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**Cirolanidae (Crustacea: Isopoda)
of Australia**

NIEL L. BRUCE

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To Tom,
with very many thanks
for your continuing help and
assistance.

My very best wishes to you

Neil



CIROLANIDAE (CRUSTACEA : ISOPODA) OF AUSTRALIA

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ABSTRACT. An account is given of the cirolanid fauna of Australia. The total number of species recorded is 102, of which 51 are new. Two new species not yet recorded from Australian coastal waters are also included. Full descriptions of all genera are given, and detailed descriptions and figures are given for all species not previously recorded from Australia or in need of redescription. The following genera and species are recorded from Australian waters: *Anopsilana* (2 species), *Bathynomus* (3 species), *Cartetolana* (1 species), *Cirolana* (30 species), *Eurydice* (8 species), *Eurylana* (1 species), *Excirolana* (1 species), *Hansenolana* (1 species), *Metacirolana* (7 species), *Natanolana* (31 species), *Neocirolana* (5 species), *Orphelana* (1 species), *Pseudolana* (7 species), and three new genera—*Booralana* (2 species), *Dolicholana* (1 species) and *Limicolana* (1 species).

Keys to the Australian genera and species are provided. Discussion on characters of taxonomic utility is given. Annotated lists for all non-Australian genera and species are provided, and brief notes on the natural history of the family are provided.

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Australia occupies a geographic position of some significance; its northern shores are at the centre of the Indo-West Pacific Region, the western and eastern coasts are on the Indian and Pacific Oceans respectively, and the southern coasts are adjacent to the sub-antarctic seas. Taxonomic research in Australia has profound significance for these areas as, without exception, their shallow-water peracarid faunas are poorly known.

Although the peracarid crustacean fauna of Australia has been perhaps better studied than that of adjacent areas, the extent of our knowledge has, until very recently, been extremely limited. This is clearly demonstrated by the work of J.L. Barnard and Margaret M. Drummond in their continuing series of publications on the Australian Amphipoda (Barnard, 1972, 1974; Barnard & Drummond, 1978, 1979) in which they have recorded 278 species, of which 181 (65%) are new. These studies deal only with the southern half of Australia, and demonstrate the variety to be expected.

The only other peracarid order to receive detailed attention is the Cumacea, revised by Hale in a long series of papers up to the early 1950's (Hale, 1951, 1953). The Tanaidacea have received no recent treatment other than that of Boesch (1973). The Mysidacea are equally poorly known, the recent catalogue provided by Mauchline & Murano (1977) listed only fifteen species from Australian waters. Until recently our knowledge of

Australian Isopoda was in a similarly poor state.

Of the shallow-water marine isopod families, the Cirolanidae are second in number of genera and species only to the Sphaeromatidae. On a world wide basis, the study of isopod taxonomy in the tropics and subtropics is still in its infancy. As marine invertebrate taxa often reach their greatest diversity in tropical areas, Australia seemed a particularly appropriate place to undertake a monographic study of such a family. In Australia, the standard works of reference to the Cirolanidae and related families were those of Hale (1925, 1926, 1940). From the time of Hale to the first of the present series of articles that I published on the Cirolanidae (Bruce, 1979) only one new species of cirolanid was recorded from Australian waters (Griffin, 1975). Effectively, Australian cirolanids were little studied.

MATERIALS AND METHODS

Specimens for study were obtained by personal collecting on the Great Barrier Reef (intertidally, and subtidally using SCUBA), from sand beaches of southeastern Queensland and northern New South Wales, and general intertidal collecting at various localities around Australia. The bulk of the material was obtained on loan from the various state museums, and also museums abroad. Type specimens were studied, where available, of all *Natatolana* from the Indo-

Pacific, north-western Pacific and southern Oceans. Type specimens of most central Pacific and Indonesian Cirolanidae were also examined.

For each genus there is a diagnosis, giving characters that allow rapid identification, and 'additional characters' including all characters typical of the entire genus.

In the account of each species is a section that includes all the available data for the specimens examined. With type localities of new species, I have attempted to restrict the position by giving approximate coordinates in the section 'Type locality'. To avoid repetition, data for the Crib Point Environmental Survey is tabulated in the appendix; data for the Port Phillip Bay survey is given in Poore et al. (1975). Up to mid-1982, a total of over 3,000 specimens had been examined.

The description of each new species is taken from the holotype and a matched dissected paratype. Where material was limited, the holotype has been partially dissected. In all new species descriptions, whole animal figures are of the holotype.

Beaches were surveyed using a 1.0 mm mesh sieve. On beaches of coarse sand, the substratum was sieved thoroughly, then deposited into a bucket. Cirolanids generally swim to the surface before burrowing back into the sand. Coral reefs were sampled by extracting the macrofauna of dead coral rocks, night-lighting for plankton, sieving sandy substrata and examining sponges and algae. The last three habitats yielded few cirolanids, and were eventually ignored.

Only figures and remarks essential for identification are given for species which have already been described in detail and for which no new data are being offered.

The length of an animal varies somewhat, depending on the degree of stretching or contraction at death. Measurements were taken through the eye, coxae and along the pleotelson. Small specimens were measured using a micrometer eye piece, those larger than 40 mm were measured with a millimetre rule. On curved specimens, the measurements were generally taken as two straight lines from pereonite 4 or 5.

The names proposed for new species have been derived from four specific sources. Aboriginal names were obtained from 'Aboriginal Words of Australia', 'Aboriginal Place Names of Australia' (Anon, 1965, 1967) and McCarthy (1971). Classical names were derived from Brown (1956).

ABBREVIATIONS

AM	Australian Museum, Sydney
AMSBS	Australian Museum Shelf Benthic Survey
BM(NH)	British Museum (Natural History), London
CPBS	Crib Point Benthic Survey
CSIRO	Commonwealth Scientific and Industrial Research Organization
HDWBS	Hunter District Water Board Survey
JCUNQ	James Cook University, North Queensland
MNHN	Museum Nationale d'Histoire Naturelle, Paris

NLB	N.L. Bruce
NMV	Museum of Victoria, Melbourne
NSW	New South Wales
NT	Northern Territory
NTM	Museum and Art Galleries of the Northern Territory, Darwin
ovig.	ovigerous
PPB	Port Phillip Bay, Victoria
Qld	Queensland
QM	Queensland Museum, Brisbane
SA	South Australia
SAM	South Australian Museum, Adelaide
Tas.	Tasmania
TM	Tasmanian Museum and Art Gallery, Hobart
USNM	National Museum of Natural History, Smithsonian Institution, Washington
Vic.	Victoria
WA	Western Australia
WAM	Western Australian Museum, Perth
WBES	Western Port Bay Environmental Survey
WP	Western Port, Victoria
ZMUC	Zoologisk Museum, University of Copenhagen

REVIEW OF CIROLANID TAXONOMY

The subfamily Cirolaninae was established within the Cymothoidae by Dana (1852), elevated to family rank by Harger (1880) and first revised by Hansen (1890). Hansen (1905) later published a separate account of the family, treating only those species found off European coasts. These two works established the character of the family, even though the family and generic diagnoses lacked precision by present standards. They represent the first comprehensive treatments of the family, and were the first that recognised that clear divisions could be distinguished within the largest genus, *Cirolana*.

Between 1890 and 1912, various workers published descriptions of genera and species. There were only two major contributors. Richardson (1905) reviewed the isopod fauna of America (including 24 species of Cirolanidae) and also recorded species from Japan (Richardson, 1904a) and the Philippines (Richardson, 1910). Stebbing (1900 to 1910b) contributed a series of excellent papers (mainly on Indian Ocean isopods) in which he described three new genera and eleven species of Cirolanidae.

Racovitza (1912) gave a superb review of the family, a work that seems never to have received the recognition it deserves. It is possible that it has been overlooked because it dealt largely with troglobitic species, whereas most isopod systematists work primarily on the marine fauna. In this study, Racovitza covered six important points which are listed below, together with comments of my own in parentheses:

1. The correctness of the family name Cirolanidae. (Use of the family name Eurydicidae Stebbing persisted until 1971.)

2. The usefulness of mouthpart morphology. (The

morphology of mouthparts was and still is frequently ignored by authors describing species of Cirolanidae.)

3. Morphological character assessment suggested that the Cirolanidae is the most primitive of isopod families, not the most advanced of the Crustacea as suggested by Schioedte (1868).

4. Most cirolanid genera would be found to possess a sixth peduncular article to the antenna as proposed by Hansen (1903). (Authors up to the late 1970's have been confused over this point.)

5. The genus *Cirolana* of Hansen (1890, 1905) "n'est pas une coupe generique", there are distinct lines within the genus that should be defined and Hansen's (1890, 1905) sections ought to be established as genera. Racovitza supplied a list of the most useful characters to use, including frontal lamina, antennae and pereopods. (Racovitza's considerations have received little attention from taxonomists working on cirolanids.)

6. Racovitza established the following subfamilies for the existing genera, except for *Pseudaega* which was not mentioned: Bathynominae (*Bathynomus*); Eurydicinae (*Eurydice*, *Pontogelos*); Colopistinae (sic) (*Colopisthus*); Hansenolaninae (*Hansenolana*, and two new genera to be created for *Metacirolana sphaeromiformis* and *M. hansenii*); Faucheriinae (*Faucheria*); Cirolaninae (*Cirolana*, *Annina*, *Cirolanides*, *Conilera* and *Typhlocirolana*).

The establishment of these six subfamilies is of special importance as these subdivisions were used, virtually unaltered, by Monod (1930) in the last classificatory work on the family. In spite of the statement that he had no intention of going into detail over the classification of the family, Monod (1930: 130) went on to offer a wealth of opinion and considerations. He discussed the impossibility of defining Racovitza's subfamilies, relegated them to "groups", warned against the conservation of overly large, ill-defined genera, and showed how the inadequacy of many previous descriptions had hampered progress in classifying cirolanid genera.

The greatest influence on the classification of cirolanid genera was affected by Monod's (1930) expansion and clear presentation of Racovitza's subdivisions. Although these groups of genera remained undefined and, in most cases, a rationale for placing a genus within a group was not given, this scheme gained immediate acceptance because it provided a framework within which authors could place new genera. This scheme was again presented unchanged by Monod (1971a) and later expanded to include 27 genera (Monod, 1972). The only author to question the integrity and homogeneity of these groups was Monod (1971a, 1972) himself.

Bowman (1975) provided fresh insight into the classification of cirolanid genera when he arranged the genera according to degree of pleonite fusion. This was not proposed as an alternative to the existing scheme but it did bring attention to a character of fundamental importance that had been largely overlooked in the past.

KEY WORKS ON THE CIROLANID FAUNA OF MAJOR GEOGRAPHICAL AREAS

Europe and the Mediterranean. Reviewed by Hansen (1890, 1905); later contributions by Jones (1969, 1979a) and Jones & Naylor (1967, on British *Eurydice*); Monod (1930) reviewed the Cirolanidae of Europe and North-west Africa.

Northern America. Richardson (1905) covered previous work, whilst Schultz (1969) provided a more recent catalogue. Recent publications include Bowman (1975, 1977a), Bowman et al. (1981), Bruce (1985), Brusca & Ninos (1978) and Cole & Minckley (1970).

South America. a) Caribbean. Reviewed by Menzies & Glynn (1968). Recent articles are those of Botosaneanu & Stock (1979), Bowman (Bowman & Franz, 1982; Bowman & Iliffe, 1983), Bruce (Bruce, 1985; Bruce & Bowman, 1982), Notenboom (1981), Carpenter (1981), Menzies & Kruczynski (1983) and Kensley (1984a).

b) Atlantic. No comprehensive revisions have been undertaken. Articles published include Lemos de Castro and Silva Brum (1969) (review of the genus *Exciorolana*), Koenig (1972), Lemos de Castro & Lima (1976) and Moreira (1972) (dealt with *Eurydice*).

c) Pacific. Carvacho (1977) reviewed previous works; Brusca & Iverson (1985) recorded the Pacific species from Costa Rica.

West Africa. Fauna very poorly known with about four species recorded. Papers contributed by Brian & Darteville (1949), Monod (1931, 1952, 1976) and Bruce (1982b).

South Africa. Kensley (1978c) reviewed all previous records; also Kensley 1984b.

East Africa. Contributions from Budde-Lund (1908), Bruce (1981c) and Jones (1971, 1976).

Red Sea. Previous knowledge summarised by Bruce & Jones (1978).

India. Poorly known, the most comprehensive work being that of Pillai (1967). Hamsa & Nammalwar (1978) provided a key to the *Cirolana* species of India, but their literature coverage was incomplete. Contributions from Barnard (1935, 1936) and Eleftheriou & Jones (1976).

Tropical Pacific. There exists a dearth of information on this vast area. There are contributions from Richardson (1910) on the Philippines, Nordenstam (1946) on the central South Pacific, while Nierstrasz (1930, 1931) described species from the Indonesian area, as well as cataloguing all the known Indo-Pacific species (Nierstrasz, 1931). Bruce (1982a) reviewed the cirolanid fauna of the Papua New Guinea region.

North-west Pacific. Bruce & Jones (1981) reviewed Japanese cirolanids, while Kussakin (1979) covered the Russian coasts; recent contributions by Nunomura (1981a, b, 1982, 1984, 1985).

NATURAL HISTORY

There is little information on the ecology of cirolanids from areas other than sand beaches. Most data are concerned with a limited number of species of the genera *Eurydice* and *Excirolana*. Brief ecological notes on other species from coral reef and rocky shore habitats have been given by Jones (1976), Bruce (1980a, b) and Bruce & Jones (1981). The distribution of Australian cirolanid genera amongst habitat types is shown in Table 1.

Cirolanids are a characteristic component of the sand beach fauna, and in Australia the representative sand beach genera are *Pseudolana* and *Excirolana*. *Eurydice*, which is common on the sand beaches of Europe (Jones, 1969; Jones & Naylor, 1967), the Indian Ocean (Jones, 1971, 1974; Eleftheriou & Jones, 1976) and Japan (Bruce & Jones, 1981) is known only from subtidal sediments in Australia. Jones (1971, 1974) and Dexter (1977) have demonstrated that there is no universal 'cirolanid-zone' on sand beaches, and that cirolanids may be found at any level or all levels of a sand beach. Where several cirolanid species occur on a single beach, species may segregate and minimise their areas of overlap. Species have been shown by Jones (1971) and Eleftheriou & Jones (1976) to prefer beaches of a characteristic sand particle size, degree of exposure and position on the beach. Dexter (1977) has shown that in *Excirolana braziliensis* there is a maturity-related distribution on a beach, with adults occurring at higher tide levels and manca at lower tide levels. In Australia, Dexter (1983b) has shown that *Pseudolana* species segregate according to the degree of wave action on a particular beach.

On coral reefs, cirolanids are found primarily in crevices, vacant burrows and in cracks in dead coral rock. The representative genera occupying these habitats

are *Cirolana*, *Hansenolana*, *Metacirolana* and *Neocirolana*. The genera *Eurydice* and *Natatolana* occur in the sediments off the reef itself. On the reef flat at Heron Island, no cirolanids were found in the sediments. The most abundant coral-reef cirolanids are members of the *Cirolana parva* complex of species.

The subtidal and continental shelf sediment is richly populated by cirolanids, and is the major habitat recorded for the genus *Natatolana*. A total of 11 genera and 57 species have been taken from these habitats in Australia (Table 1).

Mangroves and the estuarine reaches of rivers and creeks are not rich in cirolanid species. In low and variable salinity habitats, *Anopsilana* is commonly found in dead wood bored by *Sphaeroma* or *Teredo*. In north-western Australia and the Northern Territory, *Limicolana* has been taken from burrows in mangrove mud. Less commonly, species of the *Cirolana parva* group are taken where freshwater influence is slight. In the more saline reaches of rivers or estuaries, species of *Pseudolana*, *Natatolana* and *Cirolana* have been taken from the subtidal sediments.

In subtropical and temperate waters of Australia, the cirolanid-rich intertidal and subtidal habitats of coral reefs and mangrove estuaries are reduced or absent, and the number of cirolanid species consequently drops. On temperate rocky coasts, large algae are a prominent feature. Although cirolanids are not generally associated with algae, they have been taken from amongst algal holdfasts, and in South Africa *Cirolana imposita* is common in this habitat (Shafir & Field, 1980). On rocky shores, cirolanids (mainly *Cirolana* species) will generally be found in any situation that provides refuge. Typical examples are in rock crevices, under rocks, amongst the massed remains of dead barnacles, dense

Table 1. Distribution of Australian cirolanid genera among various habitats. (+ indicates the presence of a genus in a particular habitat, blank denotes absence of records) **A:** intertidal, **B:** subtidal (0-200 m), **C:** coral reefs, **D:** sand beaches, **E:** subtidal sediments, **F:** mangrove mud, **G:** estuarine, **H:** dead wood, **I:** rocky substrata, **J:** continental slope (200-1000 m).

	A	B	C	D	E	F	G	H	I	J		
<i>Eurydice</i>		+			+		+					Sand beach dwellers in northern hemisphere
<i>Excirolana</i>	+			+								Sand beaches
<i>Pseudolana</i>	+	+		+	+		+					Sand beaches, and shallow subtidal
<i>Eurydiana</i>	+											On sand beaches in New Zealand and New Guinea
<i>Metacirolana</i>	+	+	+		+					+	+	In Australia, primarily a coral reef genus
<i>Bathynomus</i>		+									+	Deep on the continental slope, taken in trawls
<i>Cirolana</i>	+	+	+		+		+	+	+	+		
<i>Anopsilana</i>	+						+	+				In tropical rivers and creeks
<i>Neocirolana</i>		+	+		+					+		
<i>Hansenolana</i>	+		+				+	+				
<i>Booralana</i>		+									+	Known only from baited traps
<i>Orphelana</i>		+			+							
<i>Natatolana</i>		+			+		+				+	Subtidal sediments
<i>Dolicholana</i>		+			+						+	
<i>Cartetolana</i>		+										A commensal of crinoids
<i>Limicolana</i>	+					+						Burrows in mangrove mud

mussel clumps and in clumps of coralline algae. Rocky-shore species are not usually found in sedimentary habitats.

Most cirolanids are taken on the continental shelf; only 11 of the 102 species recorded here having been collected at depths greater than 200 metres. Six of these are *Natatolana* species. In general, cirolanids are scarce at depths beyond 20 metres, although this may be in part due to lack of collecting effort. Two species (*Natatolana bowmani* and *N. laewilla*) have been taken between 900 and 1200 metres, the greatest depth known for any cirolanid in Australia, and in the world only exceeded by records of *Bathynomus giganteus* and *Natatolana caeca*.

In Australia, no cirolanid has yet been collected from permanent freshwater. The genus *Anopsilana* penetrates at least to the upper limits of mangrove distribution, and species of *Anopsilana* and *Pseudolana* will inhabit creeks that at low tide have only pure fresh water flowing. In contrast, the family is well represented in the freshwater of springs, wells and caves in Africa, Europe, the Middle East, Caribbean and southern United States. In most cases these species are found in areas which were, in prehistoric times, inundated by the sea (Bowman, 1964; Botosaneanu & Stock, 1979). Such areas do exist in Australia.

To obtain quantitative data from hard substrata is difficult and, unlike sand beaches, may involve the destruction of the substratum being sampled. Hutchings (1978) has described the problems encountered in trying to obtain quantitative samples from coral reef rock. On Heron Island, the numbers of cirolanids obtained per coral rock sample (enough coral to fill a 5 litre bucket) were so low as to preclude statistical analysis. Of the eight species collected from coral rock at Heron Island, three are known from less than five specimens, and two more are known from less than 12 specimens.

Records of cirolanid population densities have mainly been recorded for species inhabiting particulate substrata. Hewatt (1937) recorded *Cirolana harfordi* at densities up to 12,600 per m², and Dexter (1977) gave figures between 2,000 per m² and 6,000 per m² for *Exciorolana braziliensis*. Jones (1971) found that the greatest number of cirolanids on a 200 metre beach transect in Kenya was 46. On beaches around Sydney, Dexter (pers. comm.) has found that *Pseudolana towrae* occurs at an average density of 44 per m², while *P. concinna* averaged between 76 per m² and 266 per m².

Little data exist for the density of subtidal species, although some, such as *Natatolana variguberna* are clearly abundant in the near shore sediments (Holdich et al., 1981). From material obtained by the extensive collections of the Port Phillip Bay and the Western Port surveys (Poore et al., 1975), estimates of densities can be made for *Natatolana longispina* and *N. wowine*. These appear to occur regularly at densities of 10 to 30 per m² but occasionally peak at about 1,000 per m².

Although these high figures suggest that cirolanids occur in large numbers, most species have to be considered scarce. Of the species dealt with here, 83

(81.4%) are known from less than 50 specimens and 57 (55.9%) are known from 12 or less. Species likely to be found occurring in large numbers include members of the *Cirolana parva* group, various *Natatolana* species, and sand beach species.

Cirolanids have for a long time been considered as parasites of fish, as they were commonly found attached to fish, especially fish caught in nets. Stebbing (1893) gave a vivid account of cirolanid feeding habits, describing *Natatolana borealis* as "a savage devourer of fish", *Politolana concharum* as feeding "sweetly" on crabs, and *Eurydice* as a "vicious biter". *Conilera*, however, Stebbing referred to as "parasites". In spite of the clear documentation of cirolanids as predatory scavengers (Hale, 1925, 1929b; Jones, 1968; Sekiguchi, 1982; Sekiguchi et al., 1981, 1982), reference to cirolanids as parasites has been persistent (Menzies et al., 1955; Naylor, 1972), with Moreira & Sadowsky (1978) listing six species as parasites of elasmobranchs.

Hale (1925, 1929b) described how the cleaning of skeletons for zoological collections can be achieved by immersion of the specimen at a locality where cirolanids are abundant. Hale (1929b) also described cirolanids attacking and killing sharks, bringing about the collapse of the South Australian shark fishery. Recently cirolanids have been reported as attacking netted sharks (Sekiguchi et al., 1981) and also killing them by eating their way into the shark's vital organs (Bird, 1981).

Brusca (1981) stated that cirolanids are primarily benthic scavengers and predators, attaching temporarily to fish from which they extract a meal. Brusca (1981) also referred to cirolanids as benthic scavengers, predators and micropredators. There are very few descriptive accounts of the mode of feeding, and therefore many assessments of their feeding habits (especially with regard to live fish) are speculative. Jones (1968) reported that *Eurydice* will attack living animals of almost every phylum. Holdich (1981) has described how *Eurydice* swims in the swash zone, or emerges from freshly wetted sand to catch stranded terrestrial arthropods. Results of traps set for cirolanids as well as the occurrence of cirolanids on anglers' baits, in crab and lobster pots and on netted fish, all support the suggestion that they appear to be opportunistic predatory scavengers. Genera taken in traps include *Cirolana*, *Pseudolana*, *Eurylana*, *Exciorolana*, *Natatolana*, *Booralana* and *Anopsilana*. *Bathynomus immanis* specimens were caught while apparently feeding on fish in the trawl, as has been reported for *B. giganteus* by Holthuis & Mikulka (1972).

Certain genera are never caught in baited traps. At Heron Island, traps were set in areas where *Metacirolana* species were known to occur, yet species of this genus were never taken, no matter which bait was used. This suggests that *Metacirolana* may be less of a scavenger than *Cirolana*. Similarly, I have not been able to trap *Eurydice*, and the accounts of Jones (1968) and Holdich (1981) suggest that species of this genus are primarily opportunistic predators rather than scavengers.

Cirolanid isopods have rarely been recorded as the food item of any other animal. Likely predators of intertidal species would include birds and fish (Johnson, 1976a). Jones (1968) recorded *Eurydice* as being cannibalistic. Amongst the specimens I examined, two specimens of an unidentifiable *Natanolana* species were from the gut contents of a scombroid fish, and I have seen two specimens of *Natanolana woodjonesi* taken from the gut of *Sillago schombergi* (Family Sillaganidae). Shafir & Field (1980) considered predation an important factor in mortality of *Cirolana imposita*, but did not support their assertion with any data.

Of all the species of Cirolanidae, only *Cartetolana integra* appears to have an obligate association as a symbiont. This species is found only on crinoids, although the range of crinoid host species is not known. Collection data and Potts (1915) suggest that it inhabits the aboral surface of the host, and also enters the anal cavity. *Neocirolana hermitensis*, from collection data, is known to associate with hermit crabs of the genus *Dardanus*.

A few organisms occur as commensals or epibionts of cirolanids. Two species of barnacles have been reported from *Bathynomus giganteus* by Holthuis & Mikulka (1972), *Dichelapsis bathynomi* Annandale, and *Octolasmis aymoni* (Lessona & Tapparone-Canafri) (see Newman, 1967). *Bathynomus pelor* had numerous lepadid barnacles on the pereopods and tergites; these barnacles (kindly identified by Dr B.A. Foster) belong to the widely distributed species *Temnaspis excavatum* (Hoek). Other organisms occasionally found on cirolanids include serpulid worms, hydroids and algae. *Pseudolana* are, in some localities, infested by a stalked ciliate protozoan (pers. obs.), also recorded as an ectobiont on *Exciorolana chiltoni* by Klapow (1972). Nielsen & Stromberg (1965) recorded an unnamed species of Cryptoniscinae (Isopoda, Epicarida) from *Natanolana borealis*, and I have seen the larvae of cryptoniscan isopods on several species of Australian cirolanids. Pillai (1963) described the only adult cryptoniscan recorded from a cirolanid, *Cirolaniscus willeyi* Pillai, taken from the brood pouch of a single female of *Anopsilana willeyi*.

