachium intermedium* third maxilliped with pleurobranch (in heavy lines) and exopod, lateral; *b*- hypothetical telson with two pairs of spines and one pair of setae on posterior margin, dorsal; *c*- *Periclimenes* (*P.*) *nr obscurus* telson with three pairs of spines on posterior margin, dorsal; *d*- *M. intermedium* carapace and appendages, lateral; *e*- *Palaemon debilis* carapace and appendages, lateral; *f*- *P. debilis* fifth pereiopod, propodus and dactylus; *g*- *P. serenus* carapace and appendages, lateral; *h*- *Leander tenuicornis* fifth pereiopod, propodus and dactylus; *i*- *Periclimenes* (*Harpilius*) *nr andamanensis* carapace and appendages, lateral; *j*- *Periclimenes* (*P.*) *holthuisi* anterior carapace and appendages, lateral; *k*- *Periclimenes* (*P.*) *nr obscurus* carapace and appendages, lateral.

Family Ogyrididae

Ogyrides delli Yaldwyn 1971

Carapace with 4-7 movable spines in midline posterior to rostrum; rostrum short, triangular. Eystalks reaching to end of antennular peduncles. Second pereopod with five carpal subsegments.

Specimens of this species have been sent to A.H. and D.M. Banner and are figured in Banner and Banner (in press).

Family Palaemonidae

Subfamily Palaemoninae

Leander tenuicornis (Say, 1818)

Macrobrachium intermedium Stimpson, 1860

Palaemon debilis Dana, 1852

P. serenus (Heller, 1865)

Subfamily Pontoniinae

Periclimenes (Harpilius) nr andamanensis Kemp, 1922

Periclimenes (Periclimenes) holthuisi Bruce, 1969

Periclimenes (P.) nr obscurus Kemp, 1922

1. Third maxilliped with pleurobranch (Fig. 9a).
Posterior margin of telson with two pairs of spines and one or more pairs of setae (Fig. 9b). First antenna with three flagella.....Subfamily Palaemoninae ... 2
- Third maxilliped without pleurobranch. Posterior margin of telson with three pairs of spines (Fig. 9c). First antenna with two flagella.....Subfamily Pontoniinae ... 5
2. Branchiostegal spine absent (Fig. 9d). Mandible with three-jointed palp.....*Macrobrachium intermedium*
- Branchiostegal spine present..... 3
3. Propodus of fifth pereopod with transverse rows of setae distally (Fig. 9f). Median telsonic spines slender.....*Palaemon* ... 4
- Propodus of fifth pereopod without transverse rows of setae distally. Median telsonic spines stout.....*Leander tenuicornis*
4. Second pereopod with carpus longer than chela. One postrostral tooth posterior to orbit (Fig. 9e).....*P. debilis*
- Second pereopod with carpus shorter than chela. Two postrostral teeth posterior to orbit (Fig. 9g).....*P. serenus*
5. Supraorbital spine present (Fig. 9i).....*Periclimenes (H.) nr andamanensis*
- Supraorbital spine absent.....*Periclimenes (Periclimenes)* ... 6
6. Two postrostral teeth posterior to orbit. Rostrum slender (Fig. 9j).....*Periclimenes (P.) holthuisi*
- One postrostral tooth posterior to orbit. Rostrum moderately deep (Fig. 9k).....*Periclimenes (P.) nr obscurus*