DISTRIBUTION

Discussion of the wider distribution of the Australian cirolanid fauna is, due to the dearth of data from adjacent oceans, largely meaningless. At present over 86% of Australian species are endemic. Of the 16 genera, only 3 are endemic; *Limicolana* n. gen., *Orphelana* and *Pseudolana*. The extent to which those species and genera recorded from Australia extend into the Indian and Pacific Oceans simply is not known.

Of the non-endemic Australian species *Dolicholana elongata*, *Anopsilana pustulosa*, *A. willeyi*, *Natanolana albicaudata*, *Hansenolana anisopous* and *Exciorolana orientalis* all have wide Indo-West Pacific distributions. *Metacirolana japonica* has been recorded from northern New Zealand, northwards along eastern Australia and

Indonesia to Japan. *Eurydice orientalis* has also been recorded from the central Indo-West Pacific but the extent of its range is uncertain. *Cirolana harfordi* has a discontinuous distribution with two disjunct North Pacific populations and a southern Australian population. *Eurylana arcuata* occurs in New Zealand, the United States west coast and south-eastern Australia, but the wide distribution of this species is probably due to ship borne introductions (Bowman et al., 1981).

Within Australia, species commonly have distributions that extend along south-eastern (New South Wales and Victoria) or eastern (Queensland) coasts. Only seven species have distributions that include both eastern and western tropical coasts, and only three species occur on both south-eastern and south-western temperate coasts.

There is a marked drop in species numbers along the eastern coast from low to high latitudes. The number of recorded species for Queensland (excluding the Coral Sea) is 52, New South Wales 27, Victoria and South Australia 22, and Tasmania 12. As collecting effort and sublittoral sampling in Queensland has been far less extensive than in the southern states, a clear increase in species diversity towards the tropics is indicated.

The large genera *Eurydice*, *Cirolana*, and *Natanolana* all contain groups of morphologically similar species. In most cases these groups have wide Indo-West Pacific distributions. The *Cirolana parva* group is primarily tropical in distribution, as is the *Eurydice orientalis* group. The *Cirolana tuberculata* group has a tropical Indo-West Pacific distribution. All of the *Natanolana* species groups have wide distributions, but the *Natanolana valida* group is restricted to temperate or cooler southern hemisphere waters. Two species groups, the *Eurydice acuticauda* group and the *Cirolana* southern group, are restricted to Australia's south-eastern coasts.

TAXONOMY

Cirolanidae Dana

The synonymies include only those references which give a diagnosis or some discussion of the taxon.

Cirolaninae Dana, 1852: 204.—1853a: 748; 1853b: 1438; Hansen, 1895: 12; 1905: 337; Nierstrasz & Schuurmans Stekhoven, 1930: 69; Nierstrasz, 1931: 147; Gurjanova, 1933: 427; 1936: 66; Menzies, 1962a: 122; Naylor, 1972: 24.

Cirolanidae.—Harger, 1880: 304; Hansen, 1890: 310; Stebbing, 1893: 341; 1900: 628; 1902: 49; Sars, 1899: 68; Richardson, 1905: 81; Thielemann, 1910: 8; Norman & Scott, 1906: 40; Racovitza, 1912: 203; Vanhöffen, 1914: 495; Monod, 1930: 129; Van Name, 1936: 421; Eales, 1950: 114; Menzies & Frankenberg, 1966: 48; Menzies & Glynn, 1968: 36; Menzies & George, 1972: 19; Menzies & Kruczynski, 1983: 80; Schultz, 1969: 168; Jansen, 1978: 145; 1981: 5; Kensley, 1978c: 61; Argano, 1979: 54; Kussakin, 1979: 157; Brusca, 1973: 189; 1980: 226; Holdich, Harrison & Bruce, 1981: 557.

Eurydicidae Stebbing, 1905: 10.—Hale, 1925: 129; 1929b: 246; Pillai, 1967: 268.

Not Cirolanidae.—Menzies, 1962a: 113; Naylor, 1972: 24. (Includes the families Aegidae, Cirolanidae, Corallanidae, Cymothoidae and Phoratopodidae).

Diagnosis. Eyes lateral, small, multifaceted (when present); lateral grooves at each posterolateral angle of cephalon. Coxal plates present on pereonites 2–7, each plate separated from tergite by a distinct suture. Pleon with 5 unfused segments (36 of 43 genera); pleonite 5 with free lateral margins, or overlapped by pleonite 4 (35 of 43 genera). Frontal lamina present. Mandible with tridentate incisor, lacinia mobilis, large blade-like molar process and palp. Maxillule with 11–14 spines on exopod, 3 or 4 robust plumose spines on endopod. Maxilla with palp and exopod; provided with long setae. Maxilliped palp 5-articulate; endite present. Anterior pereopods (1–3) ambulatory with prominent robust dactyls, posterior pereopods (4–7) ambulatory or natatory. Pleopods all membranous, without ridges or folding. Uropods situated at anterolateral angles of pleotelson, freely articulating; both rami well developed and mobile (41 of the 43 genera).

Variation within the family. There are 18 freshwater and troglobitic genera, and these show morphologies that are highly modified. It seems that no character utilised in the family diagnosis occurs without exception throughout the family. The result is a rather broad family diagnosis. The variations in family characters are discussed below.

BODY SHAPE. Cirolanids have been described as having a semi-cylindrical or strongly vaulted body shape (Richardson, 1905; Naylor, 1972; Kussakin, 1979). Body shape in cross section is commonly hemispherical, with the tergites being strongly arched. Genera with this shape include *Cirolana*, *Natatolana* and *Eurydice*. Others have a distinctly flattened body shape—*Hansenolana*, certain species of *Metacirolana* and several freshwater genera. A character which has been used to separate cirolanids from sphaeromatids is the former's inability to roll into a ball (conglobate). While generally true, four freshwater genera—*Faucheria*, *Sphaerolana*, *Skotobaena* and *Turcolana*—can conglobate, as well as *Natatolana pilula* which can at least partially conglobate.

PLEON. Most genera have 5 unfused pleonites with the 6th being fused to the telson, forming the pleotelson. In some genera the pleonites have coalesced to varying degrees and in differing ways. *Faucheria* has all the pleonites totally fused to the pleotelson. Bowman (1975) has summarised the variety of pleon conditions.

MOUTHPARTS. In most genera the mandible has a broad tridentate incisor. In *Neocirolana*, some *Natatolana* and *Orphelana* it is narrow, and in *Orphelana* it is barely tridentate. In *Cartetolana*, the incisor is massive, and the lacinia mobilis and molar process vestigial. The maxilla is reduced in several genera, often the palp and exopod are reduced or, as in *Arubolana*, even absent. The maxilliped endite varies in prominence from vestigial (*Eurydice*) to large with 5 or more coupling hooks (*Bathynomus*).

ANTENNULE AND ANTENNA. The cirolanid antennule is generally described as having three peduncular articles, although articles 1 and 2 have a tendency to coalesce (Bruce, 1981a, b). At the end of the third is often a short article. This article has been considered as part of the flagellum (e.g. Hale, 1925, describing *Neocirolana obesa*) or the third peduncular article (Jones, 1976, describing *Cirolana carina*), or often illustrated but not discussed (e.g. Bowman, 1966). Bruce (1981a) discussed this terminal article, pointing out that the cirolanid antennule could be considered to have 4 peduncular articles. Wägele (1983) considered this fourth article to be part of the flagellum. In this, Wägele (1983) is at odds with his own interpretation of the antennal homologies. Wägele figured the isopod antenna with five or six articles: precoxa (often lost), coxa, basis, and articles I, II and III. The last three he regarded as peduncular in function and morphology. Wägele identified the basis of the antenna by the presence of an exopod in some Asellota and Oniscoidea. The antennule of *Bathynomus* has a vestigial exopod at the end of the third peduncular article, and this identifies the first three peduncle articles as precoxa, coxa and basis. In *Bathynomus*, the Serolidae, and the Bathynataliidae, the fourth antennule article is clearly peduncular in function and morphology (e.g. cuticular thickness, lack of aesthetascs) and, to maintain the homology, must correspond to the antenna peduncle article I of Wägele. The cirolanid antennule has 4 peduncular articles or reductions from that condition to 3 articles. This occurs by loss of the fourth article in *Eurydice* and *Dolicholana* or, more commonly, by fusion of peduncular articles 1 and 2 as shown by *Neocirolana* and several species of *Cirolana*. Examples of cirolanid antennules and antennae are shown in Fig. 1.

The antennae of cirolanids are routinely described as having a peduncle of five articles. Hansen (1903) clearly illustrated the presence of a basal article in *Bathynomus*, and considered this to be the first peduncular article. As this article is not part of the articulating structure of the peduncle and is difficult to observe, Hansen (1903, 1905) modified his diagnosis and key to an antennal peduncle with at least five visible articles. The basal article is figured for three genera (Fig. 1F–G). Of the Australian genera, in only *Eurydice* and *Excirolana* is the article absent. In *Metacirolana*, *Hansenolana* and *Orphelana* I could not determine its presence or absence.

Remarks. Family diagnoses have frequently failed to utilise characters by which the Cirolanidae could be separated from the Corallanidae and other minor families such as the Phoratopodidae. From studying collections made by survey teams and museum workers expert in crustaceans other than the isopods, it is clear that the family most frequently confused with the Cirolanidae is the Corallanidae. The surest way to separate the two families is by examination of the mouthparts. All the Corallanidae have a strongly curved, hook-like maxillule (Bruce et al., 1982) which is usually easy to see. Additionally, in corallanids, the

maxilla is vestigial and all genera lack the maxilliped endite. In the field, corallanids can usually be recognised by the stronger setation of the pereon, pleon and pleotelson, and by their larger eyes. The family Tridentellidae is readily separated by having a styliform maxillule and a maxilla with abundant serrate, scale-like spines (Bruce, 1984). It is also possible to confuse some aegid species with the Cirolanidae. However, the stout hooks on the maxilliped and the strongly hooked dactyls on pereopods 1–3 of the Aegidae separate them from cirolanids. A key for separating the families Cirolanidae, Corallanidae, Aegidae, Tridentellidae and Cymothoidae was given by Bruce (1985).

Classification of the Genera

Only one scheme for grouping genera within the Cirolanidae has been developed, allocating the genera into six subfamilies (Racovitza, 1912). Monod (1930,

1971a, 1972) expanded this scheme, placing all genera into seven groups, but did not recognise them as subfamilies. He considered the boundaries of the groups to be too vague and too many of the genera to be inadequately defined. Monod made no attempt to define the seven groups and, except for his "Groupe *Hansenolana*", offered no rationale as to why the genera were being grouped. Since Monod's (1930) work the number of genera has increased from nineteen to forty-three, including the genera described in this work. Placement of a genus within a group was usually on the basis of similarity to a particular genus or genera, rather than by diagnostic morphological characteristics of the whole group.

At present, I consider Monod's (1972) most recent expansion of Racovitza's (1912) scheme unacceptable. The splitting up of the once vaguely defined and overlarge genus *Cirolana* was achieved through considerable refinement of generic character

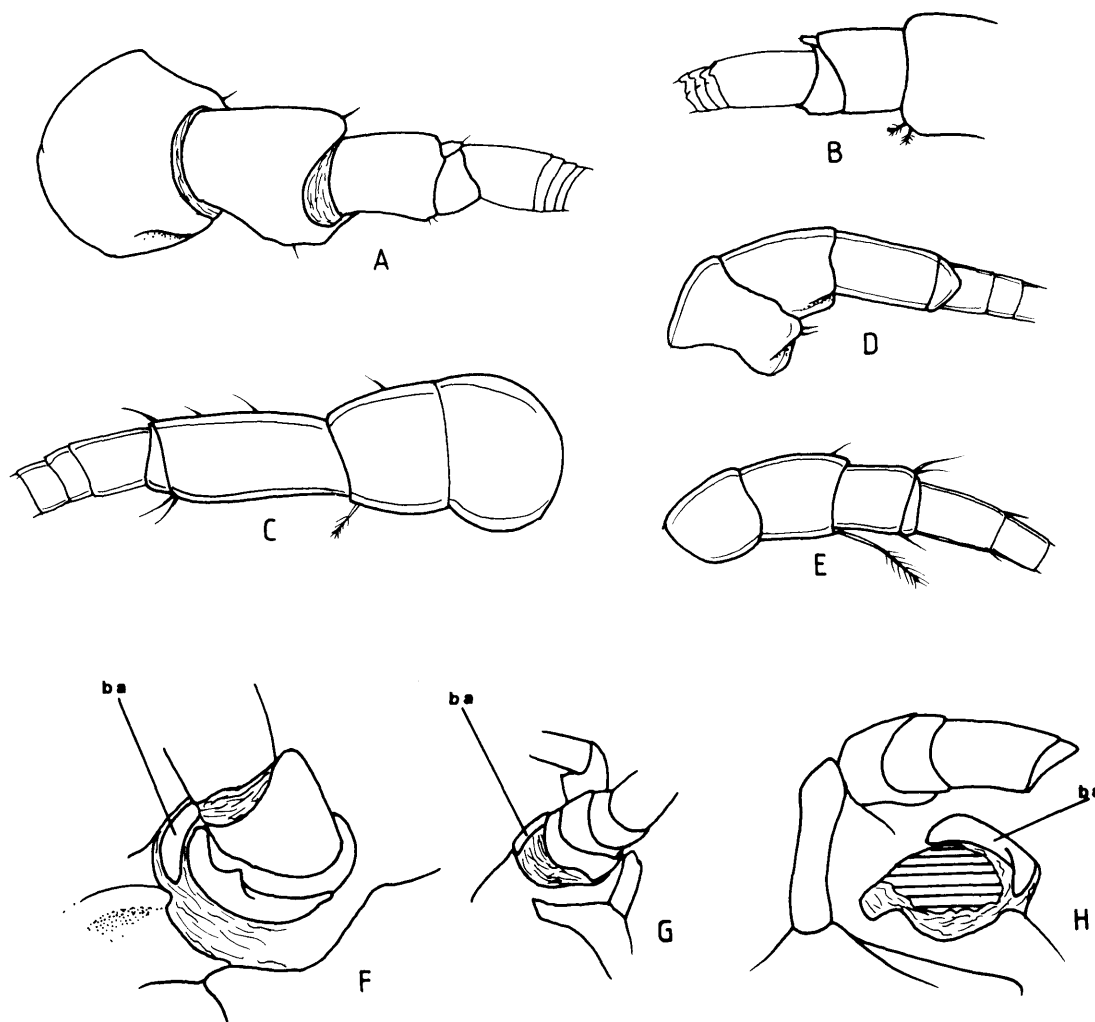


Fig. 1. Antennular peduncles (A–E) and antennal bases (F–H) of selected cirolanid genera; b.a., basal article. A, *Bathynomus immanis* n. sp., anterior view; B, *B. immanis* n. sp., articles 3 and 4, posterior view; C, *Cirolana australiense*; D, *Pseudolana brevifimbria*; E, *Metacirolana japonica*; F, *B. immanis* n. sp.; G, *Cirolana cranchii*; H, *Natatolana rossi*.

discrimination (Bruce, 1981b). Characters little used in the past, such as the relative length of the antennule and antennal peduncle articles, total pereopod morphology, pleopod shape, and clypeal morphology, were used to diagnose and describe genera.

The use of more detailed generic descriptions revealed the heterogeneity of Monod's (1971a, 1972) seven groups. For example, the "Groupe *Hansenolana*" was one whose validity Monod himself questioned. Comparison of the figures given in this work clearly demonstrate that *Neocirolana* is most closely related to *Cirolana*, as is *Saharolana*. Less obviously, *Hansenolana* is most similar to *Cirolana* (see the generic comments on *Hansenolana*) rather than *Metacirolana*. *Metacirolana* is most closely allied to the genera *Colopisthus* and *Arubolana*, all three of these genera having antennule, antennal, mouthpart, pereopod and pleopod morphologies that are essentially the same.

Although a full character state analysis is yet to be undertaken for the Cirolanidae, it is possible to perceive some major groupings of the marine genera. A major division occurs between those genera with a triangular laminar projecting blade clypeus, and those that have a flat and sessile clypeus. Other characters associated with the projecting clypeus include the pleon usually having 5 free (not overlapped, not fused) pleonites, and the male pleopod with the appendix masculina in a sub-basal or medial position. These characters isolate the marine genera *Annina*, *Eurydice*, *Eurylana*, *Exciorolana*, *Colopisthus*, *Metacirolana*, *Pseudaega* and *Pseudolana*. Within this group of genera, *Eurydice* occupies a place apart with unique antennule, antennal, maxilliped, uropod and pleotelson morphology. The genera *Annina*, *Exciorolana*, *Pseudaega*, *Pseudolana* and *Eurylana* all have robust pereopods, elongate pleopod rami, lobate pleopod peduncles, prominent penes and medial insertion of the appendix masculina.

The remaining marine genera can be further split into two groups. The first group is characterised by: antennal peduncle articles 3 and 4 subequal in length, without a secondary unguis on the pereopod dactyls; anterodistal margins of the ischium and merus of pereopods 1 to 3 produced; abundant long plumose setae on the posterior pereopods; no ornamentation of the somites; frontal lamina usually flat and narrow. The genera included in this group are *Conilera*, *Conilorpheus*, *Dolicholana* n. gen., *Natatolana*, *Oncilorpheus*, *Orphelana* and *Politolana*. The second group of genera all share the following characters: antennal peduncular articles 4 and 5 subequal and longest; frontal lamina flat and short; robust pereopods which lack long plumose setae; pereopod dactylus with prominent secondary unguis; penes reduced or absent; appendix masculina in a basal position; pleonite 5 always laterally overlapped by pleonite 4; lateral margins of pleonite 3 often posteriorly produced. The marine genera within this group are *Cirolana*, *Anopsilana*, *Calyptolana*, *Limicolana*, *Neocirolana* and *Hansenolana*. The freshwater genera *Saharolana* and *Haptolana* are also very close to *Cirolana*. The relationships of the

remaining marine (and freshwater) genera remain to be elucidated.

Characters of Taxonomic Utility

Somatic. CEPHALON: presence or absence of rostral point; presence or absence and development of interocular or submarginal furrows; eye size.

PEREON: any ornamentation of dorsal surfaces; in *Natatolana*, differences in the coxal furrows, especially presence or absence; in *Eurydice*, coxal shape.

PLEON: any ornamentation of dorsal surfaces is usually species specific; relative length of pleonite 1, particularly in *Eurydice*. In *Natatolana*, *Eurydice* and the *Cirolana parva* species group, fine details of pleonite lateral margins most useful.

PLEOTELSON: nearly always shows some species specific characters, but in some species complexes (e.g. within different *Eurydice* species groups) it is of no use. Characters to observe are general morphology, spination and setation. In most species, number of pleotelson spines is constant and is often diagnostic.

Appendages. ANTENNULE AND ANTENNA: within genera, peduncle often of little use; length of flagellum frequently useful. In *Cirolana*, relative length of antennule third peduncular article, and degree of fusion between articles 1 and 2 should be noted.

FRONTAL LAMINA AND CLYPEUS: details of frontal lamina often diagnostic, but often do not separate closely related species; of little use in *Eurydice* and *Pseudolana*. Clypeus generally of little use.

MOUTHPARTS: generally of little use in separating species within a genus; exception is *Neocirolana* where mouthparts are of prime importance. Maxilliped may offer supportive characters.

PEREOPODS: vary in usefulness between genera; male first pereopod, in species groups where it is sexually dimorphic, may offer species specific characters. In *Natatolana*, spination of pereopods 1-3, and shape of basis of pereopods 6 and 7 are important characters to note.

PENES: vary in usefulness between genera. In *Cirolana*, presence, absence and position all useful characters.

PLEOPODS: vary in usefulness between genera; often nearly identical within species groups, otherwise very useful. Shape, setation, appendix masculina morphology all important. First two pairs of pleopods in male particularly useful. In *Eurydice*, the only difference is in morphology of appendix masculina.

UROPODS: usually show species specific characters; shape, relative length of rami, setation and spination should all be noted. Fine details of uropod morphology particularly important in *Cirolana* group of species.

Key to Australian Genera of Cirolanidae

1. Clypeus flat. 6
—Clypeus freely projecting. 2
2. Prominent rostral process separating antennules. *Excirolana* p. 39
—Without prominent rostral process. 3
3. Uropods with peduncle not produced. *Eurydice* p. 11
—Uropods with peduncle produced. 4
4. Frontal lamina linear. *Pseudolana* p. 43
—Frontal lamina broad. 5
5. Pleonite 5 lateral margins not laterally enclosed by pleonite 4. *Metacirolana* p. 31
—Pleonite 5 lateral margins laterally enclosed by pleonite 4. *Eurylana*
6. Pereopods 5–7 ambulatory, articles not flattened. 9
—Pereopods 5–7 natatory, articles flattened. 7
7. Pereopods 5–7 with ischium to propodus flattened; basis without long plumose marginal setae. *Orphelana* p. 125
—Pereopods with all articles flattened; basis with long plumose marginal setae. 8
8. Frontal lamina narrow, flat. *Natatolana* p. 52
—Frontal lamina with posterior part ventrally produced. *Dolicholana* p. 122
9. Posterior of frontal lamina produced ventrally. *Booralana* p. 136
—Entire frontal lamina flat. 10
10. Pleopod peduncles with respiratory branchiae. *Bathynomus* p. 126
—Pleopod peduncles without respiratory branchiae. 11
11. Endopods of pleopods 3–4 with marginal setae. 12
—Endopods of pleopods 3–4 without marginal setae. 14
12. Mandibles massive; molar vestigial. *Cartetolana* p. 209
—Mandibles not massive; molar normal (e.g. Fig. 116). 13
13. Mandibles with narrow incisor (e.g. Fig. 144). *Neocirolana* p. 200
—Mandibles with broad incisor (e.g. Fig. 116). *Cirolana* p. 138
14. Pereopod 1 propodus massive, subchelate. *Hansenolana* p. 214
—Pereopod 1 propodus not massive, ambulatory. 15
15. Pereopod 1 dactylus with secondary unguis; penes small or absent. *Anopsilana* p. 196
—Pereopod 1 without secondary unguis; flat obvious penes present. *Limicolana* p. 214

Eurydice Leach

Eurydice Leach, 1815: 354, 370.—Milne-Edwards, 1840: 237; Hansen, 1890: 362; 1905: 356; 1916: 165; Sars, 1899: 72; Richardson, 1905: 123; Stebbing, 1910a: 95; Tattersall, 1911: 202; Vanhöffen, 1914: 505; Barnard, 1914: 350a; 1940: 387; Nierstrasz & Schuurmans Stekhoven, 1930: 60; Hale, 1933: 558; Naylor, 1957: 3; 1972: 26; Menzies & Barnard, 1959: 31; Menzies & Frankenberg, 1966: 48; Menzies & Glynn, 1968: 170; Menzies & Kruczynski, 1983: 84; Schultz, 1969: 170; Jones, 1971: 201; Moreira, 1972:

60; Brusca, 1973: 203; 1980: 228; Kussakin, 1979: 158; Bruce & Jones, 1978: 396; 1981: 67; Holdich, Harrison & Bruce, 1981: 596.

Slabberina Beneden, 1861: 88.

Helleria Czerniavsky, 1868: 81 (not *Helleria* Ebner, 1868—Tyloidea).

Branchuropus Moore, 1901: 167.—Richardson, 1905: 128. *Pelagonice* Soika, 1955: 49. (Subgenus of *Eurydice*).

Type species. *Eurydice pulchra* Leach, 1815. Type material at British Museum (Natural History).

Diagnosis. Pereonites 1 and 2 subequal in length. Pleonite 5 lateral margins not overlapped by pleonite 4. Antennule peduncle article 2 at right angles to article 1. Antenna peduncle 4-articulate. Frontal lamina reduced; clypeus with downwardly projecting triangular blade. Maxilliped endite reduced, without coupling hooks. Pereopods 5-7 with ischium to propodus flattened, setose. Pleopods rounded, only endopod of pleopod 5 without setae; appendix masculina inserted medially. Uropod peduncle not produced, exopod lateral margin without setae.

Additional characters. Body 2.5-3.5 times longer than broad, smooth, without ornamentation; dorsal surface of pereon and pleon with medial sensory setae. Pleon with lateral margins of pleonites 2-5 produced. Pleotelson with anterodorsal depression.

Antennule article 4 very short. Frontal lamina not united with clypeus, anterior part projects ventrally. Mandibular palp with third terminal article truncate. Maxilliped palp article margins not produced, lateral margins without setae, medial margins with few setae. Pereopods 1-3 ambulatory, merus anterodistal margin not produced, all dactyls with slender secondary unguis. Pereopod 1-3 with anterior margins of ischium and merus not produced; spine opposing dactylus conspicuously large, half as long as dactylus. Flattened penes present on sternite 7. Exopods of pleopods 3-5 with complete suture. Pleopod 1 peduncle about as long as wide. Uropods not projecting beyond apex of pleotelson.

Sexual dimorphism. The sexes are generally immediately separable. Males have a narrow elongate body shape, with the pleon often as long as the pereon. Females have a strongly vaulted pereon, a short pleon and are usually more ovate in outline. The antennular and antennal flagellae are generally far longer in males. In many species, the male has a plicate process present on many articles of the antennal flagellum.

Remarks. The genus is immediately separable from all others by the distinctive antennule, antennal, pleotelson, and uropod morphology. *Eurydice* is

unusual amongst the Cirolanidae in the form of the maxilliped which has the endite greatly reduced, and also in the shape and setation of the palp. No other cirolanid genus shows these maxilliped characters, although two species of *Neocirolana* approach this maxilliped form.

Eurydice is represented around Australia by eight species, all of which are exclusively subtidal. In Australia there are no intertidal sand beach *Eurydice* species. In Europe, Western Indian Ocean and Japan, *Eurydice* is the dominant sand beach isopod (Jones, 1969, 1971, 1974; Eleftheriou & Jones, 1976; Bruce & Jones, 1981), except in the tropics where it may be displaced by *Excirolana*. In Australia the dominant sand beach isopods are species of *Pseudolana*, and on the tropical coast of Queensland, *Excirolana orientalis* is present.

The genus *Eurydice* is large, comprising a total of 45 known species. Notwithstanding the large number of species, the genus is easily defined and recognised, and has no obvious subgroupings except on the basis of pleotelson shape and the presence or absence of pleotelson spines. Soika (1955) proposed the subgenus *Pelagonice* for pelagic species that also lacked spines on pleotelson. Jones & Naylor (1967) considered the subgenus unacceptable. They pointed out that both *E. inermis* and *E. truncata* occur in the benthos and are thus not purely pelagic. However, Soika's division does recognise the only visible separation within the genus. That is, species with pleotelsonic spines and those without. Of those species without spines, only *E. inornata* has been convincingly demonstrated to be intertidal (Jones, 1971). Whether or not this division is of systematic value is questionable since virtually no other differences seem to correlate with the lack of spines. In Australia, *Eurydice* does not occur intertidally, and no species has pleotelson spines.

The most closely allied cirolanid genus appears to be *Metacirolana*. Characters in common between the two genera include: pereonite 1 short, all pleonites free, prominent penes and a projecting clypeus. Both genera are sexually dimorphic.

Key to Australian Species of *Eurydice*

1. Posterior margin of pleotelson truncate (*E. orientalis* group). 2
 —Posterior margin of pleotelson acute (*E. acuticauda* group). 5
2. Pleotelson posterior margin very narrow with 4 setae. *E. woka*
 —Pleotelson posterior margin moderately narrow with 6-8 setae. 3
3. Pleonite 1 largely concealed by pleonite 7. *E. minya*
 —Pleonite 1 largely exposed. 4
4. Male with antennule flagellum long; antennal flagellum reaching pleotelson
 or further. *E. orientalis*
 —Male with antennule flagellum short; antennal flagellum reaching pleonite 3. *E. wyuna*

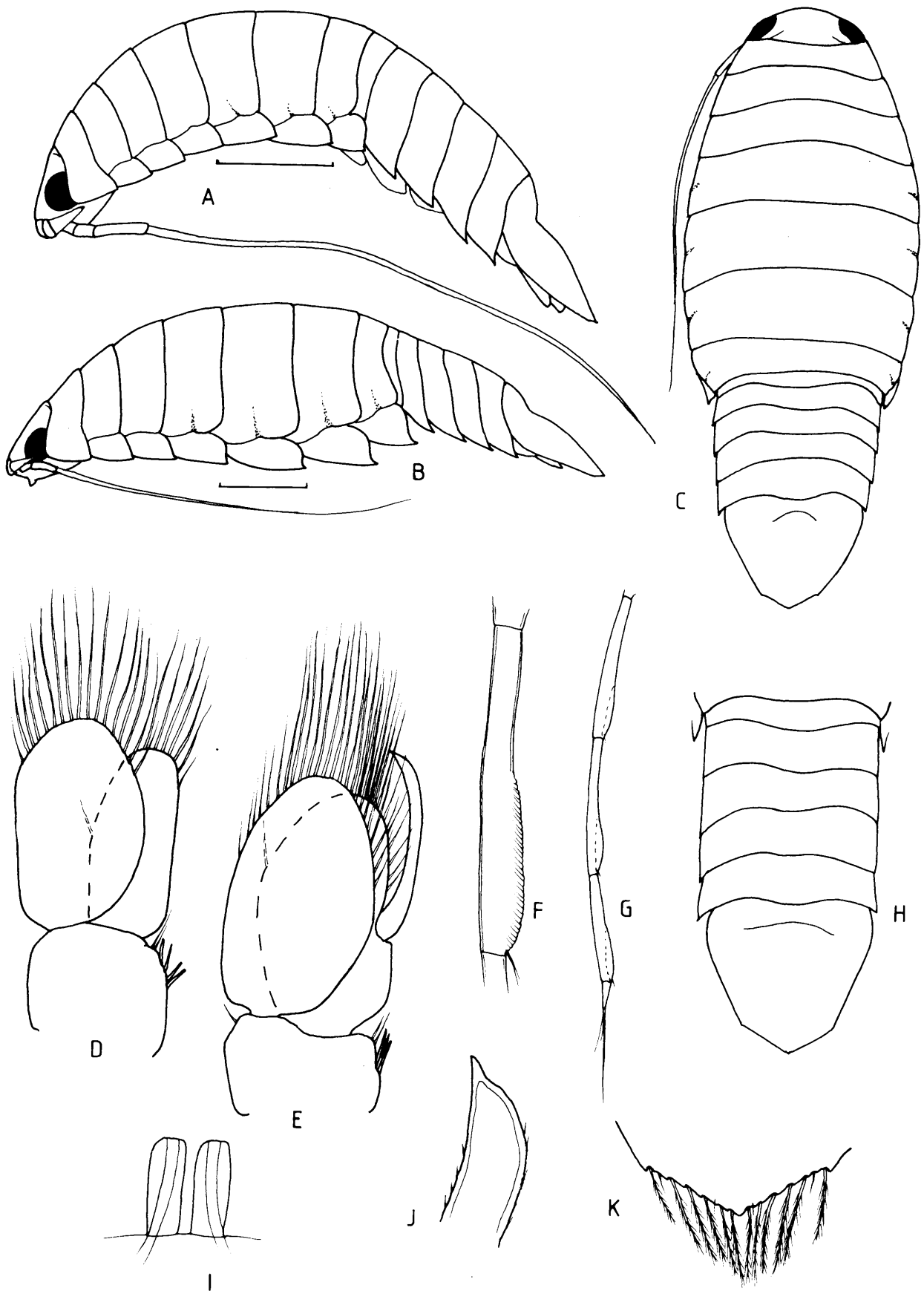


Fig. 2. *Eurydice acuticauda*. A, D–J, male 5.6 mm WP; B, C, K female 5.0 mm WP. A, lateral view (male); B, lateral view (female); C, dorsal view (female); D, pleopod 1; E, pleopod 2; F, antenna, flagellar article 20; G, antenna, flagellar articles 21–24; H, pleon; I, penes; J, appendix masculina, apex; K, pleotelson, posterior margin. Scale 1.0 mm.

- 5. Pleotelson with posterior margins concave. *E. spenceri*
- Pleotelson with posterior margins smoothly tapered. 6
- 6. Prominent coxal points on all coxae; appendix masculina with acute apical process. *E. binda*
- Coxal points only on pereonites 5–7; appendix masculina apical process reduced or absent. 7
- 7. Antennal flagellum longer than pleon (male); coxal points on pereonites 5–7 distinct. *E. acuticauda*
- Antennal flagellum shorter than pleon (male); coxal points on pereonites 5–7 feebly developed. *E. tarti*

***Eurydice acuticauda* Bruce**

Figs 2, 3

Eurydice acuticauda Bruce, 1981a: 645, figs 1, 2. (Part).

Material examined. Male (5.6 mm), 7 females (4.9–6.3 mm), WP, Vic., 22 Oct. 1971, from plankton, coll. R.H. Miller. Female (5.0 mm), WP, Vic., 38°21.17'S, 145°15.93'E, 20 Nov. 1973, sand. 2 female (5.2, 5.6 mm, ovig.), WP, Vic., 38°25.83'S, 145°19.28'E, 21 Nov. 1973. All type material examined by Bruce (1981a) was also re-examined.

Types. Held at the Museum of Victoria, Melbourne.

Type locality. Western Port, Vic., 38°27'S, 145°14'E.

Description of male. Body about 3.5 times as long as wide, straight sided. Eyes moderately large, red or black. Coxae with posterior margins only slightly produced, those of pereonites 5–7 with slight points. Pleonite 1 largely concealed by pereonite 7. Pleotelson about as long as broad, posterior margin forming acute angle, provided with 12–14 plumose setae, each set within a notch.

Antennule peduncle articles 1–3 short, approximately subequal in length; flagellum short, composed of 3 articles, proximal article as long as peduncle, provided with numerous aesthetascs. Antenna long, peduncle extending to middle of pereonite 1; peduncular article 3

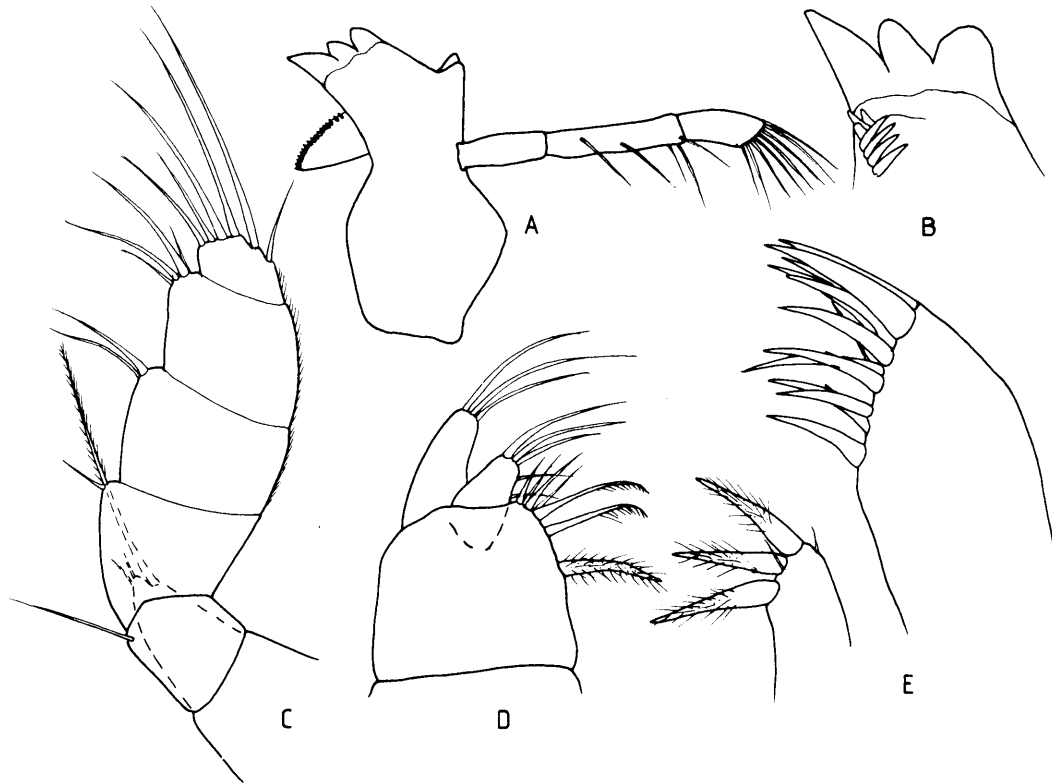


Fig. 3. *Eurydice acuticauda*, male 5.6 mm, WP. A, left mandible; B, right mandible, detail of incisor and spine row; C, maxilliped; D, maxilla; E, maxillule.

as long as combined length of articles 1 and 2 and about half as long as article 4; flagellum extremely long, extending to or just beyond apex of pleotelson, composed of 24 elongate flagellar articles, each with plicate process at distal end.

Pereopod 1 short with few setae; prominent spine present on anterodistal angle of ischium; posterior borders of merus, carpus and propodus with 4, 1 and 3 spines respectively; distal spine of propodus opposes dactylus which has well developed secondary unguis. Pereopods 2 and 3 similar to pereopod 1 but less robust. Pereopod 7 large, anterior margins of all articles except basis with numerous setae, ischium with 2 prominent spines on anterodistal angle, merus with 2 groups of spines on anterior margin, and further group on each distal angle, as has carpus; propodus with 2 single spines and single terminal spine; posterior margins with fewer setae, each article except basis with 2 groups of spines and third group at distal angle. Pereopod 6 similar to pereopod 7 but slightly longer, pereopods 4 and 5 shorter.

Pleopod 2 appendix masculina extending beyond inner ramus by 0.2 of its length, slightly recurved, apex coming to blunt point. Uropod peduncle lateral margin armed with row of about 12 stout setae and single spine. Exopod subovate, about half as long as endopod, posterior margin with 8 long plumose setae, distolateral angle with 2 small spines and group of about 6 setae; lateral margin with 3 small setae. Endopod posterior margin truncate, armed with about 13 plumose setae; lateral margin with 5 plumose setae; lateral distal angle with 2 small spines between which lies group of simple setae.

Female. Coxae of pereonites with acute points on posterolateral margins. Antenna slightly shorter than male, composed of 12 articles all lacking plicate process. Otherwise, female differs only in sexual characters.

Colour. Reddish brown with black chromatophores in alcohol.

Size. Largest female 6.5 mm, largest male 5.5 mm.

Remarks. The original description of *E. acuticauda* was based on material from Western Port, although specimens were included from Port Phillip Bay and the coast of New South Wales. The variation between specimens was commented on but at the time there seemed insufficient evidence to separate species. The discovery of two mature males of what is now described as *Eurydice binda* allowed the recognition that the Western Port, Port Phillip Bay and NSW populations are distinct.

Males of these two species can be distinguished by differences in appendix masculina morphology, length of the penes, differences in the length of the antennal flagellum and differences in the shape of the antennal flagellum articles.

Females are all rather similar and less easy to separate. Female *E. acuticauda* differ from *E. binda* by having the coxal points less well developed, particularly on the coxae of pereonites 2–4. Females of *E. acuticauda* are

separated from *E. tarti* by having a slightly wider posterior margin to the pleotelson, by having more distinct points on the coxae of pereonites 5–7, and in having the posterior lateral margin of pleonite 5 less convex.

All the type material designated by Bruce (1981a) belongs to this species, except that from NSW, which belongs to *E. binda*. The Port Phillip Bay material was not included in the type series, and is here described as *E. tarti*.

Distribution. Known only from Western Port, Victoria, at depths of 3–5 metres.

Eurydice spenceri Bruce

Fig. 4

Eurydice spenceri Bruce, 1981a: 649, fig. 3.

Types. Held at the Stockholm Museum of Natural History, Sweden; two paratypes held at the South Australian Museum.

Type locality. Spencer Gulf, SA.

Remarks. This species can be separated from *E. acuticauda* by the more excavate hind margin of the pleotelson and the spatulate appendix masculina. Other differences are the greater number of spines on the posterior pereopods and the lack of a prominent spine on the anterior angle of the merus of pereopod 1.

Distribution. Known only from the type locality, where it was taken in 1856.

Eurydice binda n. sp.

Figs 5, 6

Eurydice acuticauda Bruce, 1981a: 645, figs 1, 2 (Part).

Material examined. Female (5.4 mm), east of Burwood Beach, 3.5 kms south of Hunter River, NSW, 32°57'S, 151°44.8'E, 31 Oct. 1975, 22 m; female (5.1 mm), same as previous station but 28 Jan. 1976, 22 m; 2 females (4.8, 5.1 mm), east of Belmont Beach, 16 kms south of Hunter River, NSW, 33°02.5'S, 151°40.8'E, 20 May 1975, 18 and 22 m; female (4.4 mm), east of McMaster's Beach, Gosford, NSW, (6.2 mm), 3 females (4.6, 5.0, 5.2 mm), off Lorne, Bass Strait, Vic., Mar. 1980, coll. D. O'Sullivan. Male (6.9 mm, crushed), south-west of Beachport, SA, 37°09.5'S, 138°30.0'E, 20 June 1962, 144 m, coll. CSIRO.

Types. Holotype male NMV J1710. Paratypes NMV J925, J1711-J1712; AM P23053-P23056, P23156, P30347.

Type locality. Bass Strait, off Lorne, Vic., 39°S, 144°E.

Description of male. Body about 3.5 times as long as wide. Cephalon anterior margin indented, with blunt median process. Pereonites 5 and 6 longer than others which are subequal in length. All coxae with small acute process at posteroventral angle; all with posterior margin convex, markedly so in coxae of pereonites 6 and 7. Pleonite 1 partially concealed by pereonite 7, pleonites 4–5 subequal in length, ventral posterior angles acute. Pleotelson posterior margin acute, with 8 plumose setae.

Antennule peduncle articles 1–2 subequal in length, article 3 slightly shorter than 2; flagellum composed of

1 long article and 1 or 2 short articles, extends to posterior of cephalon. Antenna peduncle article 4 subequal in length to total lengths of peduncle articles 1-3; flagellum extending to posterior of pleotelson composed of 26 slender articles, with small plicate process on about articles 10-24.

Frontal lamina clypeus, labrum and mouthparts not examined in detail but generally as for others of genus. Projecting part of clypeus short.

Pereopod 1 with 3 blunt and 2 acute spines on posterior margin of merus; carpus with 1 long acute spine; propodus with 4 acute spines on palm. Pereopods 2-3 similar to 1, generally with more and larger spines. Pereopods 4-6 becoming progressively longer. Pereopod 7 shorter than 6, particularly propodus; anterior margin conspicuously indented on merus, carpus and propodus, each indentation being provided with 1-4 spines; posterior margin less indented, each article except basis with 3 groups of spines as well as spines at distal angles; all margins setose except basis and posterior margin of ischium and merus.

Penes present on sternite 7, flat, about 3.4 times longer than wide.

Pleopods 1-3 with peduncle projecting slightly above coupling hooks. Pleopod 2 with broad curved appendix

masculina standing well clear of endopod, apex with acute process on lateral margin. Uropod exopod lateral margin convex, with 3 fine setae and 1 plumose seta, distal margin subtruncate, with 8 plumose setae, lateral angle with 2 small spines. Endopod distal margin truncate, with about 10 long plumose setae, distolateral angle with 2 small spines; lateral margin with 4 setae, medial with 1. Peduncle with 9 long setae and single spine on lateral margin.

Female. Generally similar to male, but antennal flagellum shorter, with 16 articles, articles themselves shorter, lacking plicate process. Antennule peduncle article 3 slightly longer than in male; antennule flagellum with fewer aesthetascs. Lastly, pereopod 7 with merus, carpus and propodus markedly shorter than male. Male length to width ratio of merus, carpus and propodus is 1.60, 1.95 and 3.60; in the female it is 1.16, 1.10 and 2.60. Furthermore, in females, merus and carpus are equal in length while in males carpus is two thirds longer than merus.

Colour. Overall pale brown with chromatophores forming darker brown transverse bands. Eyes black.

Size. Largest specimen male 6.6 mm.

Remarks. This species is very similar to *E. acuticauda*.

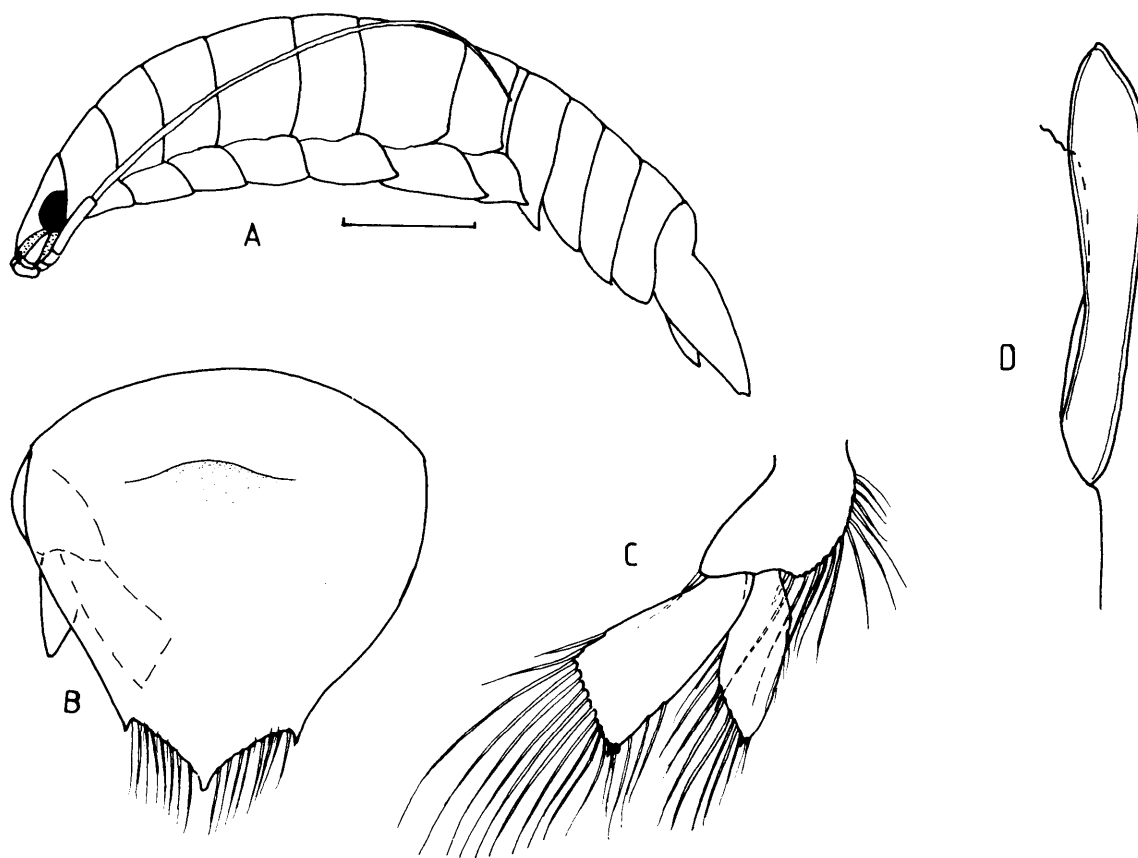


Fig. 4. *Eurydice spenceri*. A, holotype, lateral view; B, pleotelson; C, uropod; D, appendix masculina. Scale 1.0 mm.

Mature males are readily separated by appendix masculina differences and the proportional length of the penes. Other differences between the two species include the relative size of the projecting clypeus and more prominently rounded coxae, each with a point in the new species; otherwise these two species are similar. *Eurydice spenceri* is also similar and has a similar appendix masculina. In that species, the posterior margins of the pleotelson are concave, the uropodal

exopod is far more slender, the coxae of pereonites 2-5 lack points, and the posterolateral angle of pleonite 5 is less acute.

Distribution. Off the Hunter River, NSW; off Lorne, Vic.; and off Beachport, SA; at depths of 20-144 metres.

Etymology. *Binda* is an Aboriginal word meaning deep water.

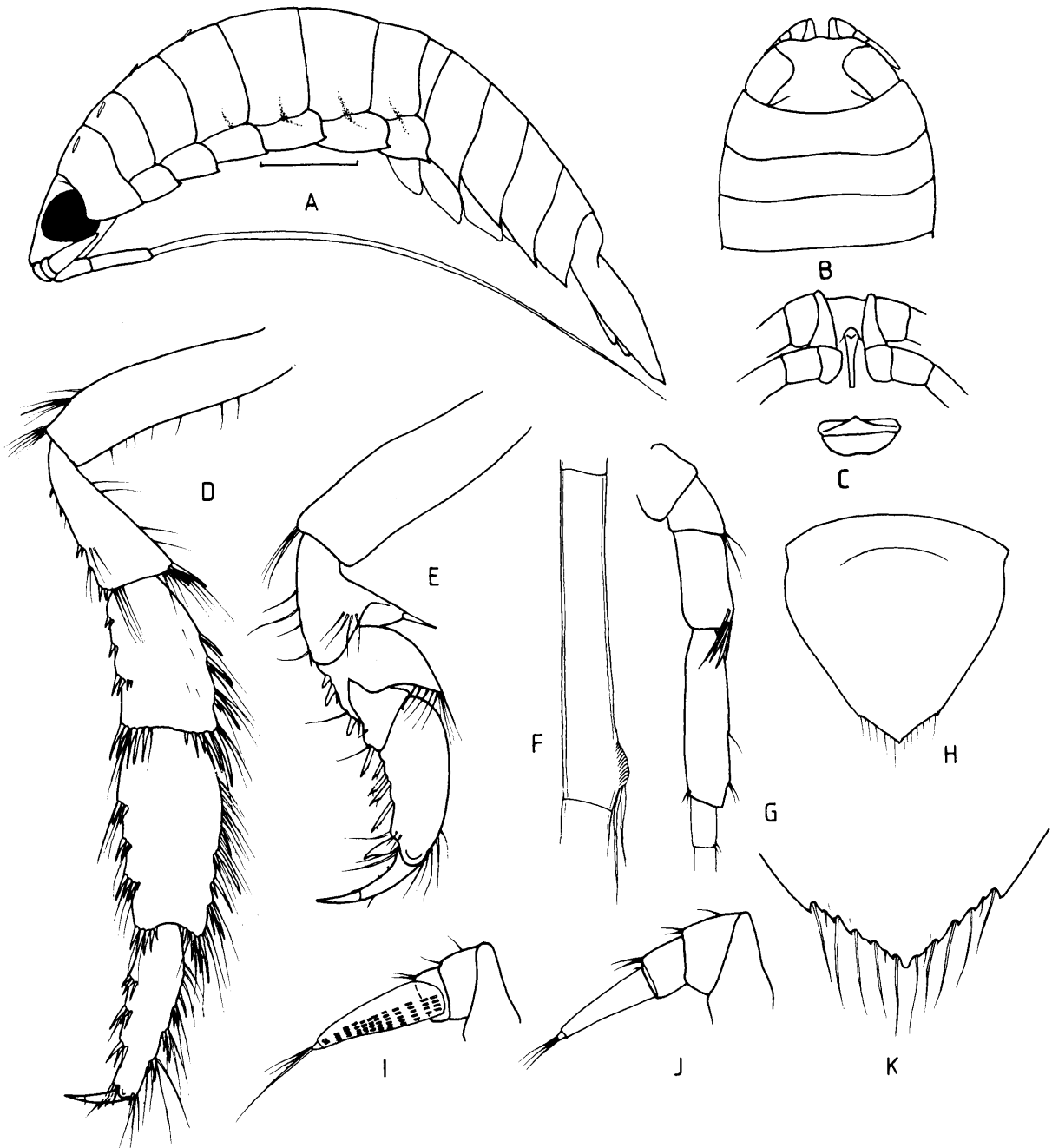


Fig. 5. *Eurydice binda* n. sp. A-G, male holotype; I, female paratype; remainder male paratype. A, lateral view; B, cephalon, anterior pereonites, dorsal view; C, clypeal region; D, pereopod 7; E, pereopod 1; F, antenna, flagellar article 17; G, antennal peduncle; H, pleotelson; I, antennule (male); J, antennule (female); K, pleotelson, posterior margin. Scale 1.0 mm.