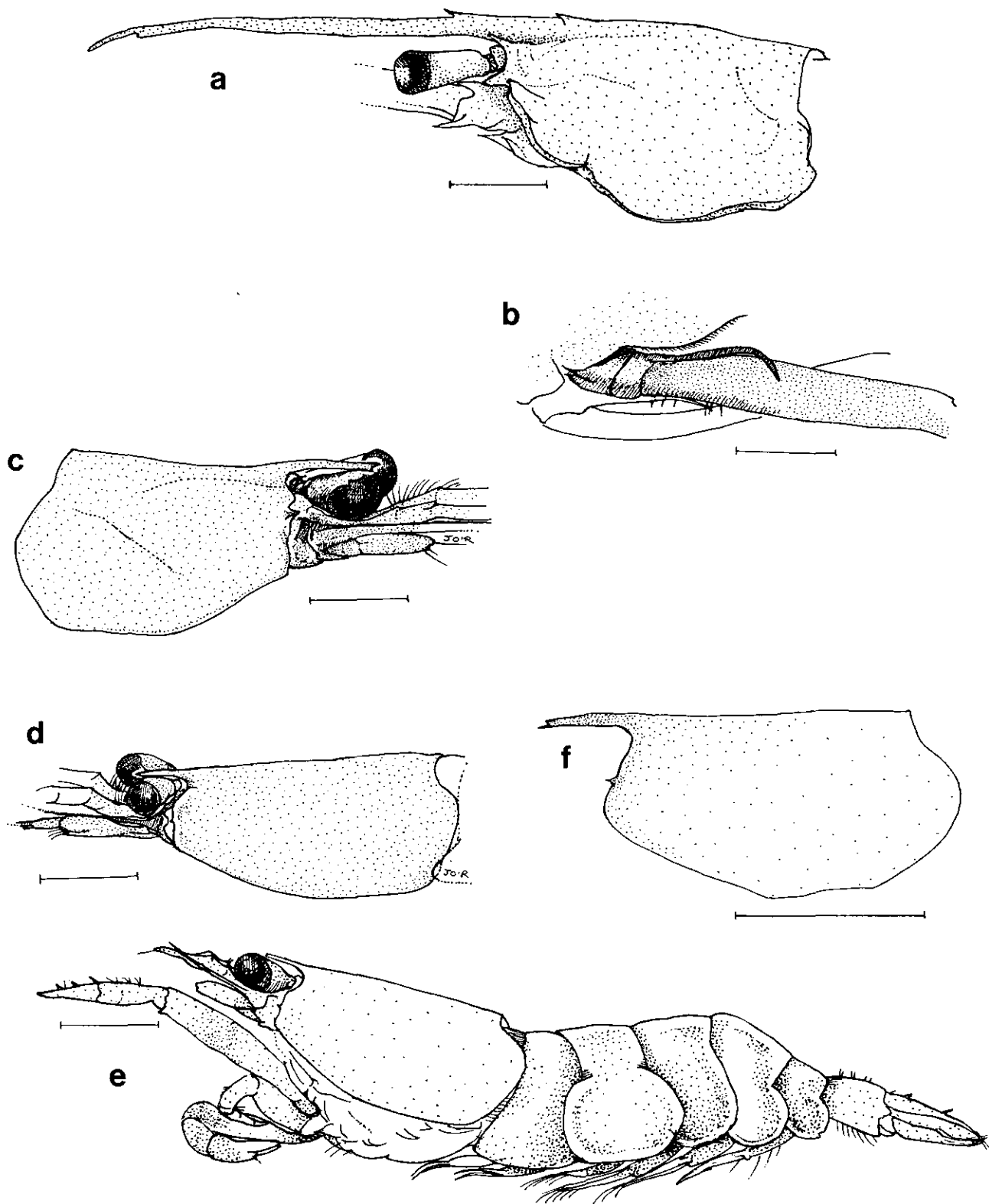


Figure 10. Family Pandalidae: a- *Chlorotocella gracilis* carapace and appendages, lateral; Family Processidae: b- *Nikoidea danae* proximal part of first pereiopod with exopod; c- *N. danae* carapace and appendages, lateral; d- *Processa japonica* carapace and appendages, lateral; e- *P. sulcata*, lateral, pereiopods missing; f- *P. dimorpha* outline of carapace.

Family Pandalidae

Chlorotocella nr *gracilis* Balss, 1914
(Fig. 10a)

Family Processidae

Nikoides danae Paulson, 1875
Processa dimorpha Hayashi, 1975
P. japonica (de Haan, 1844)
P. sulcata Hayashi, 1975

1. Exopod present on first pair of pereopods (Fig. 10b). Rostrum long, apex bifid. Pleuron of fifth abdominal segment pointed but not acute (Fig. 10c).....*Nikoides danae*
- Exopod absent from first pair of pereopods.....*Processa* ... 2
2. Third maxilliped without exopod. Rostrum short, triangular in dorsal view (Fig. 10d).....*P. japonica*
- Third maxilliped with exopod..... 3
3. Pleuron of fifth abdominal segment with posterolateral spine. Triangular process on posterior margin of pleuron of sixth abdominal segment. (Fig. 10e).....*P. sulcata*
- Pleuron of fifth abdominal segment without posterolateral spine. Triangular process absent on posterior margin of pleuron of sixth abdominal segment (Fig. 10f).....*P. dimorpha*

GLOSSARY OF TERMS USED IN THE KEY

(see also Figure 2)

| | |
|----------------------|---|
| balaeniceps | shaped like the jaws of a baleen whale |
| bifid | forked, divided into two |
| chelate | claw or pincer-like |
| cornea | transparent covering on anterior surface of eyeball |
| endopod | inner branch of biramous limb |
| epipod | process arising from basal joint of limb, usually extending into gill chamber |
| exopod | outer branch of biramous limb |
| mandible | paired mouthpart comprising jaw |
| maxilliped | paired mouthpart posterior to maxilla (upper jaw); third maxilliped is anterior to first pereopod |
| orbit | cavity in carapace from which eyestalk arises |
| pereopod | walking limb |
| pleopod | swimming limb |
| petasma | male reproductive appendage |
| pleurobranch | gill originating on lateral wall of body, beneath carapace |
| pleuron | side of abdominal segment |
| pterygostomial spine | spine on anterolateral corner of carapace |
| scaphocerite | scale-like exopodite of second antenna |
| seta | bristle |
| stylocerite | leaf-like exopodite of first antenna |
| subchelate | imperfectly chelate; almost pincer-like |
| spathulate | spoon-shaped |

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