Eurydice tarti n. sp.

Figs 7, 8

Eurydice acuticauda Bruce, 1981a: 645, figs 1, 2 (Part).

Material examined. Male (4.1 mm), manca (3.0 mm), PPB, Vic., PPBS Stn 924, 21 Sept. 1970, mud, 22 m; male (3.8 mm), 2 females (4.3, 4.4 mm), PPB, Vic., PPBS Stn 986, 12 Oct. 1971, sand, 4 m; male (5.2 mm), female (4.2 mm), PPB, Vic., PPBS Stn 974, 13 Oct. 1971, sand, 5 m; male (5.0 mm, crushed), 2 females (4.5, 5.0 mm), PPB, Vic., PPBS Stn 968, 13 Oct. 1971, sand, 8 m; female (4.7 mm), PPB, Vic., PPBS Stn 945, 16 Nov. 1971, sand, 2 m, coll. Ministry for Conservation, Vic.

Types. Holotype, male 5.2 mm, NMV J1714. Paratypes, NMV J1715-J1717; AM P32375, P32376.

Type locality. Port Phillip Bay, Vic., 38°20'S, 144°40'E.

Description of male. This species is extremely similar to *Eurydice acuticauda*, and the description deals only with points of difference. Coxal points present on coxae of pereonites 5-7. Posterolateral margins of pleonite 5

convex; posterolateral margins of pleonites 2-5 acute, barely produced. Pleotelson posterior margin acute, provided with 10 plumose setae; lateral margin feebly convex.

Antenna flagellum extending to pleonite 3, composed of 24 articles, without plicate processes.

Penes slightly less than twice as long as wide, rectangular in shape.

Pleopod 2 appendix masculina curved, extending slightly beyond apex of endopod, apex blunt.

Female. Similar to male, but antennal flagellum shorter, with 12 articles; these articles far longer and more slender than those of male. Coxal points more clearly discernable but small on coxae of pereonites 2-3.

Size. Largest male 5.2 mm, largest female 5.0 mm.

Remarks. In the remarks given with the original description of *Eurydice acuticauda*, comments were made on the differences between Western Port, Port Phillip Bay and New South Wales populations. The

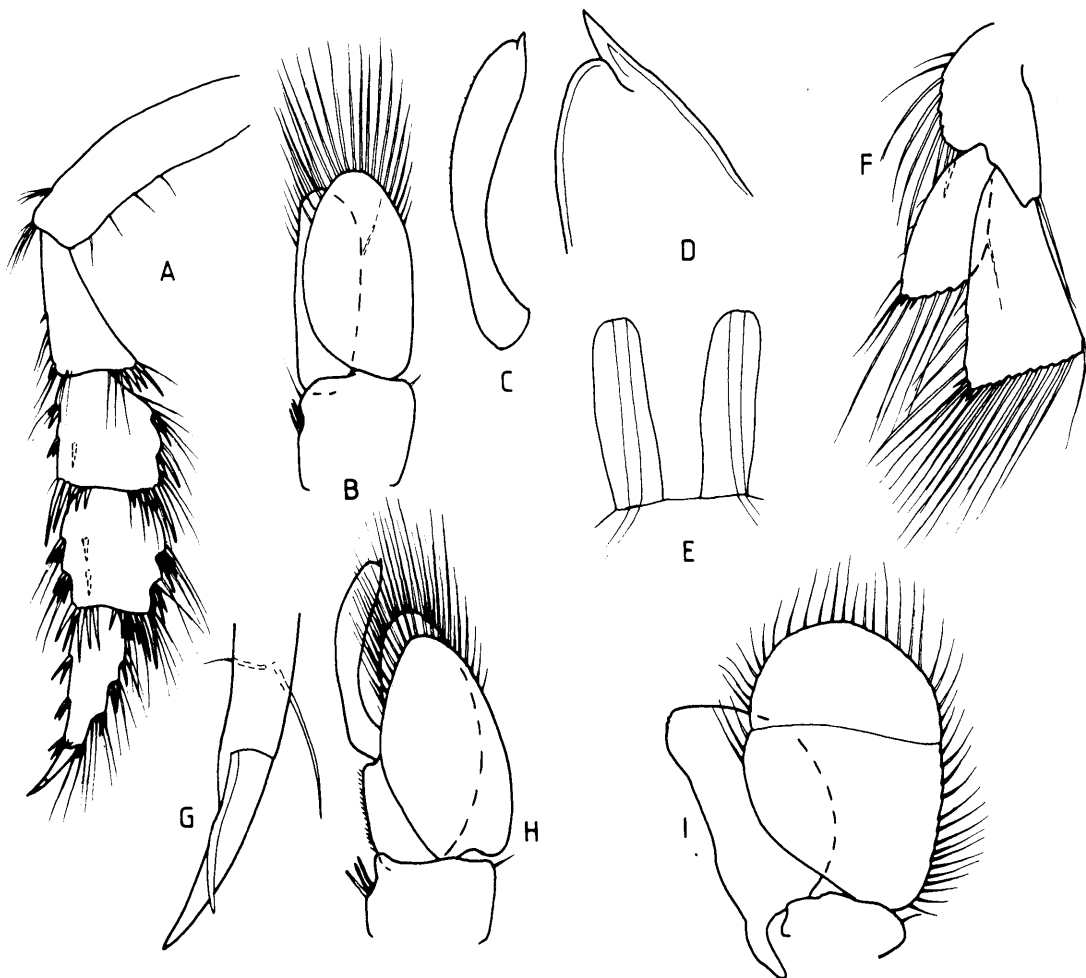


Fig. 6. *Eurydice binda* n. sp. B-E, G, H, male holotype; remainder female paratype. A, pereopod 7; B, pleopod 1; C, appendix masculina; D, appendix masculina, apex; E, penes; F, uropod; G, pereopod 1, dactylus apex; H, pleopod 2; I, pleopod 5.

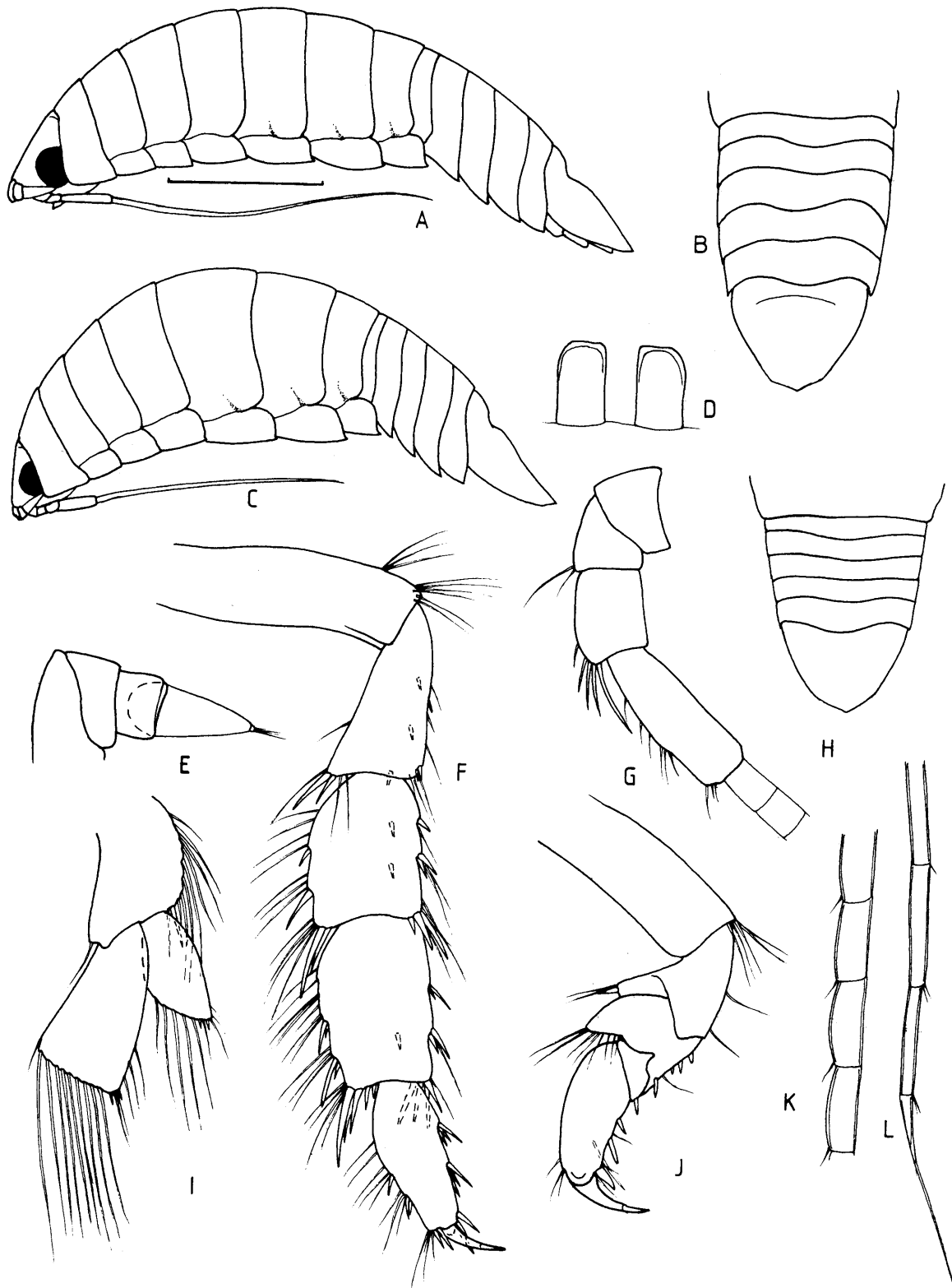


Fig. 7. *Eurydice tarti* n. sp. A, B, E-G, J, K, male holotype; C, H, I, L, female paratype; D, male paratype. A, lateral view (male); B, pleon (male); C, lateral view (female); D, penes; E, antennule; F, pereopod 7; G, antennal peduncle; H, pleon (female); I, uropod; J, pereopod 1; K, antenna (male), flagellar articles 18-20; L, antenna (female), flagellar articles 10-12. Scale 1.0 mm.

discovery of mature males of *E. binda* in the Bass Strait and off South Australia showed that the NSW females originally included as *E. acuticauda* belonged to separate species. Examination of fresh material of *E. acuticauda* (from Western Port) led to the conclusion that the Port Phillip Bay *Eurydice* should be recognised as a species. The differences are slight but appear constant. It now seems likely that these species are in fact allopatric, with *E. binda* distributed on oceanic coasts from Newcastle, NSW, to South Australia, and *E. acuticauda* and *E. tarti* existing as separate isolated populations within the virtually enclosed bays of Western Port and Port Phillip.

Eurydice tarti is separated from others of the complex by its short antennal flagellum (never reaching the pleotelson) which, in the male, has short articles without a plicate process, by the short pleon which has the posterolateral margins of pleonite 5 convex and, in the male, by the lack of obvious coxal points, and the blunt and relatively short appendix masculina.

Distribution. Known only from the type locality, taken at depths of 2–22 metres.

Etymology. *Tarti* is an Aboriginal word for little sister, and alludes to the similarity of species to *E. acuticauda*.

Eurydice orientalis Hansen

Figs 9, 10

Eurydice orientalis Hansen, 1890: 369: pl. 6, figs 2–2h.—Richardson, 1910: 8; Nierstrasz, 1930: 3, fig. 1; 1931: 147; Hale, 1933: 558; Barnard, 1936: 48; Bruce, 1980b: 158. Not *Eurydice orientalis*.—Monod, 1934: 7, pl. IV, IXA,B;

Bruce, 1980a: 110: fig. 1 (= *E. wyuna* and *E. minya*); Holdich, Harrison & Bruce, 1981: 596, fig. 15 (= *E. minya*).

Material examined. 2 males (4.2, 4.4 mm), syntypes, Java Sea, 2°25'S, 106°50'E, 1869, 14.4 m. 3 males (4.3, 4.5 (damaged), 5.0 mm), Barrow Is., WA, 2 Sept. 1954, tide running, 8 p.m. coll. K. Sheard. 2 males (3.7, 3.9 mm), off Southern Point, Mermaid Cove, Lizard Is., Qld, 8 Oct. 1978, in sand between coral outcrops, 6.1 m, coll. C. Short & P.C. Terrill. Male (3.5 mm), Halifax Bay, Townsville, Qld, 23 Nov. 1976, sandy mud, 10.8 m, coll. JCUNQ. 2 males (3.5, 3.6 mm), 2 females (3.1, 3.4 mm), 2 post manca (2.9, 2.9 mm), 6 manca (1.9–2.8 mm), Wistari Reef edge, Capricorn Group, Qld, 15 Sep. 1978, surface plankton, coll. A.J. Bruce.

Types. Two syntypes held at the Zoologisk Museum, Copenhagen, Denmark.

Type locality. Java Sea, north of Jakarta, Indonesia, 3°25'S, 106°50'E.

Description of male. Body nearly 4 times as long as wide. Cephalon anterior margin barely indented, minute rostral process present; submarginal carina running between each eye. Pereonites 1–6 become progressively longer, pereonite 7 distinctly shorter than 6; coxae of pereonites 5 and 6 with minute points at ventrodiscal angle. Pleonite 1 shorter than 2, posterolateral angles of pleonites 2–4 with their points all clear of next segment; posterolateral margins of pleonites 1 to 4 not visible dorsally, those of pleonite 5 expressed laterally, conspicuous in dorsal view. Pleotelson slightly shorter than wide, lateral margins feebly convex; posterior margin truncate about 0.33 as wide as greatest width, provided with 7 plumose setae, each seta between a dentation; the 2nd seta medial to each lateral margin

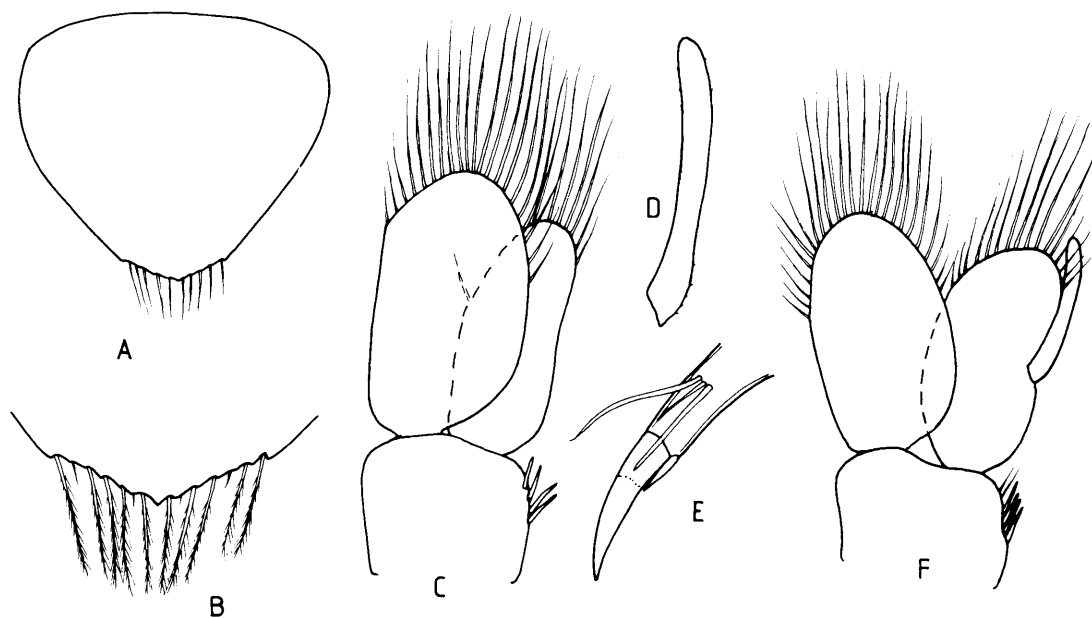


Fig. 8. *Eurydice tarti* n. sp. A, B, female paratype; C–F, male holotype. A, pleotelson; B, pleotelson, posterior margin; C, pleopod 1; D, appendix masculina; E, pereopod 1, dactylus apex; F, pleopod 2.

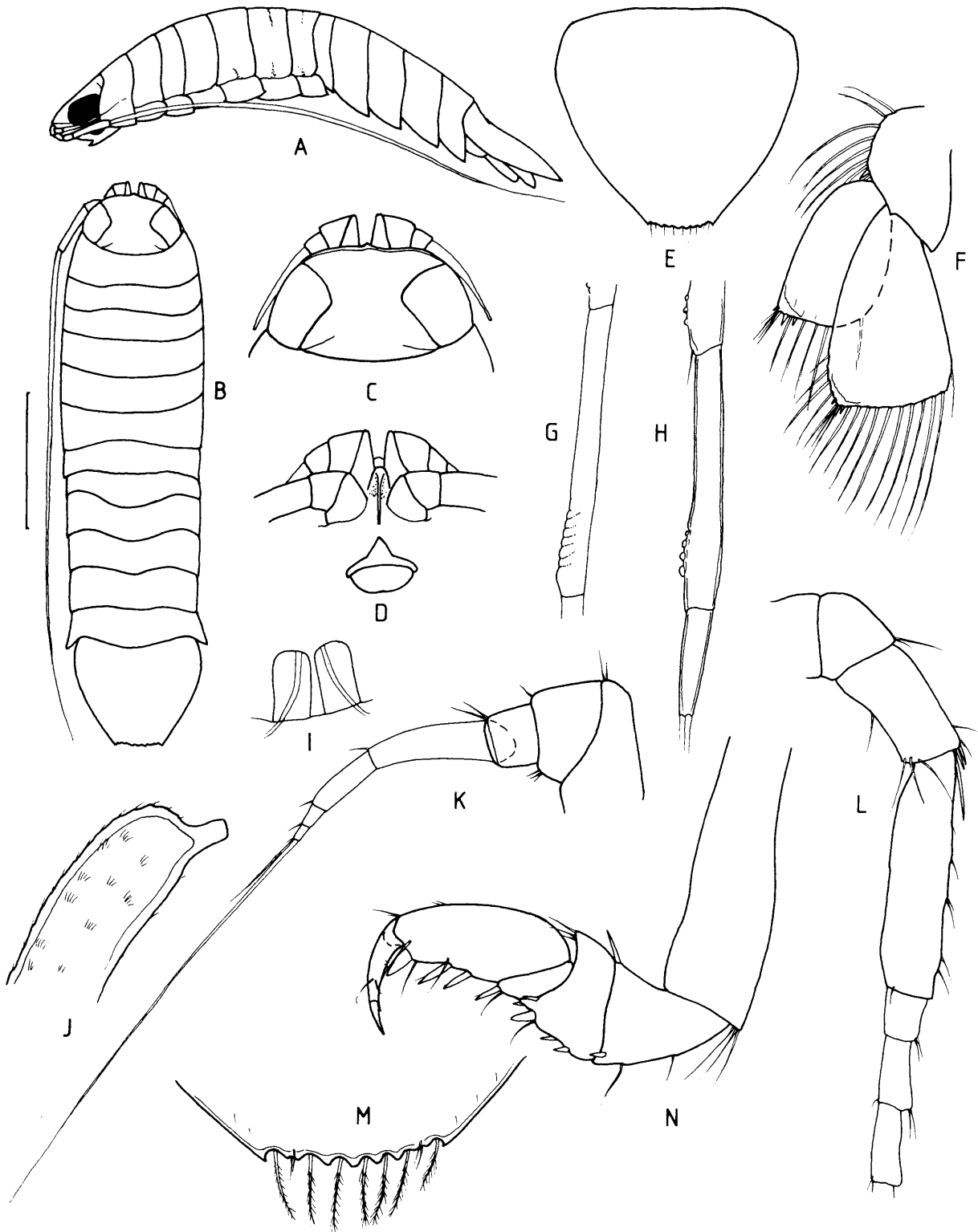


Fig. 9. *Eurydice orientalis*. A-C, male 3.9 mm, Lizard Is.; D, male 5.0 mm Barrow Is.; remainder male 3.7 mm, Lizard Is. A, lateral view; B, dorsal view; C, cephalon, dorsal view; D, clypeal region; E, pleotelson; F, uropod; G, antenna, flagellar article 12; H, antenna, flagellar articles 20, 21; I, penes; J, appendix masculina, apex; K, antennule; L, antennal peduncle; M, pleotelson, posterior margin; N, pereopod 1. Scale 1.0 mm.

always simple; lateral dentation not prominent.

Antennule peduncle articles 1-2 subequal in length, article 3 slightly shorter; flagellum with 4 articles, article 1 twice as long as 2, while 3 and 4 short; article 4 with stiff setae greater in length than peduncle. Antenna flagellum composed of about 21 articles, extending beyond pleotelson; flagellum articles become longer and very slender towards distal end; distal articles with plicate process which, on articles 19-21, form into small tubercles.

Anterior margin of frontal lamina rounded; clypeus with medial half produced to form triangular process. Maxilliped with lateral margin strongly curved, palp article 3 about twice as wide as long, article 4 two and one half times wider than long.

Pereopod 1 with 3 spines on posterior margin of merus, carpus with 1 and propodus with 2 acute spines on palm; ischium with single spine at anterodistal angle and 1 on medial distal margin. Pereopods 2 and 3 similar to pereopod 1 but with additional spine on posterior margin of ischium. Pereopod 7 with margins of merus and carpus with 1 group of marginal spines and cluster at each distal angle; propodus with 2 spines on anterior margin and 2 spines on posterior margin as well as

terminal spines on either side of the dactylus base.

Penes set close together, twice as long as broad.

Pleopod 2 appendix masculina extending beyond endopod by a little more than 0.1 its width (about 0.2 of the length of the appendix masculina), broadest distally, lateral margin with short apical projection. Uropod rami margins slightly convex; medial margin of exopod noticeably rounded. Exopod less than twice (1.7) as long as wide, distal margin with 7 plumose setae and 2 spines, lateral margin with 1 spine. Endopod with 10 plumose setae on distal margin, 4 on lateral margin, and 2 small spines on either side of lateral distal angle. Peduncle lateral margin with 8 plumose setae and single spine.

Female. No female specimens were seen that could be positively assigned to this species. Those from Wistari Reef, Capricorn Group were tentatively included.

Variation. The specimens from Barrow Island, while identical with respect to pereon, pleon and pleotelson morphology, the form of the appendix masculina, penes and maxilliped, differed slightly in the form of the articles of the antennal flagellum. In the specimens from eastern Australia, the distal articles are extremely

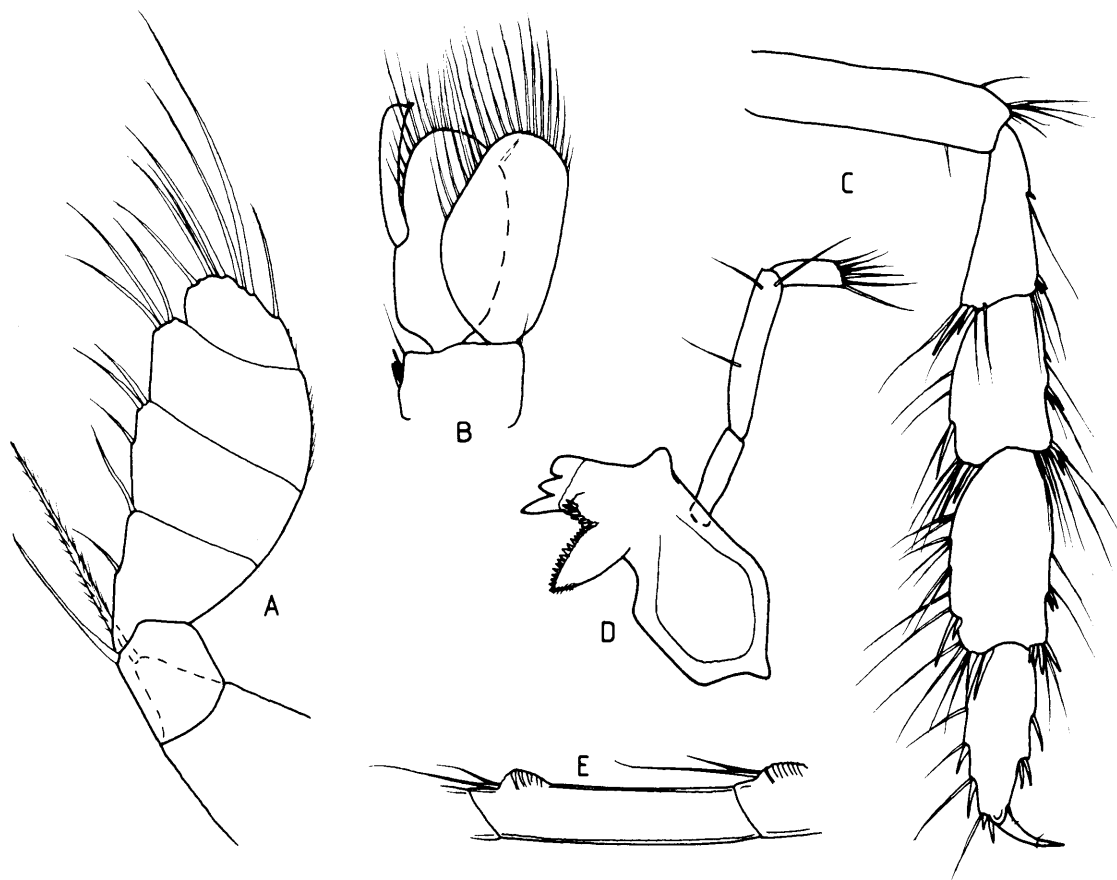


Fig. 10. *Eurydice orientalis*. A, E, D, male 4.5 mm, Barrow Is.; remainder male 3.7 mm, Lizard Is. A, maxilliped; B, pleopod 2; C, pereopod 7; D, mandible; E, antenna, flagellar article 23.

slender, and the plicate process is feebly developed. In Barrow Island specimens the flagellum has more articles (26 versus 21) and these are shorter with a prominent plicate process.

Colour. Barrow Island specimens are all dark brown. Lizard Island specimens are white to cream with black chromatophores.

Size. Largest specimen 5.0 mm.

Remarks. The type specimens of *Eurydice orientalis* are, due to their age, in a somewhat rubbed and fragile state. Comparison of Australian material to the syntypes revealed few differences. The antennular flagellum in Hansen's specimens is composed of 6 articles, with the penultimate article longest. In Australian specimens, the antennular flagellum is composed of 4 articles. Neither of Hansen's specimens had the lateral margins of pleonite 5 expressed outward. Until further material is available the Australian and Java Sea material are considered conspecific.

The males of this species can be identified by the form of the pleon, with the lateral margins of pleonite 5 only expressed outwards, the relative shortness of pereonite 7, and the posterior margin of the pleotelson with the lateral dentitions most prominent. The characters that separate males include the appendix masculina extending only a short way beyond the endopod, and the lengths of the antennular and antennal flagellum. Females have not yet been positively identified, and although female *E. minya* and *E. woka* can be separated, *E. wyuna* females as yet cannot be separated from *E. orientalis*.

Distribution. In Australia, recorded from Barrow Island in tropical Western Australia and along the eastern coast as far south as Heron Island, Qld. Also recorded from the Philippines (Richardson, 1910), Indonesia (Nierstrasz, 1931), Papua New Guinea (Nierstrasz, 1930), Sri Lanka (Barnard, 1936) and Indo-China (Monod, 1934). Monod's (1934) record seems unlikely to be this species as the uropodal exopod is clearly far narrower than in *E. orientalis*. All records other than Hansen's and the present records should be regarded with caution.

Eurydice woka n. sp.

Figs 11, 12

Eurydice orientalis.—Bruce, 1980a: 110, fig. 1 (Part) (not *Eurydice orientalis* Hansen, 1890).

Material examined. 6 males (4.2, 4.4, 4.5, 4.6, 4.7, 4.8 mm), Heron Is., Capricorn Group, Qld, 1980, from night plankton, Heron-Wistari Channel. Female (4.2 mm), Heron Is., Capricorn Group, Qld, 1980, night plankton, coll. A.J. Bruce. 6 males (3.7, 3.8, 4.4, 4.8, 5.0 mm), female (3.8 mm), 3 manca (2.7, 2.6, 3.2 mm), Heron-Wistari channel, Capricorn Group, Qld, 23 Nov. 1978, night plankton, coll. D Fisk.

Types. Holotype, male, QM W9801. Paratypes, QM W9802-W9804; AM P32377; USNM 190719.

Type locality. Heron Island, Capricorn Group, Great Barrier Reef, Qld, 23°26.5'S, 151°43.5'E.

Description of male. Body nearly 4 times as long as wide. Cephalon anterior margin only slightly indented, with obscure rostral point. Pereonites 2–6 becoming progressively longer; pereonite 7 shorter than 6. Coxae of pereonites 5 and 6 each with small point at posterior ventral angle. Pleonites all well exposed, lateral margin of pleonites 2–5 slightly expressed laterally; posterolateral margin of pleonite 5 very slightly convex. Pleotelson with dorsal depression faint; lateral margin convex, converging smoothly to posterior margin which is provided with 4 plumose setae, and less than 0.2 of the maximum width of pleotelson.

Antennule peduncle articles 1–2 subequal in length, article 3 slightly longer, flagellum composed of 4 articles, first being 5 times longer than wide, second shorter than first but elongate, and articles 3 and 4 short; article 4 bears 1 long stiff seta which is greater than length of peduncle and flagellum combined; flagellum including seta extends to pereonite 3. Antenna peduncle articles 1 and 2 short, article 4 twice as long as article 3; flagellum composed of about 30 articles, extending to pleotelson; articles becoming progressively longer distally, plicate process barely developed.

Frontal lamina anterior margin appearing rounded; clypeus with median half triangular, produced and projecting.

Pereopod 1 without spines on ischium, merus with 3 spines on posterior margin, anterior margin with about 5 setae; merus with single spine at posterodistal angle; propodus with 3 acute spines on palm, and robust spine opposing dactylus. Pereopods 2 and 3 similar to 1, with additional spines on posterior margin of ischium, propodus with only 2 spines on palm. Pereopods 4–7 similar, pereopod 6 longest. Pereopod 7 with basis and ischium slender; ischium with single spine on posterior margin and 2 spines at posterodistal angle, anterodistal angle with 2 large spines; merus with 3 groups of spines on each margin; carpus with 4 groups of spines on posterior margin, anterior margin with only 2 groups of spines, but with 3 groups of setae; propodus with 4 groups of spines on posterior margin, anterior margin with 2 groups of spines and 2 groups of setae.

Penes set close together on sternite 7, rectangular in shape, about twice as long as wide.

Pleopod 2 appendix masculina exceeding endopod by 0.2 its length, slightly curved, apex rounded, with small blunt process on lateral margin; surface with microtrichs. Uropod endopod truncate, all margins very nearly straight; posterior margin with 13 plumose setae, lateral angle with 1 small spine on either side, lateral margin with 3 short setae. Exopod shorter than endopod, posterior margin subtruncate with 8 plumose setae and 2 small spines, lateral margin with single small spine. Peduncle lateral margin with 7 long plumose setae and single spine; medial margin with single seta.

Female. Pleonite 1 not as produced as in male, pleon length shorter. Both antennule and antenna with flagellae much shorter; antennal flagellum with about 15 articles extending to pereonite 6 or 7; distal articles

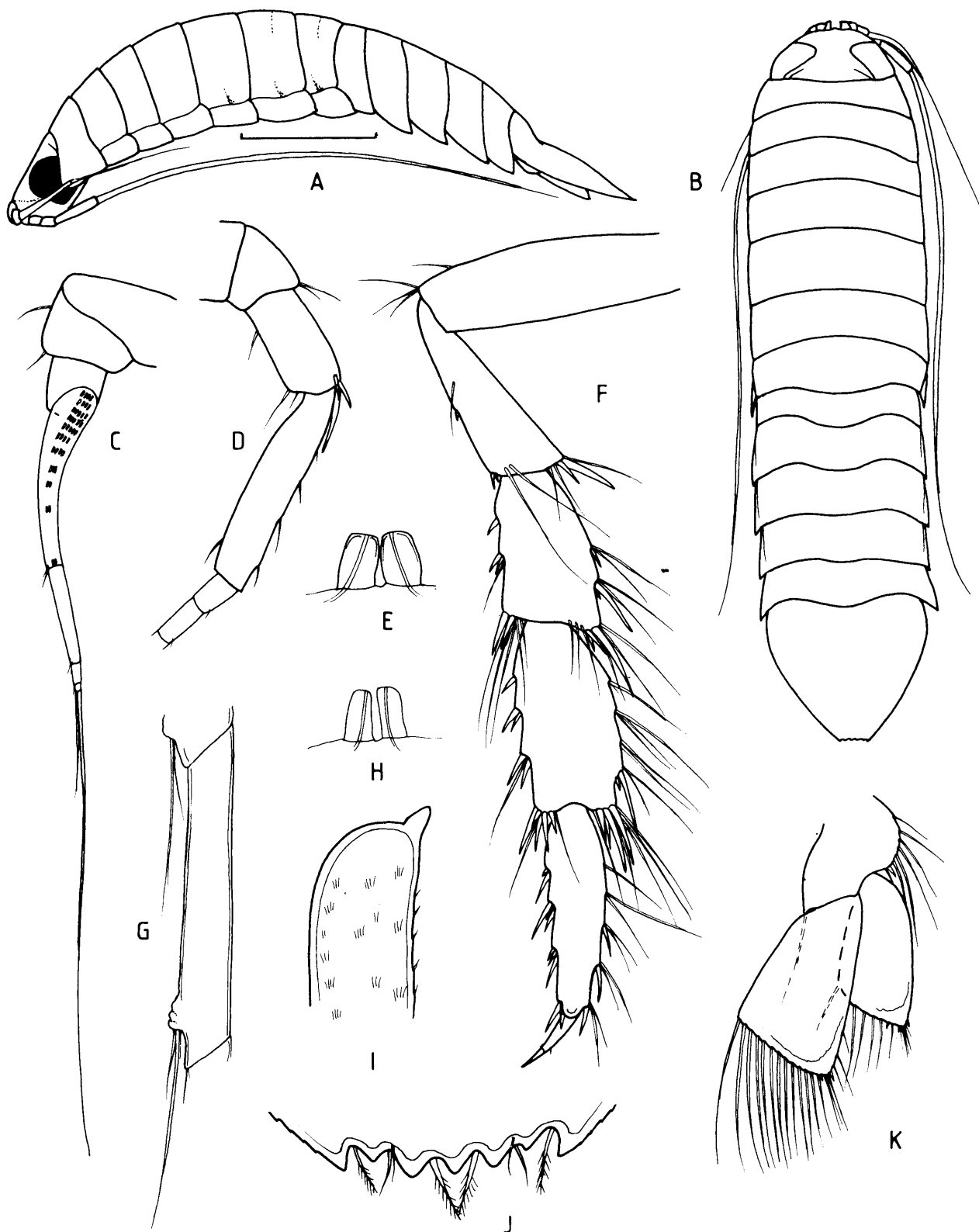


Fig. 11. *Eurydice woka* n. sp. A, B, H, holotype; remainder male paratype 4.6 mm. A, lateral view; B, dorsal view; C, antennule; D, antennal peduncle; E, penes; F, pereopod 7; G, antenna, flagellar article 20; H, penes (in situ); I, appendix masculina, apex; J, pleotelson, posterior margin; K, uropod. Scale 1.0 mm.

elongate. Pereopod 6 and 7 somewhat shorter than in male.

Colour. Translucent in life with black and brown chromatophores forming transverse bands. In alcohol, pale cream.

Size. Males range 3.7–5.0 mm, average 4.5 mm. Females up to 4.2 mm. Largest manca 3.2 mm.

Remarks. This species is at once separated from all

others by the narrowness of the posterior margin of the pleotelson, which is less than one fifth of the maximum width. This character is clearly visible in females and mancas. The male appendix masculina is similar to others of this group, but the apical projection is shorter than in most species.

Stebbing (1910a) described and briefly figured *Eurydice humilis*. This species is very close to the Australian form but the description and figures do not

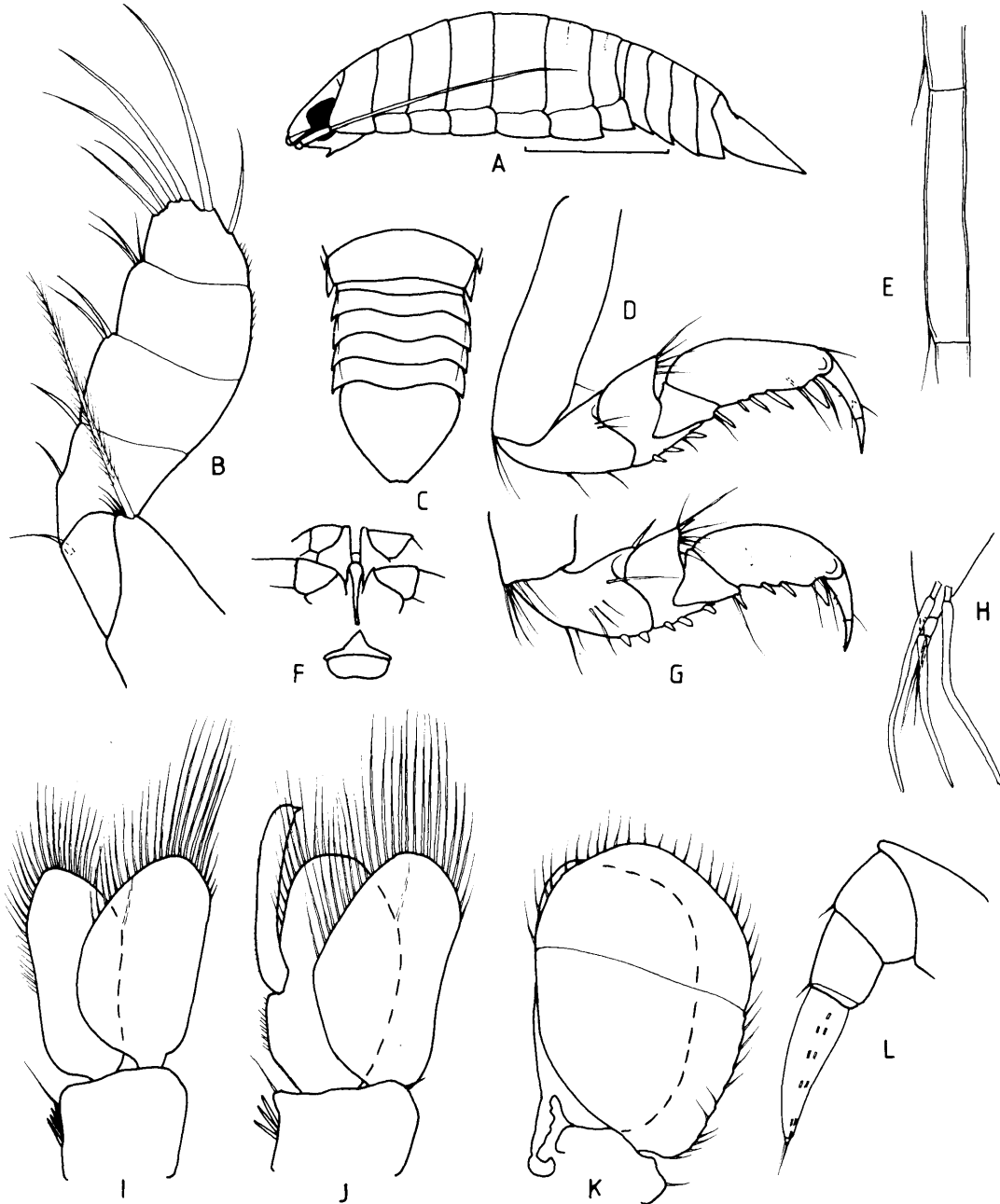


Fig. 12. *Eurydice woka* n. sp., paratypes: B, male 4.5 mm; A, C, E, H, L, female 3.8 mm; remainder male 5.0 mm. A, lateral view (female); B, maxilliped; C, pleon and pleotelson; D, pereopod 1; E, antenna, flagellar article 13; F, clypeal region; G, pereopod 2; H, antennule, flagellum apex; I, pleopod 1; J, pleopod 2; K, pleopod 5; L, antennule. Scale 1.0 mm.

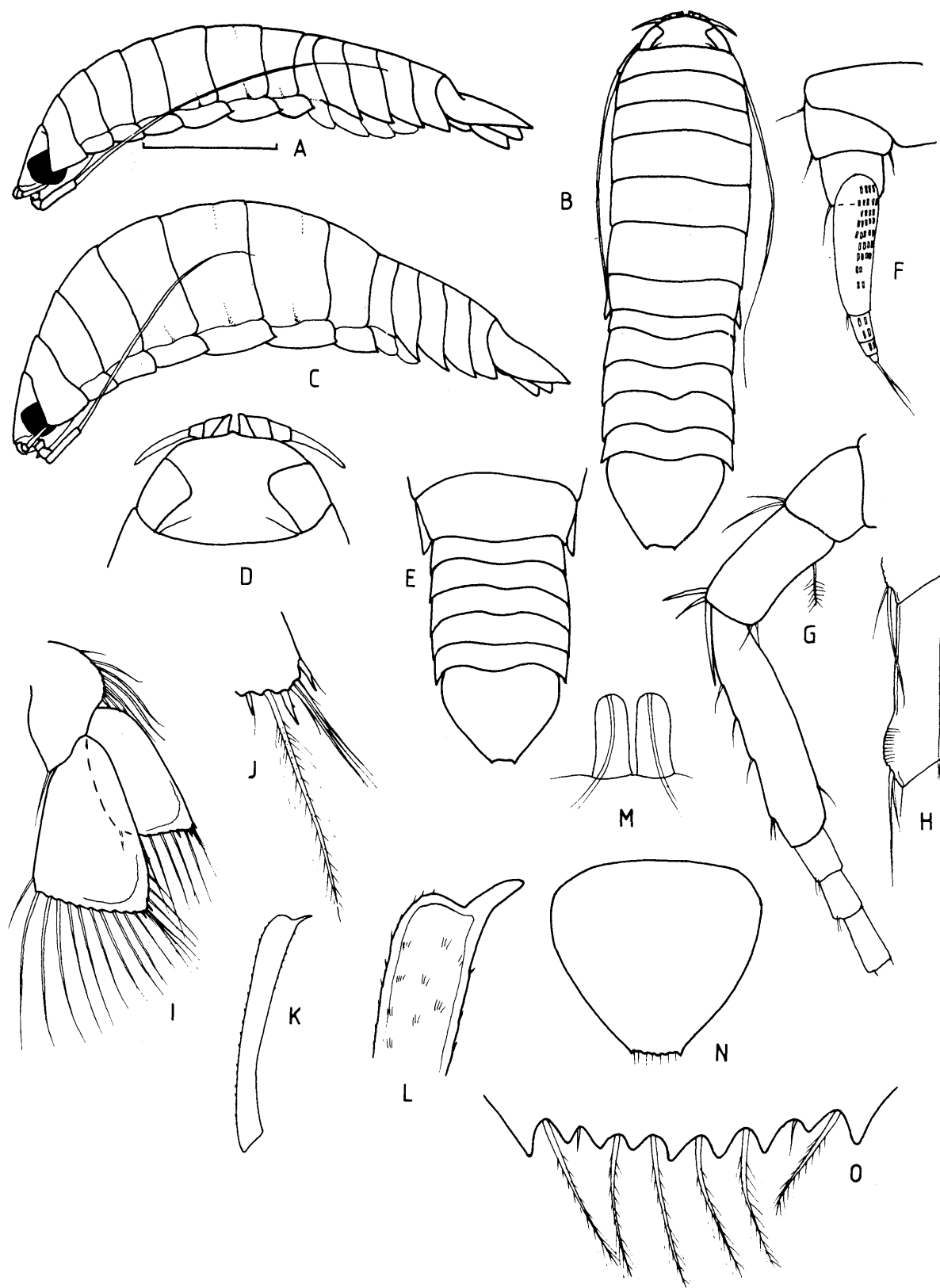


Fig. 13. *Eurydice wyuna* n. sp. **A, B, D**, holotype; **C, E** female paratype 4.4 mm; remainder male paratype 3.7 mm. **A**, lateral view; **B**, dorsal view; **C**, lateral view (female); **D**, cephalon, dorsal view; **E**, pleon and pleotelson; **F**, antennule; **G**, antennal peduncle; **H**, antenna, flagellar article 15; **I**, uropod; **J**, uropod exopod, distolateral angle; **K**, appendix masculina; **L**, appendix masculina, apex; **M**, penes; **N**, pleotelson; **O**, pleotelson, posterior margin. Scale 1.0 mm.

allow many comparisons to be made. It appears that *E. humilis* has an equally narrow posterior margin but it is not truncate as in *E. woka*. Unfortunately, the holotype of *E. humilis* appears to have been lost.

Distribution. Known only from the type locality.

Etymology. *Woka* is an Aboriginal word meaning to swim.

Eurydice wyuna n. sp.

Figs 13, 14

Eurydice orientalis.—Bruce, 1980a: 110, fig. 1 (Part) (not *E. orientalis* Hansen, 1890).

Material examined. 32 males (3.5–4.7 mm, mean 3.9mm), 6 females (3.5–4.4 mm, mean 3.9 mm), manca (3.6 mm), Heron Is., Qld, 1979, night plankton, Heron-Wistari channel,

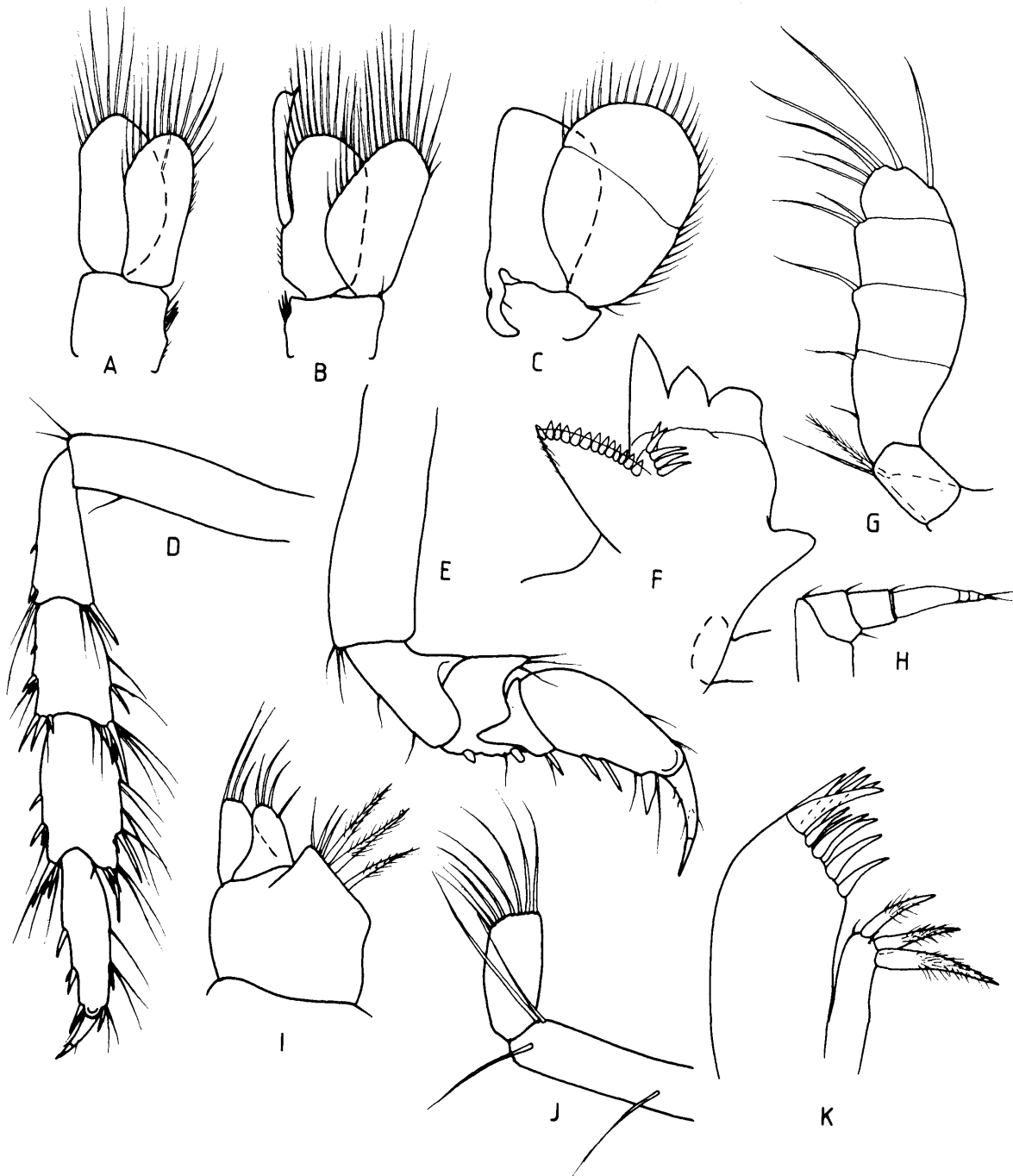


Fig. 14. *Eurydice wyuna* n. sp. H, male paratype 3.7 mm, remainder male paratype 3.9 mm. A, pleopod 1; B, pleopod 2; C, pleopod 5; D, pereopod 7; E, pereopod 1; F, mandible; G, maxilliped; H, antennule; I, maxilla; J, mandibular palp, terminal article; K, maxillule.

coll. D. Fisk. 2 males (3.8, 3.1 mm), 3 manca (1.9, 2.0, 2.5 mm), Heron Is., Qld, 20 Nov, 1979, surface night plankton, at mouth of boat channel, coll. B. Hodgson.

Types. Holotype, male, QM W9792. Paratypes, QM W9793, W9794; AM P32378; USNM 190720.

Type locality. Heron Island, Great Barrier Reef, Qld, 23°26.5'S, 151°54.5'E.

Description of male. Body about 3.5 times as long as wide, cephalon with feeble rostral point, anterior margin not indented. Pereonites 1–6 becoming progressively longer, pereonites 7 slightly shorter than 6; coxal plates of pereonites 5–7 with small points at posteroventral angle. Pleonites all visible, lateral margins not expressed outwards. Pleotelson lateral margins very slightly convex, posterior margin slightly more than 0.2 maximum width of pleotelson, lateral dentations prominent; provided with 6 plumose and 2 small simple setae.

Antennule peduncle articles short, article 3 slightly longer than 2; flagellum extends to posterior of cephalon, composed of 1 long and 3 short articles, provided with numerous aesthetascs. Antenna flagellum composed of 25 articles, extending to pleonite 3 or 4; articles become progressively longer towards the distal end of flagellum, each provided with obvious plicate process.

Frontal lamina, clypeus and mouthparts generally similar to those of *E. orientalis*; maxilliped somewhat more slender than in related species.

Pereopod 1 with 2 blunt spines on posterior margin of merus; carpus with single acute spine; propodus with 2 acute spines on palm. Pereopod 7 with margins of ischium to basis with 2 groups of spines as well as at distal angle; anterior margin of merus to propodus with spines at distal angle, and further single or pair of spines on margin.

Penes flat, about twice as long as broad.

Pleopod 2 appendix masculina extending beyond endopod by about 0.33 of its length; broadest distally with well developed apical process on lateral margin. Uropod rami about twice as long as broad. Endopod distal margin very nearly truncate, provided with 6 plumose setae and 2 acute spines, lateral margin with single spine at distal angle. Endopod medial and distal margins straight, lateral margin very slightly convex; distal margin with 11 plumose setae; lateral angle with spine on either side. Peduncle lateral margin with 7 plumose setae and 1 spine.

Female. Pleon distinctly narrower than pereon, segments shorter than in male. Antennule peduncle article 3 slightly longer than male; antennal flagellum shorter, extending to pereonite 6, composed of about 18 articles, without plicate processes.

Colour. Black and brown chromatophores scattered over dorsal surface giving an overall dark brown or black banded appearance. Chromatophores present on pereopods.

Size. Both males and females from the large sample averaged at 3.9 mm.

Remarks. *Eurydice woka* and *E. minya* are both easily separated from *E. wyuna*. *Eurydice woka* has an extremely narrow pleotelson hind margin, and the males also have longer antennae and antennules, while *E. minya* can be separated by pleonite 1 being almost entirely hidden by pereonite 7.

Mature male *Eurydice orientalis* can be separated by having longer antennule and antennal flagellae, by having the lateral margins of pleonite 5 produced outwards, and also by having a proportionally shorter appendix masculina. Other differences include the antennal flagellum articles being longer (not true for the Western Australian specimen from Barrow Island), and the uropods being broader than in *Eurydice wyuna*.

The males have been separated from mixed samples taken from Heron Island. Separation of females remains a problem. The diagnostic characters of the antennal flagellum are absent from females, as are those of the pleon. Until female specimens can be positively assigned to *E. orientalis*, separation of females remains in doubt.

Distribution. Known only from the vicinity of Heron Island, Queensland.

Etymology. *Wyuna* is an Aboriginal word meaning clear water.

Eurydice minya n. sp.

Figs 15, 16

Eurydice orientalis.—Bruce, 1980a: 110, fig. 1 (Part) (not *E. orientalis* Hansen, 1890).

Eurydice inermis.—Holdich, Harrison & Bruce, 1981: 599, fig. 16 (not *Eurydice inermis* Hansen, 1890).

Material examined. 4 males (2.7–3.5 mm, average 3.24 mm), 15 females (2.5–3.9 mm, average 3.17 mm), Halifax Bay, Townsville, Qld, 23 Nov. 1976, soft mud on sandy mud, and particulate substrata 2.5–10.8 m. 2 males (3.1, 3.2 mm), N.E. channel, Cleveland Bay, Townsville, Qld, 17 Apr. 1976, plankton sample. Male (2.7 mm), 2 females (3.0, 3.1 mm, ovig.), Halifax Bay, Townsville, Qld, 23 Feb. 1977, soft mud on sandy mud, all JCUNQ. '3-Bays Survey'. Male (3.7 mm, damaged), 2 females (3.8, 3.5 mm), Heron Island, Qld, 1979, night plankton, Heron-Wistari channel, coll. D. Fisk. Male (3.2 mm, sub-adult), 5 females (2.9, 3.5, 3.5, 3 and 3.7 mm), Heron Island, Qld, 12 June 1978, boat harbour, coll. NLB.

Types. Holotype, male, QM W9766. Paratypes, QM W7816, W7817, W7924, W9767–W9771, W9841–W9845; AM P32379; USNM 190718.

Type locality. Halifax Bay, Townsville, Qld, 19°09'S, 147°19'E.

Description of male. Body about 3 times as long as wide. Cephalon with feeble rostral point, anterior margin scarcely indented. Coxae with obscure point on ventral posterior angle. Pleonite 1 almost entirely concealed by pereonite 7, pleonites 2–4 with lateral margins not expressed outwards, posterolateral margin of pleonite 5 tending to be slightly convex. Pleotelson posterior margin provided with 8 plumose setae and 2 short simple setae.

Antennule peduncle articles 2–3 subequal in length; flagellum composed of 4 articles, first of which is

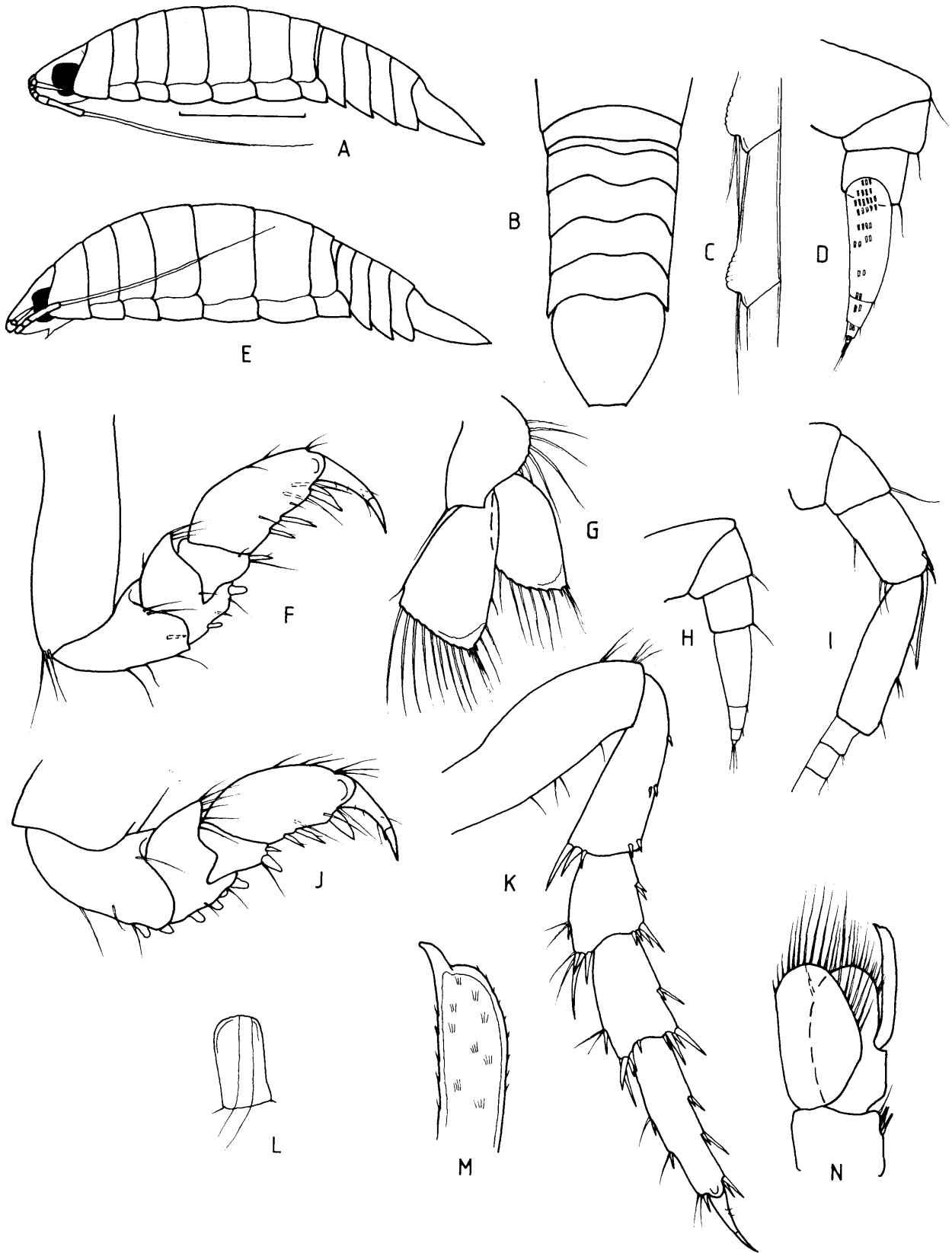


Fig. 15. *Eurydice minya* n. sp. A, B, holotype; E, H, I, female 3.5 mm, Townsville; remainder male 3.7 mm, Heron Is. A, lateral view; B, pleon, dorsal view; C, antenna, flagellar article 17; D, antennule; E, lateral view; F, pereopod 1; G, uropod; H, antennule; I, antennal peduncle; J, pereopod 2; K, pereopod 7; L, pene; M, appendix masculina, apex; N, pleopod 2. Scale 1.0 mm.

distinctly longest. Antenna flagellum extending to pereonite 6-7, composed of about 20 articles, articles 5 onwards each with distinct plicate process.

Frontal lamina, clypeus and mouthparts not differing from others of the *E. orientalis* group.

Pereopod 1 with 2 stout spines on posterior margin of merus, 1 acute spine on posterior margin of carpus, and propodus with 2 acute spines on palm. Pereopod 2 similar to 1 but with additional and larger spines. Pereopod 7 without setae on posterior margin of ischium to propodus; anterior margin sparsely setose.

Penes subrectangular in shape, about twice as long as broad.

Pleopod 2 appendix masculina extending beyond endopod by about 0.33 of its length, distolateral margin with pointed process. Uropod with both rami about twice as long as broad. Exopod lateral and distal margins merging smoothly; distal margin not truncate, provided with 6 plumose setae and 2 small acute spines; lateral margin with single small spine. Endopod with 10 plumose setae and 1 spine on truncate distal margin; lateral margin slightly convex with 3 setae and 1 acute spine. Peduncle lateral margin with 6 plumose setae and single spine.

Female. Generally similar to male, lacking plicate process on flagellar articles of antenna. Pereopod 7 somewhat broader and distinctly more setose than male.

Colour. Pale brown to white in alcohol, with transverse bands of black and brown chromatophores. In life, translucent but for the chromatophores.

Size. The average size of males from Townsville area was 3.24 mm and females 3.17 mm. The only fully

mature male specimen was a damaged one from Heron Island measuring 3.7 mm.

Remarks. As with the other species of this group, the morphology of many of the appendages are so similar as to be taxonomically useless. The characters by which this species can be consistently separated from others is the very short pleonite 1, antennal flagellum not extending beyond the pereon, and males having pereopod 7 almost without setae.

This species was recorded as *Eurydice orientalis* by Bruce (1980c) and as *Eurydice inermis* by Holdich et al. (1981). Comparison with the types of *E. inermis* showed that the two species are separate. The appendix masculina of each species is clearly distinct, and other points of difference are pleonite 1 of *E. minya* being shorter, the antennal peduncle of the female with shorter articles, and the uropodal exopod broader.

There exist two other records of *E. inermis* from the Indo-Pacific region. The first was that of Pillai (1967). There are numerous differences between Pillai's figures and those of Hansen (1890, 1905) and the Australian species. It seems probable from Pillai's figures that his species is new. The second record was given by Bruce & Jones (1978) who expressed some doubt as to the validity of their *E. inermis* determination. In view of the differences in appendix masculina shape and of the presence of several closely similar species in Australia, it seems likely that the Red Sea species is not *E. inermis* but another, possibly new, species.

Distribution. Heron Island and Townsville, Queensland.

Etymology. *Minya* is an Aboriginal word meaning small, and alludes to the small size of the species.

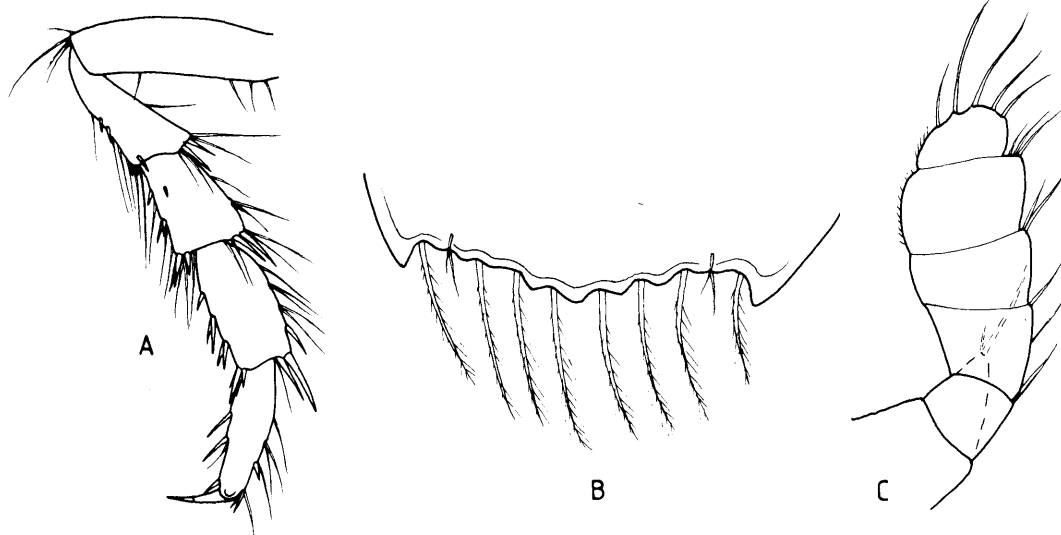


Fig. 16. *Eurydice minya* n. sp. All specimens from Townsville. **A**, pereopod 7 (female); **B**, pleotelson, posterior margin (male); **C**, maxilliped (female).

Metacirolana Nierstrasz

Metacirolana Nierstrasz, 1931: 147, 162.—Kussakin, 1979: 212; Bruce, 1981b: 950, figs. 1f-i, 2c-f; 3c,d; 4b; 5e,g.
Paracirolana Nierstrasz, 1931: 147.

Type species. *Cirolana japonica* Hansen, 1890; designated by Kussakin (1979), not Nierstrasz (1931) who merely indicated the two species be placed within the genus. Holotype held by the Zoologisk Museum, Copenhagen, Denmark.

Diagnosis. Pereonites 1–2 subequal in length. Pleonite 5 lateral margins not overlapped by pleonite 4. Antennule peduncle articles colinear, article 2 longest. Antenna peduncle 5-articulate. Frontal lamina anterior margin dilated, freely projecting; clypeus with downwardly projecting triangular blade. Maxillule endopod spines slender, feebly plumose. Maxilliped endite with one coupling hook. Pereopods 5–7 slender, with few setae or spines. Pleopods rounded, only endopod of pleopod 5 without setae; appendix masculina inserted basally or sub-basally. Uropod peduncle medial margin produced, rami with setae on all margins.

Additional characters. Body generally twice as long as wide, posterior pereonites and pleon may be sculpted. Pleon lateral margins extending out horizontally.

Antennule 4-articulate; antenna peduncle article 5 longest. Left mandible incisor with accessory tooth on lateral margin. Maxillule endopod spines either without setules or feebly plumose. Maxilla palp and exopod tending to be reduced. Maxilliped palp articles slender. All pereopods ambulatory with few spines or setae. Pereopods 1–3 short, merus anterodistal margin not produced; 4–7 with articles not flattened; dactyls with secondary unguis feeble or absent. Pleopods undifferentiated, rami similar; peduncle broader than long, without lobes. Pleotelson and uropods usually feebly plumose, with or without spines.

Sexual dimorphism. The flagellum of the antennule tends to be longer in the male. The males are also often more slender and with a longer pleon than the females.

Remarks. Bruce (1981b) has discussed the taxonomy of the genus. The genus is readily identified by the long second article of the antennule peduncle, the projecting clypeus, dilated frontal lamina, and pleonal and mouthpart morphology. In some species the fifth pleonite is partially overlapped by the fourth.

The genus is clearly related to the genera *Colopisthus* and *Arubolana*. The single species of *Colopisthus* occurs in the Caribbean (Menzies & Glynn, 1968) and West Africa (Monod, 1952) and, from the generic diagnosis given by Richardson (1905) and Menzies & Glynn (1968), the similarities of the two genera can be seen. The figures, given by Monod (1952) and Menzies & Glynn (1968), of the mouthparts demonstrate the close affinities of the two genera. The dominating difference is that *Colopisthus* has the pleon with four segments (Menzies & Glynn, 1968) or, as Monod (1952) describes it, two free pleonites. The genus *Arubolana* shows clear affinities with *Metacirolana* in the overall appearance and in the morphology of mouthparts, antennae and pereopods. This is a brackish-water species that has a near terminal appendix masculina.

Some authors considered two new genera were necessary to contain species now placed in *Metacirolana* (Racovitza, 1912; Nierstrasz, 1931), while Stebbing (1910a) thought *M. sphaeromiformis* sufficiently similar to the genus *Hansenolana* as to include it in that genus. While shape is similar to some species of *Metacirolana*, the appendages of *Hansenolana* are of the same form as those of genera such as *Cirolana* and *Neocirolana*. Species within the genus can be grouped according to eye size and body shape, those with small eyes having a dorsoventrally compressed body. These differences do not, at present, merit generic status.

Key to Australian Species of *Metacirolana*

1. Pleotelson with ridges. *M. rugosa*
—Pleotelson unornamented. 2
2. Pleotelson, uropods prominently spinose. *M. spinosa*
—Pleotelson, uropods without spines. 3
3. Eyes small; lateral margins of pleonites rectangular. *M. nana*
—Eyes not small; posterolateral margin of pleonites acute. 4
4. Pleotelson moderately narrow. 5
—Pleotelson broad. 6
5. Pleotelson apex converging smoothly; medial margin of uropodal endopod sinuate. *M. japonica*
—Pleotelson apex subtruncate; uropodal endopod broadly rounded. *M. basteni*
6. Pleotelson broadly rounded; uropods feebly serrate. *M. anatola*
—Pleotelson and uropods distinctly serrate. *M. serrata*

Metacirolana basteni (Bruce)

Fig. 17A, B

Cirolana basteni Bruce, 1980b: 166, figs 5, 6.
Metacirolana basteni.—Bruce, 1981b: 954.

Types. Types held at the Queensland Museum Brisbane (additional paratypes at the AM, BM(NH), and USNM).

Type locality. North Cay, Chesterfield Reefs, Coral Sea (Bruce, 1980b).

Remarks. *Metacirolana basteni* is most similar to *Metacirolana rotunda* (Bruce & Jones, 1978). The

antennule and uropodal exopod are shorter in *M. basteni*, which also lacks the carina on the lateral margins of pereonites 6 and 7 and the median carina of the pleotelson.

A similar species, *M. serrata* (Bruce, 1980a), has been described from the Barrier Reef, and *M. basteni* can be distinguished from that species by the broadness of the uropodal endopod, and the telson being truncate and angular rather than smoothly rounded.

Distribution. Mellish Reef and Chesterfield Reefs, Coral Sea.

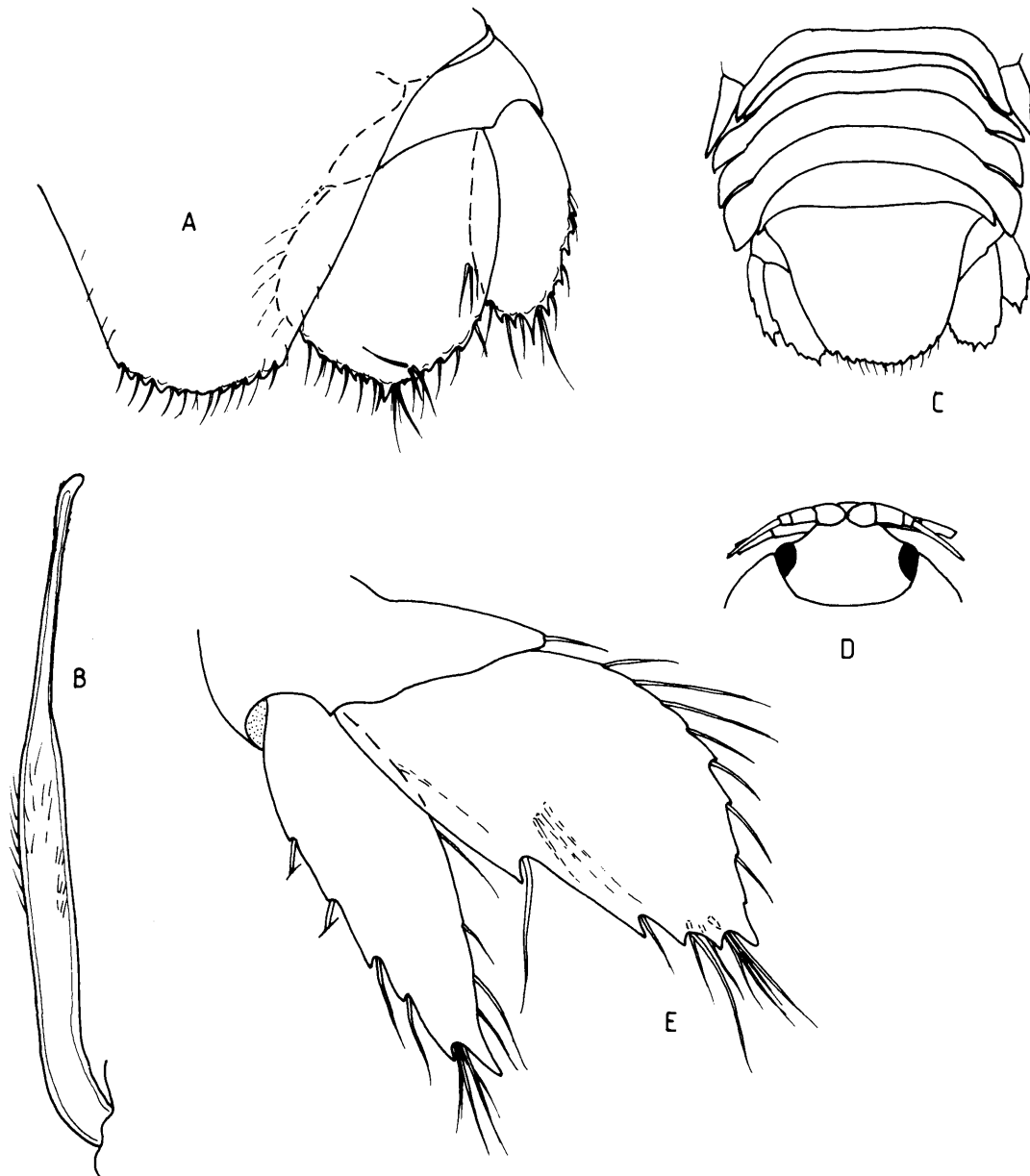


Fig. 17. *Metacirolana basteni*: A, pleotelson and uropod; B, appendix masculina. *Metacirolana nana*: C, pleon, pleotelson; D, cephalon; E, uropod.

Metacirolana serrata (Bruce)

Fig. 18

Cirolana serrata Bruce, 1980a: 115, figs 5–7.*Metacirolana serrata*.—Bruce, 1981b: 954.

Material examined. Lizard Island, Qld series: 2 males (2.5, 1.7 mm), 3 females (1.5, 2.0, 2.9 mm), 12 Dec. 1980, Granite Point, 10–12 m; 3 females (2.1, 2.4, 2.5 mm), 13 Dec. 1980, North Point reef, 11 m, and female (2.7 mm) at 7 m; female (2.1 mm), 14 Dec. 1980, W. of Palfrey Island, 7 m; 6 females (2.0–2.6 mm), 16 Dec. 1980, north of Crystal Beach, 1 m; all coll. NLB. Male (2.0 mm), 2 females (2.3, 2.0 mm), Lodestone Reef (east from Townsville), Qld, Aug. 1976, in dead coral on reef flat, coll. D.M. Holdich. Heron Island series: 2 females (3.3, 3.4 mm with embryos), 3 Jan. 1979, middle reef flat; manca (1.0 mm), 13 Jan. 1979, outer reef flat; female (3.2 mm), manca (1.3 mm), 28 Jan. 1979, inner reef flat; 2 females (2.0, 2.4 mm), 25 Apr. 1979, outer reef flat, N.W. Heron; male (2.7 mm), 10 Nov. 1979, nocturnal surface plankton, Heron-Wistari channel; 4 males (2.0, 3.0, 3.0, 3.2 mm), 19 Oct. 1979, nocturnal plankton, Heron reef lagoon; 2 females (1.9, 2.5 mm ovig.), 27 Nov. 1979, lagoon, 2 m; 2 females (2.3, 2.4 mm), 30 Nov. 1979, Wistari Reef slope, Heron-Wistari channel, 20 m; male (2.8 mm), 30 Nov. 1979, nocturnal plankton, harbour entrance; 3 females (1.6, 2.0, 2.3 mm), 8 Dec. 1979, Canyons, 7 m, all coll. NLB.

Types. Holotype held at the Queensland Museum, Brisbane.

Type locality. Heron Island, Capricorn Group, Australian Great Barrier Reef.

Colour. Semi-translucent with brown and white chromatophores in life. White in alcohol.

Size. Largest male 3.2 mm, largest female 3.4 mm.

Remarks. This species was originally described from a single male. Collection of further material reveals that

the specimen was an immature male. Figures are given of a mature male, which clearly illustrate the differences between immature specimens and mature males. Immature males are similar to females.

Distribution. Queensland: Heron Island and Wistari Reef, Capricorn Group; Townsville; Lizard Island.

Metacirolana nana (Bruce)

Fig. 17C–E

Cirolana nana Bruce, 1980b: 162, figs 2, 3.*Metacirolana nana*.—Bruce, 1981b: 954.

Types. Held at the Queensland Museum, Brisbane, Queensland.

Type locality. Long Island, Chesterfield Reefs, Coral Sea.

Remarks. The relatively small eyes, shape of the cephalon and clypeal morphology serve to identify this species.

Distribution. Known only from the type locality.

Metacirolana anatola n. sp.

Fig. 19

Material examined. Male (2.9 mm), female (2.8 mm, ovig.), east of Bowen, Qld, 20°16'S, 150°51'E, 12 May 1971, 85–100 m, large bottom dredge, coll. AM on HMAS *Kimbla*.

Types. Holotype, male, AM P32384; paratype, AM P30376.

Type locality. Off Bowen, Qld, 20°16'S, 150°51'E.

Description of male. Body about 2.5 times as long as wide. Cephalon with median rostral process; eyes

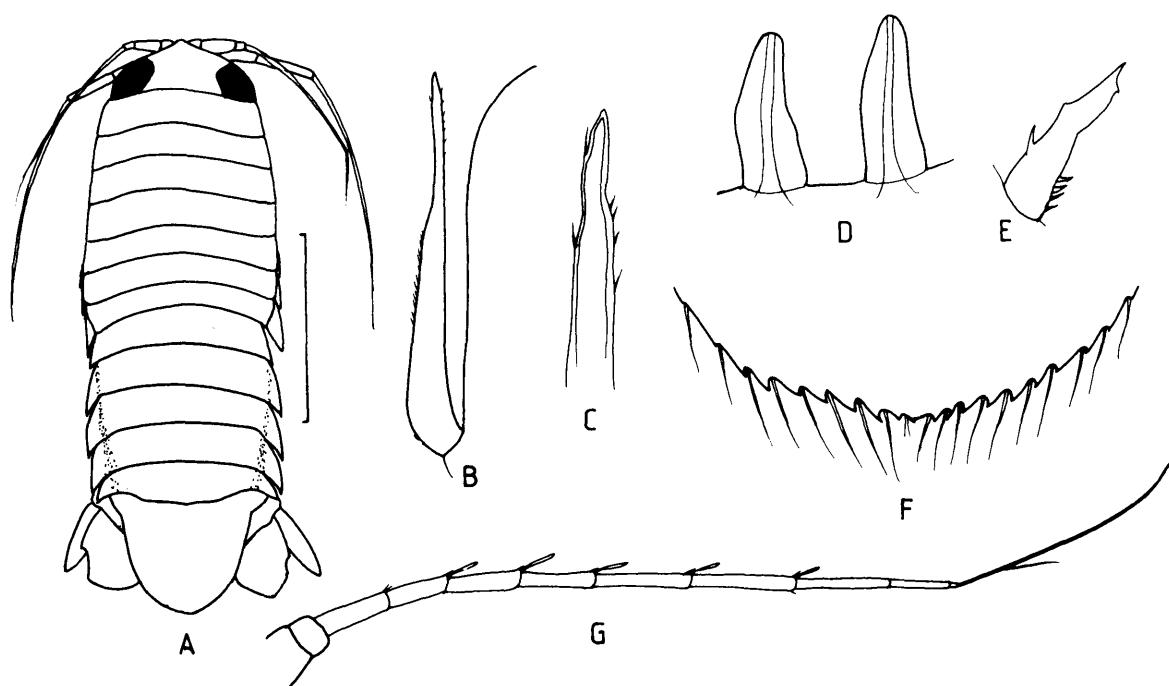


Fig. 18. *Metacirolana serrata*, male 3.0 mm. A, dorsal view; B, appendix masculina; C, appendix masculina, apex; D, penes; E, terminal spine, propodus, pereopod 1; F, pleotelson, posterior margin; G, antennal flagellum. Scale 1.0 mm.

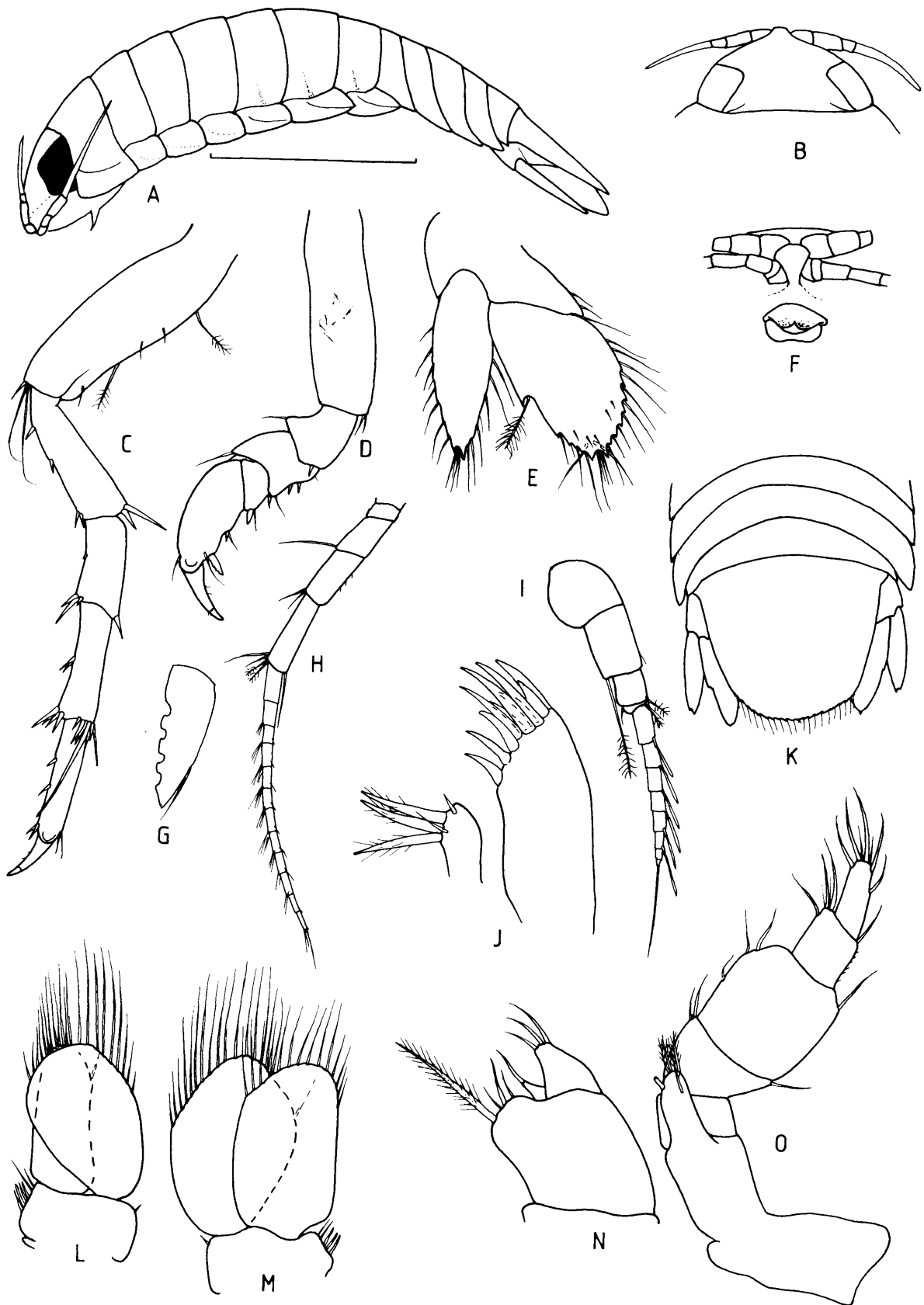


Fig. 19. *Metacirolana anatola* n. sp. A, B, F, K, L, M, male holotype; remainder female paratype. A, lateral view; B, cephalon, dorsal view; C, pereopod 7; D, pereopod 1; E, uropod; F, clypeal region; G, distal propodial spine; H, antenna; I, antennule; J, maxillule; K, pleon and pleotelson; L, pleopod 1; M, pleopod 2; N, maxilla; O, maxilliped. Scale 1.0 mm.

large. Pereonite 1 with single horizontal furrow. Coxae of pereonites 2–7 each with an indistinct furrow, furrows being slightly more prominent on posterior coxae. Pleonites with lateral margins not markedly produced horizontally. Pleotelson slightly shorter than greatest width; posterior margin finely serrated, provided with about 20 short plumose setae, each seta being set within serration; median pair of short simple setae, about 0.33 the length of setae.

Antennule peduncle article 3 about half as long as article 2; flagellum composed of about 8 articles, each with single aesthetasc; terminal article with single long spine. Antenna peduncle slender; flagellum extending to pereonite 2 with about 13 articles of which the first is longest.

Frontal lamina with anterior margin semicircular, freely projecting, basally constricted. Clypeus with posterior margin strongly produced, anterior portion of projection recessed. Maxillule with 10 spines on gnathal surface of exopod; endopod with 3 feebly plumose spines and 2 setae. Maxilla with exopod greatly reduced, palp with 3 setae; endopod with single large plumose seta and 3 simple setae. Maxilliped slender, sparsely setose, palp articles 3–5 rectangular in shape, endite with single coupling hook and 3 plumose setae.

Pereopods all slender, all sparsely setose. Pereopod 1 with 3 spines on posterior margin of merus, 1 spine on posterior margin of carpus, 1 spine on palm of propodus, and 1 large spine opposing dactylus. Pereopods 2–3 similar to pereopod 1, but propodus slightly less robust; 3–4 spines present on posterodistal angle of carpus. Pereopods 4–7 basically similar, increasing in length from 4–6, pereopod 7 being slightly shorter than pereopod 6. Pereopod 6 with spines only at anterodistal angles of all articles except basis; posterior margins except basis with medial spines.

Penes present on sternite 7, short, set adjacent to one another.

Uropods extending slightly beyond apex of pleotelson. Endopod with conspicuous sensory spine placed half way along lateral margin; medial margin with continuous row of plumose setae, distal half feebly serrate, apex bifid, medial process most prominent. Exopod subequal in length to endopod, both margins with setae; apex bifid, medial process most prominent. Both uropodal rami entirely without spines.

Female. In general similar to male but shorter, and the pereon broader. Female specimen has posterior angles of coxal plates more acute than in male.

Colour. Pale tan in alcohol.

Size. Up to 2.9 mm.

Remarks. This species is similar to the two shallow-water reef dwelling species, *M. serrata* and *M. nana*. In *M. serrata* the posterior margin of the pleotelson is less broadly rounded and more obviously serrate, the uropods are far broader, possess more setae, and the endopod of the maxilla is not as reduced. In *M. nana* the shape of the anterior margin of the cephalon differs, the eyes are smaller than in *M. anatola*, the shape of

the frontal lamina differs, and the lateral margins of the pleon segments are expressed horizontally.

The male lacked an appendix masculina on pleopod 2. Both second pleopods lacked this, and nor was there any trace of an emerging and developing appendix masculina. The holotype is an apparently mature male as the penes were distinct, and pereopod 7 was fully developed.

Distribution. Known from the type locality only.

Etymology. *Anatola* is a Greek word meaning southern.

Metacirolana japonica (Hansen)

Figs 20, 21

Cirolana japonica Hansen, 1890: 349, pl. 4, figs 2–21.—Tattersall, 1921: 208, pl. 2, figs 11–16; Monod, 1930: 135, 142, fig. 3; Roman, 1970: 167, 172, 192, 195.

Metacirolana japonica.—Nierstrasz, 1931: 162; Hurley, 1961: 267; Kussakin, 1979: 213, fig. 89; Bruce, 1981b: 952, 954, figs 1c,f; 2c,f; 3c,d; 4b; 5e,f.

Cirolana bathyalis Menzies & George, 1972: 19, figs 10, 11.

Material examined. Holotype, male (3.5 mm), Yeddo Light, Japan, 19 Aug. 1846, *Galathea*, Reinhart. Male (2.7 mm), Kei Is., West Irian, 5°29.5'S, 132°50.0'E, 15 May 1922, 290 m, in sand, shell concretions, coll. Th. Mortensen. 4 males (3.5, 3.7, 4.0, 4.3 mm), 5 females (3.3, 3.6 ovig., 3.8, 4.2 ovig., 4.7 mm ovig.), 8 manca (1.9–3.2 mm), off Sydney, NSW, 33°47'S, 151°43'E, 5 Dec. 1977, 192 m, coll. AM on FRV *Kapala*. 4 males (3.2, 3.6, 3.7, 3.8 mm), 4 females (3.7, 4.0 ovig., 4.1, 4.5 mm), east of Malabar, Sydney, NSW, 33°57'S, 150°19'E, 1973, 32 m, coll. AMSBS. Female (4.7 mm), off Sydney, NSW, 33°58'S, 151°29'E, 18 June 1962, 150 m, coll. CSIRO. Male (3.1 mm), off Port Kembla, NSW, 13 Dec. 1978, 161 m, dredged, coll. A.M. on FRV *Kapala*. Male (4.3 mm), between N.E. Tas. and Vic., 30°10'S, 149°55'E, 15 Sept. 1914, ring trawl, 360–450 m.

Types. Holotype held at Zoologisk Museum, Copenhagen, Denmark.

Type locality. Yeddo, Japan.

Descriptive notes. Anterior margin of cephalon somewhat produced, with minute rostral point; interocular furrow runs behind anterior margin. Faint furrow runs across posterior of each pereonite except pereonite 1. Frontal lamina with anterior part acutely angled; slight transverse ridge present; clypeus with downwardly projecting process, anterior portion of which is excavate. Penes present on sternite 7, set close together, generally angled towards mid line. Largest male with distinctly longer penes than smaller specimens.

Female. Similar to male, except for sexual characters. Females are more ovate, with shorter pleon, and body is more strongly vaulted than in male.

Colour. In alcohol the more recent specimens varied from being virtually without visible chromatophores to an overall dense brown colour. Ground colour pale tan.

Size. Males 3.1–4.3 mm, females 3.2–4.8 mm, manca 1.9–3.2 mm.

Remarks. This species is readily recognizable from

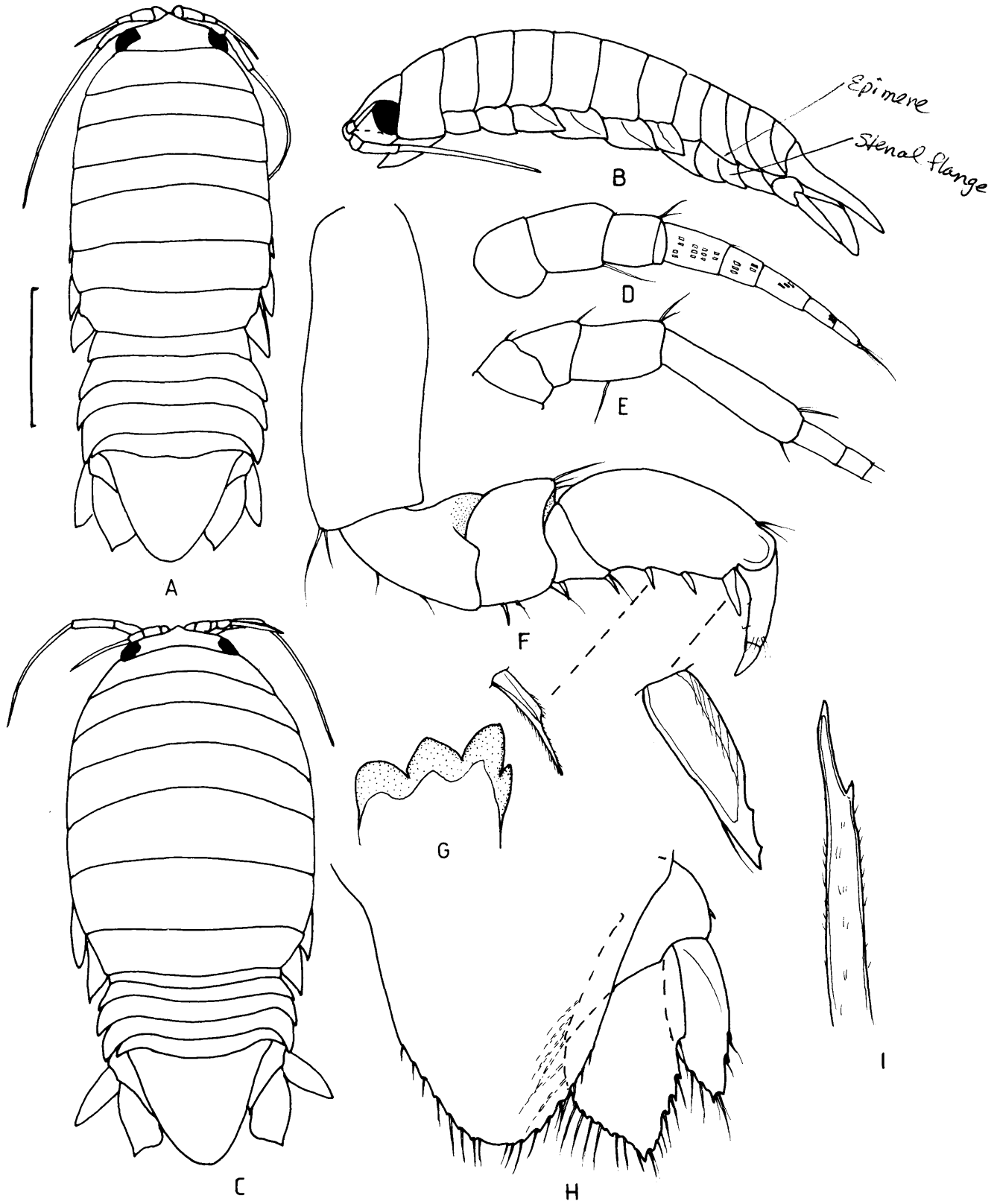


Fig. 20. *Metacirolana japonica*, male 3.6 mm, except C, female 4.5 mm, off Sydney. A, dorsal view; B, lateral view; C, dorsal view; D, antennule; E, antennal peduncle; F, pereopod 1; G, right mandible, incisor; H, pleotelson and uropod; I, appendix masculina, apex. Scale 1.0 mm.

Hansen's (1890) figures. Comparison of the holotype with Australian material revealed that in spite of the wide distribution there was only one species involved. The differences in the shape of the frontal lamina and anterior margin of the cephalon in earlier drawings (Tattersall, 1921; Menzies & George, 1972) are due to differences in perspective. The shape of the pleotelson, uropods, frontal lamina and in the male, the appendix masculina, serve to identify this species.

Menzies & George (1972) described *Cirolana bathyalis*. Comparison of their figures to the holotype and Australian specimens of *M. japonica* reveal that the only differences are that material described by Menzies

& George has smaller eyes. Eye size can vary within species (Tattersall, 1921; Brusca & Ninos, 1978), and this character alone is insufficient to separate Peruvian material as a different species.

Distribution. Eastern seaboard from Tasmania up to New Guinea, at depths of 32–450 m. Originally described from Japan, this species has also been taken off Peru (see remarks).

The record of *M. japonica* from Madagascar given by Roman (1970) should be treated with scepticism as *M. japonica* has neither been recorded from South Africa (Kensley, 1978c), nor shallow-water habitats in East Africa (Jones, 1976; Bruce, 1981c).

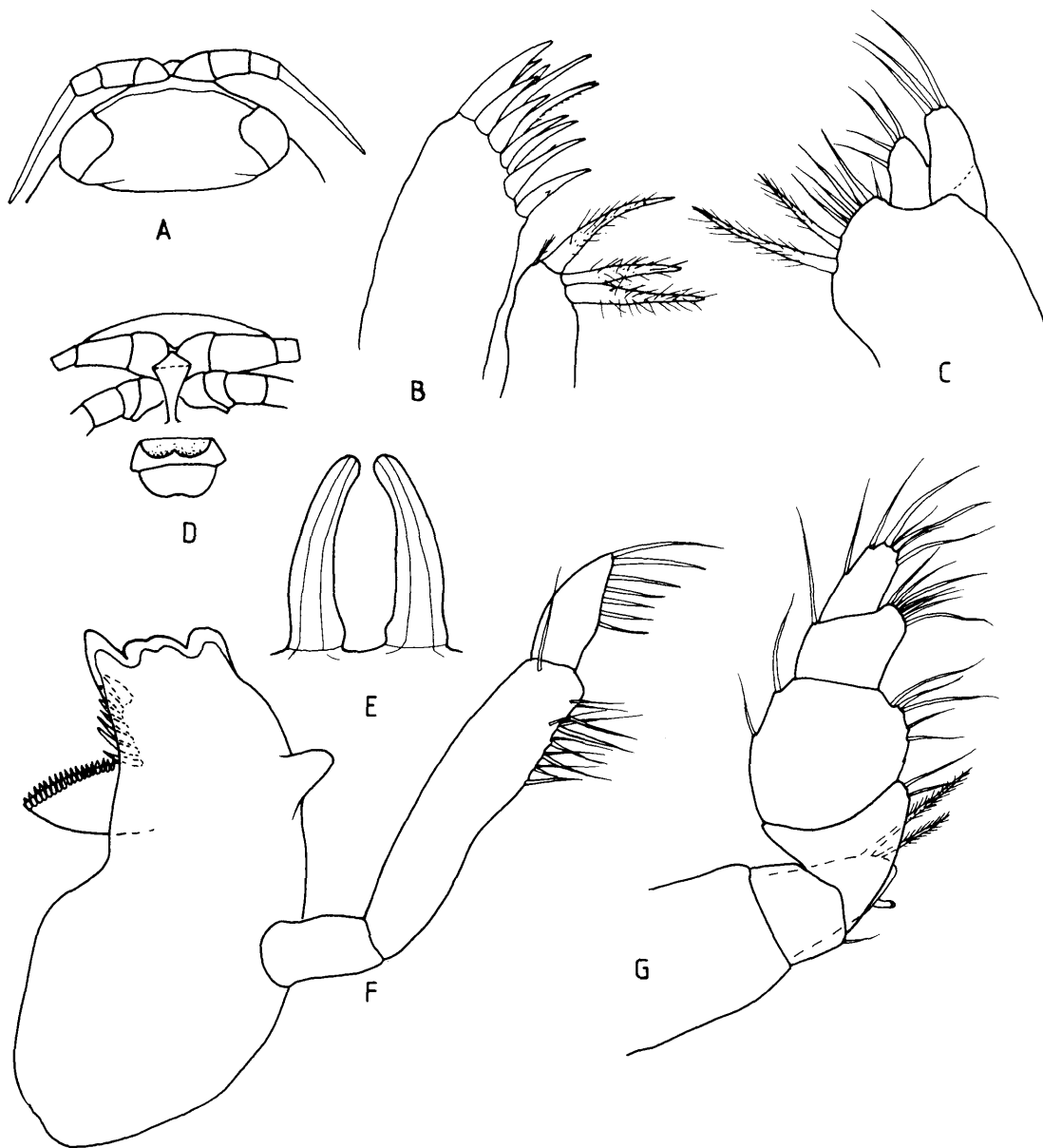


Fig. 21. *Metacirolana japonica*, male 3.6 mm, off Sydney. A, cephalon dorsal view; B, maxillule; C, maxilla; D, clypeal region; E, penes; F, left mandible; G, maxilliped.

***Metacirolana rugosa* (Bruce)**

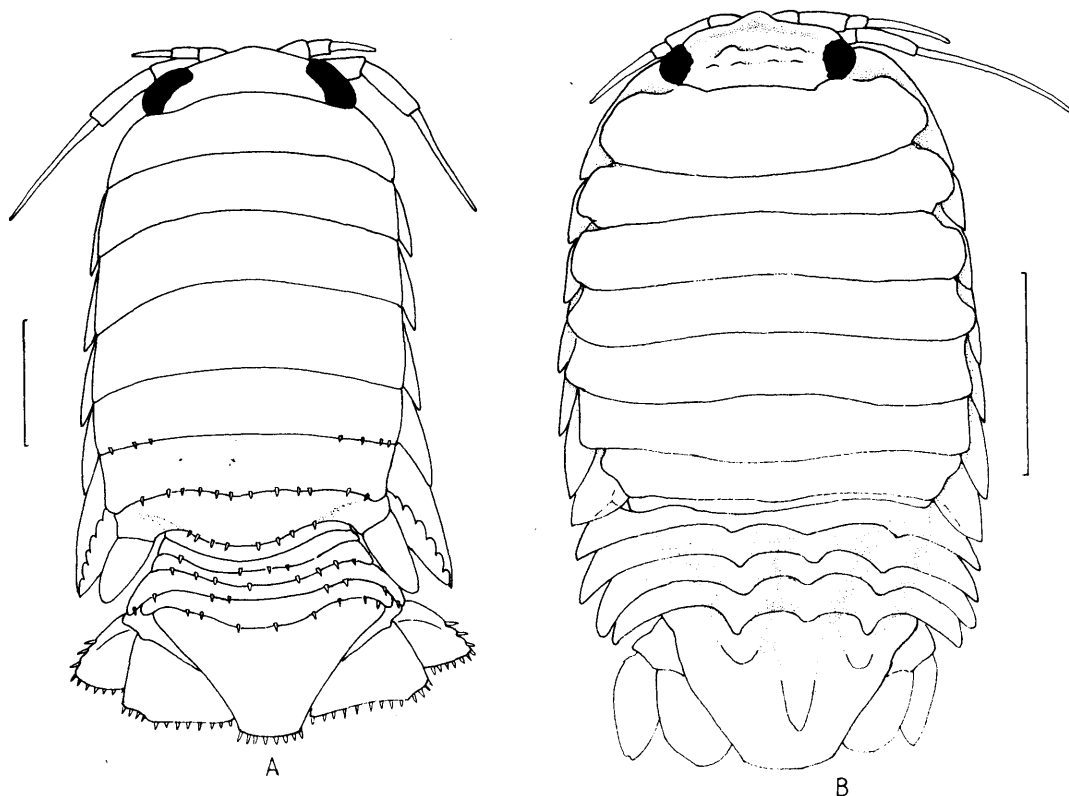
Fig. 22B

Cirolana rugosa Bruce, 1980a: 122, figs 11–13.*Metacirolana rugosa*.—Bruce, 1981b: 954.**Types.** Held at the Queensland Museum, Brisbane (one paratype at USNM).**Type locality.** Tryon Island, Capricorn Group, Australian Great Barrier Reef.**Remarks.** This species shows a close affinity with *M. sphaeromiformis*, *M. hansenii* and *M. monodi*. It can be distinguished from all these species by the sculpting of the cephalon, pleon and telson. *Metacirolana mbudya* from East Africa has similar but distinct sculpting on the pleon and posterior pereonites.**Distribution.** Heron Island and Tryon Island, Capricorn Group, Queensland.***Metacirolana spinosa* (Bruce)**

Fig. 22A

Cirolana spinosa Bruce, 1980a: 118, figs 8–10.*Metacirolana spinosa*.—Bruce, 1981b: 954.**Material examined.** Female (3.5 mm), Lizard Is. Qld, central lagoon, 19 Dec. 1980, in dead coral, 1 m, coll. NLB. Heron Island Series: female (3.3 mm, with embryo), 12 Jan. 1979, outer reef flat; male (4.6 mm), 5 females [2.7, 3.2, 3.7 (with

3 embryos), 3.8 (with 4 embryos), 4.0 mm], 14 Jan. 1979, outer reef flat; male (3.6 mm), 5 females (2.4, 3.1, 3.2, 3.5, 3.7 mm), 25 Dec. 1979, behind north east reef crest; 2 females (2.9 ovig., 3.7 mm ovig.), behind reef crest north east, coll. NLB.

Types. Held at the Queensland Museum, Brisbane.**Type locality.** Heron Island, Capricorn Group, Australian Great Barrier Reef.**Colour.** Translucent with conspicuous brown and white chromatophores on dorsal surface. Creamy white with brown chromatophores in alcohol.**Size.** Largest male 4.6, largest female 4.0 mm.**Remarks.** This species is very different to all other Australian members of the genus, and is readily identified by the spinosity of the pereon segments, pleon segments, telson and uropods. The large coxae on pereon segment 6 further distinguish it, as does the overall truncate appearance of the telson and uropods. Similar species are *M. riobaldoi* from Brazil and *M. halia* from Belize.**Distribution.** Heron Island and Lizard Island, Great Barrier Reef.***Eurylana* Jansen***Eurylana* Jansen, 1981: 5, 7.—Bruce, 1982a: 614.**Type species.** *Cirolana cooki* Filhol, 1885, by designation (Jansen, 1981). Types held at the Muséum National d'Histoire Naturelle, Paris.Fig. 22. A, *Metacirolana spinosa*; B, *Metacirolana rugosa*. Scale 1.0 mm.

Diagnosis. Pereonite 1 about twice as long as pereonite 2. Pleonite 5 largely overlapped by lateral margins of pleonite 4. Antennule peduncle articles colinear. Antenna peduncle 5-articulate. Frontal lamina flat, anterior margin projecting; clypeus with anteriorly directed triangular blade. Pereopods 5–7 not markedly flattened, with abundant setae. Pleopod rami elongate, endopods of pleopods 3–5 without setae; appendix masculina inserted medially. Uropod peduncle medial margin produced, rami with setae on all margins.

Additional characters. Cephalon deeply immersed in pereonite 1. Pleonite 1 largely concealed by pereonite 7; pleonites 1–2 with lateral margins not produced.

Antennule peduncle 4-articulate, peduncle article 3 longest; flagellum longer than peduncle. Antenna peduncle articles 1–3 short, 4–5 long, with peduncle article 5 equal in length to or longer than article 4. Mouthparts similar to *Cirolana*. Pereopods ambulatory, all with simple dactyls. Pereopods 1–3 with anterodistal angle of merus produced. Penes present on sternite 7. Pleopod exopods with incomplete suture; appendix masculina not extending beyond apex of inner ramus.

Remarks. This genus is readily separated from others of the family by the morphology of the clypeal region and pleopods. The lack of a secondary unguis on the dactylus is a further useful character. The genus is known from the Australasian region with two species in New Zealand (Jansen, 1981), one of which occurs in Australia, and a third in New Guinea (Bruce, 1982a). *Eurylana arcuata* has also been recorded from the Pacific coasts and also South and North America, where it was probably introduced (Bowman et al., 1981).

Eurylana arcuata (Hale)

Fig. 23

Cirolana arcuata Hale, 1925: 133, fig. 2.—Naylor, 1961: 11, fig. 4; Hurley, 1961: 267, 292; Morton & Miller, 1968: 454, 481, fig. 167–3; Bowman, Bruce & Standing, 1981: 545, figs 3–9; Bruce, 1981b: 960.

Cirolana robusta Menzies, 1962a: 123, fig. 4D–E.—Ramirez, 1974: 417, fig. 8; Carvacho, 1977: 32, fig. 4; Bruce, 1981b: 961.

Cirolana concinna.—Menzies, 1962a: 123, fig. 40A–E [not *Pseudolana concinna* (Hale, 1925)].

Eurylana arcuata.—Jansen, 1981: 7, fig. 2.

Material examined. 3 males (7.5, 8.9, 9.5 mm), 4 females (8.5, 8.8, 10.3, 10.8 mm), labelled "paratypes" with no other data, SAM C331. Male (5.8 mm), near Newcastle, NSW, summer 1978, splash zone on boulder beach in conjunction with amphipods, coll. S. Smith (no other data available). Male (10.0 mm), female (11.0 mm), Murrumbulga Point, Twofold Bay, NSW, 9 Oct. 1984, intertidal rocks, coll. S.J. Keable. 11 males and females, Murrumbulga Point, Twofold Bay, NSW, 25 June 1985, intertidal rock platform, coll. S.J. Keable. Female (8.0 mm), Aislings Beach, Twofold Bay, NSW, 22 Feb. 1985, dredged 8.5 m, coll. S.J. Keable. Male (5.8 mm), Port Willunga, SA, amongst *Natatolana corpulenta* presumably taken on bait, reported on by Hale (1925) under the remarks for *C. australiense*. Also examined: Menzies' material of *C. robusta*, and *C. concinna* and 8 paratypes of *C. arcuata* from

Broughton Is., NSW.

Types. Held at the South Australian Museum, Adelaide, and the Australian Museum, Sydney.

Type locality. Little Sirius Cove, Port Jackson, NSW.

Remarks. The taxonomy and distribution of this species has been discussed in detail by Bowman et al. (1981).

The Australian specimens differ from those from the coasts of the Americas by having entire coxal furrows on pereonites 3–7 although the dorsal part is faint, by having large spines on the pereopods, and in having fewer setae on the maxilliped.

Distribution. Newcastle and Twofold Bay, NSW, and Port Willunga, SA. The species was probably introduced from New Zealand (Bowman et al., 1981) and now also occurs on the western coasts of South America and San Francisco Bay, USA.

Exciorolana Richardson

Exciorolana Richardson, 1912: 201.—Hale, 1925: 156; Monod, 1930: 174; 1931: 3; Nierstrasz, 1931: 148; Barnard, 1940: 387; Lemos de Castro & Silva Brum, 1969: 1; Menzies, 1962a: 126; Jones, 1971: 212; Kensley, 1978c: 73; Kussakin, 1979: 181; Bruce & Jones, 1981: 70; Holdich, Harrison & Bruce, 1981: 586.

Pontogeloides Barnard, 1914: 355a.—1940: 389; Monod, 1930: 174; Nierstrasz, 1931: 149.

Pontogeloides (subgenus of *Exciorolana*).—1930: 169; 1931: 3; Brian & Darteville, 1949: 121.

Type species. *Cirolana orientalis* Dana, 1853a, (Richardson, 1912). Location of types not known, and they have probably been lost (Bowman, pers. comm.) when the sloop *Peacock* sank off the mouth of the Columbia River, USA.

Diagnosis. Cephalon with prominent rostrum separating antennule bases. Pereonite 1 about twice as long as pereonite 2. Pleonite 5 not laterally overlapped by pleonite 4. Antennule peduncle articles colinear. Antenna peduncle 4- or 5-articulate. Frontal lamina flat, usually united with rostrum; clypeus with weakly developed triangular blade. Maxilliped endite with one coupling hook. Pereopods 5–7 not markedly flattened, spinose. Pleopod rami elongate, endopods of pleopods 3–5 without setae; appendix masculina inserted basally to medially. Uropod peduncle medial margin weakly produced, exopod lateral margin without setae or spines.

Additional characters. Body smooth, without ornamentation. Cephalon rostrum often dilated anteriorly. Pleotelson with depression at anterodistal surface. Pleonites all visible.

Antennule peduncle 3-articulate, bases separated by frontal lamina; flagellum longer than peduncle. Antenna peduncle articles 1 and 2 (or 3) short, 3–4 (or 4–5) long. Mandible with 2 or 3-articulate palp. Maxilliped generally slender. Maxillule and maxilla similar to *Cirolana*. Pereopods all ambulatory. Pereopods 1–3 with merus anterodistal margin slightly produced. Dactyls prominently biungiculate. Penes

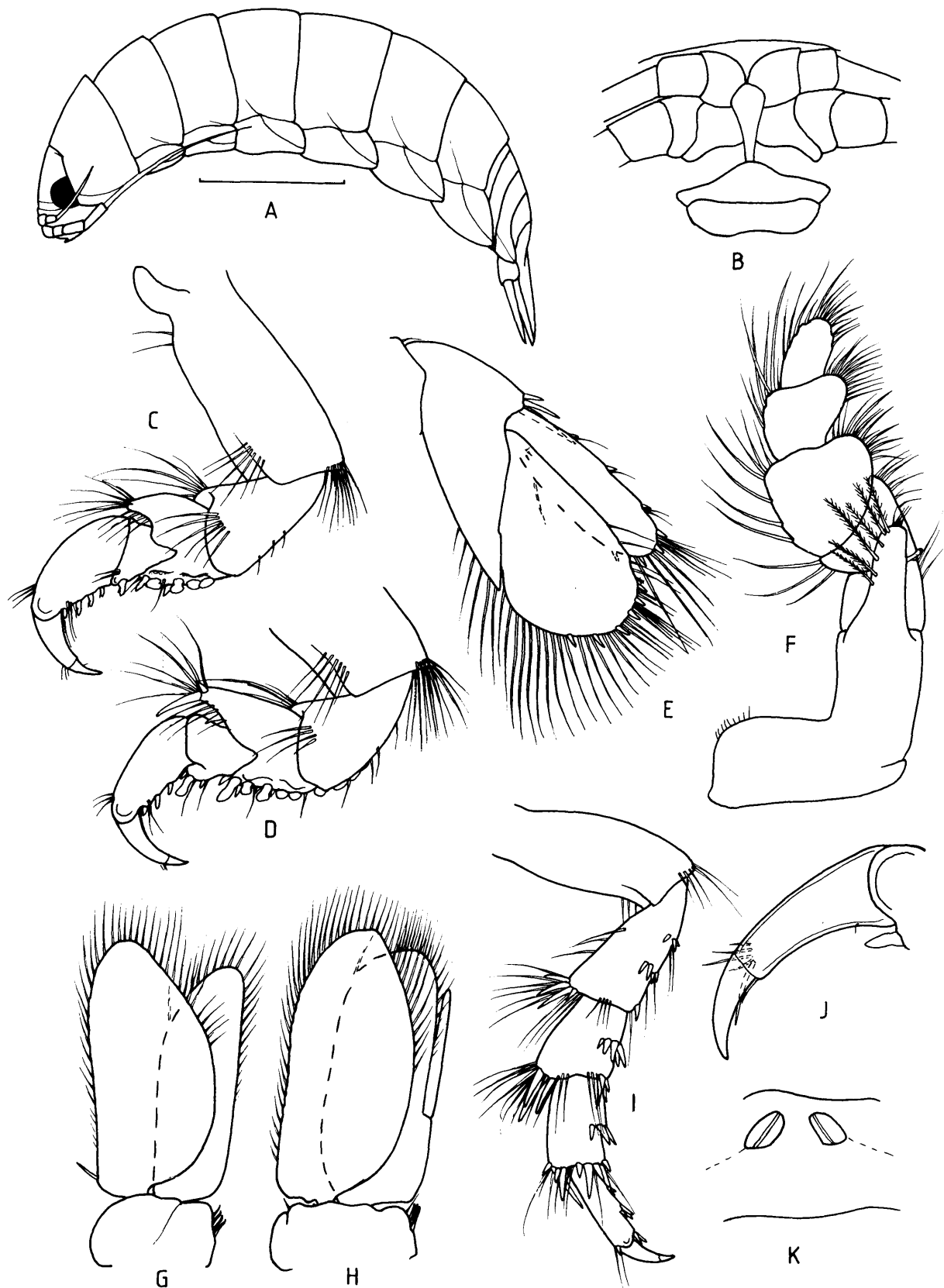


Fig. 23. *Eurylana arcuata*. A, female 8.8 mm; remainder male paratype. A, lateral view; B, clypeal region; C, pereopod 1; D, pereopod 2; E, uropod; F, maxilliped; G, pleopod 1; H, pleopod 2; I, pereopod 7; J, pereopod 1, dactylus; K, penes, in situ. Scale 2.0 mm.

present on sternite 7. Pleopods rami with or without accessory lobes, endopod of pleopod 2 occasionally without setae. Uropods extending well beyond apex of pleotelson, exopod equal to or longer than endopod.

Remarks. The genus *Exciorolana* is, at present, a difficult one to delimit. This is mainly due to the lack of constancy of morphological characters shown by species currently placed in the genus, and the inadequacy of so many of the species descriptions. Coupled to these problems, and emphasising the variety of morphology of the genus, are the problems of the status of the genera *Pontogeloides* and *Annina* Budde-Lund.

The validity of *Pontogeloides* has been discussed (Monod, 1930; Jones, 1971; Carvacho, 1977) but no author has resolved the problem. The characters involved in this discussion are the number of antennal peduncle articles, the number of mandibular palp articles and the morphology and setation of the pleopods. Table 2 shows that the form of these characters are apparently randomly spread throughout the genus *Exciorolana*. It is true that only two species have the endopods of pleopods 2-5 naked, and this is the only character by which *Pontogeloides* can be separated from *Exciorolana*. A biarticulate mandibular palp occurs in several species, and is not associated with accessory lobes to the pleopods, nor possession of a 4-articulate antennal peduncle. At present I regard *Pontogeloides* as a synonym of *Exciorolana*. *Annina* has been recently rediagnosed by Jones (1983), and occupies a position close to *Exciorolana*.

The species of the genus, easily recognised by the large rostrum separating the antennule bases, are distributed on the tropical and subtropical coasts of all oceans. The only temperate species appear to be *Exciorolana chiltoni*, which has a North Pacific distribution (Bruce & Jones, 1981), and *E. linguifrons*. All species are primarily sand beach dwellers.

Exciorolana orientalis (Dana)

Fig. 24

Cirolana (Eurydice) orientalis Dana, 1853a: 773, pl. 51.

Cirolana orientalis.—Hansen, 1890: 353, pl. IV figs 4, 4a-h; Stebbing, 1900: 633; Thielemann, 1910: 17; Richardson, 1910: 4.

Exciorolana orientalis.—Richardson, 1912: 201; Hale, 1925: 156, fig. 14; 1929a: 34; Nierstrasz, 1931: 148; Pichon, 1967: 70, 83; Roman, 1970: 174; Jones, 1971: 213, fig. 8a; 1979b: 677, fig. 3; Holdich, Harrison & Bruce, 1981: 587, fig. 12; Bruce, 1982a: 613.

Cirolana bombayensis Joshi and Bal, 1959: 58, pl. 1.

Exciorolana orientalis.—Fishelson, 1971: 128 (err. typ.).

Material examined. 5 males (7.5, 8.5, 9.6, 9.7, 10.1 mm), 3 females (8.2, 9.5, 10.7 mm), Cape Ferguson, Qld, 9 Dec. 1979, beach in front of Australian Institute of Marine Science, feeding on dead tern, coll. N. Svehnivig. Male (6.3 mm), Black Point, Cobourg Peninsula, NT, 11°9'S, 132°51.4'E, 24 June 1981, trapped on sand, 0.5 m, coll. A.J. Bruce.

Types. The whereabouts of the types is not known.

Type locality. "Sooloo Sea" (Dana, 1853a); Sulu Sea, South of the Philippines.

Colour. In alcohol, pale brown to cream, generally densely covered by chromatophores. Some specimens are chocolate coloured with two pale sublateral bands.

Size. Hale (1925) recorded specimens up to 11 mm. Present material includes an ovigerous female to 10.7 mm. Bruce (1982a) recorded specimens from Papua New Guinea that were 16.0 mm in length.

Remarks. This species has been recorded widely in the Indo-West Pacific but, up until its redescription by Holdich et al. (1981), still remained poorly described. Figures are given here of all mouthparts, of the pleopods, and also of the cephalon, clypeal region and uropod, all of which are useful in aiding recognition of the species.

The species described by Joshi & Bal (1959) as

Table 2. Distribution of potential generic characters among *Exciorolana*. Asterisk indicates where specimens have been examined, otherwise derived from the literature (n = naked).

SPECIES	A2 PEDUNCLE		MANDIBULAR PALP		Setation	PLEOPODS Acc. Lobes	App. ♂
	4-art.	5-art.	2-art.	3-art.			
<i>E. affinis</i>	+		+		2-5 n	+	medial
<i>E. armata</i>	?			+	?	?	basal
<i>E. braziliensis</i> *	+		+		3-5 n	-	s-basal
<i>E. chilensis</i>	?		?	?	?	?	? ?
<i>E. chiltoni</i> *	+		+		3-5 n	-	basal
<i>E. geniculata</i>	?		?	+	3-5 n	+	s-basal
<i>E. hirsuticauda</i> *	+		+		3-5 n	-	s-basal
<i>E. latipes</i> *	+		+		2-5 n	+	medial
<i>E. linguifrons</i>	?		?	?	?	?	?
<i>E. mayana</i>	?		?	+	?	?	s-basal
<i>E. monodi</i>	+		+		?	?	?
<i>E. natalensis</i> *	+		+		3-5 n	+	medial
<i>E. orientalis</i> *	+			+	3-5 n	-	s-basal

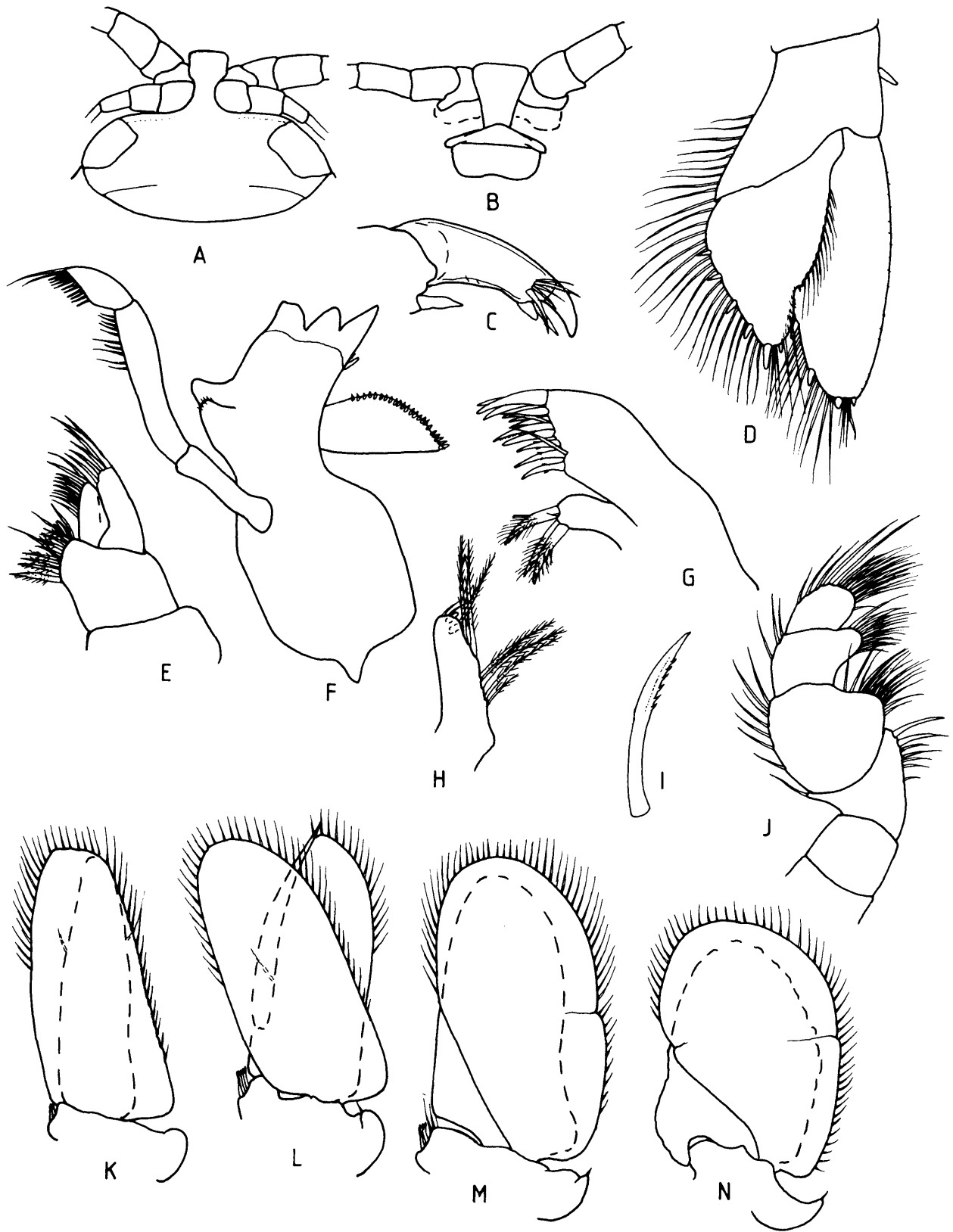


Fig. 24. *Excirolana orientalis*, male 10.1 mm, Townsville. A, cephalon, dorsal view; B, clypeal region; C, pereopod 1, dactylus; D, uropod; E, maxilla; F, right mandible; G, maxillule; H, maxilliped endite; I, medial spine, maxilliped palp article 2; J, maxilliped; K, pleopod 1; L, pleopod 2; M, pleopod 3; N, pleopod 5.

Cirolana bombayensis appears to be entirely similar to *E. orientalis*, the diagnostic uropod shape being clearly indicated.

Distribution. Indo-West Pacific from East Africa eastwards to the Philippines; in Australia from Townsville, Qld, and Cobourge Peninsula, NT.

Pseudolana Bruce

Pseudolana Bruce, 1979: 112; 1980c: 153.—Holdich, Harrison & Bruce, 1981: 590.

Type species. *Cirolana concinna* Hale, 1925, by designation (Bruce, 1979). Types held at the Australian Museum, Sydney, and the South Australian Museum, Adelaide.

Diagnosis. Pereonite 1 about twice as long as pereonite 2. Pleonite 5 not laterally overlapped by pleonite 4. Antennule peduncle articles colinear. Antenna peduncle 5-articled. Frontal lamina linear; clypeus with downward projecting triangular blade. Maxilliped endite with one coupling hook. Pereopods 5–7 not markedly flattened, spinose. Pleopods elongate, pleopods 3–5 endopods without setae; appendix masculina inserted medially. Uropod peduncle medial margin produced, rami with all margins setose.

Additional characters. Body smooth, unornamented, 2–3 times longer than broad. Pleon with 5 visible segments.

Antennule peduncle 4-articulate; flagellum long, extending beyond pereonite 1; antenna peduncle articles 1–2 very short, 4–5 long. Mouthparts generally similar to *Cirolana*, except maxilliped rather more slender, with fewer plumose setae on lateral margin of palp articles 2–3. Pereopods all ambulatory; anterodistal margins of merus of pereopod 1 slightly produced; posterior

pereopods generally with abundant robust spines and setae on anterior margins. Dactylus with feebly produced secondary unguis. Penes present on sternite 7. Pleopods 1–5 with prominent lobe on peduncle lateral margins; exopods of pleopods 3–5 with incomplete transverse suture. Uropods with marginal setae interspersed with spines.

Sexual dimorphism. Males and females are similar except that females may be broader, and reach a slightly greater length.

Remarks. The characters that most readily identify this genus are the linear frontal lamina (occurs rarely in other genera), the freely projecting clypeus, and pleonite 5 with free lateral margins. Less immediately obvious characters include the form of the maxilliped, the point of insertion of the appendix masculina, the elongate shape and the setation of the pleopods. Related genera include *Excicrolana* and *Eurylana*. *Excicrolana* is readily distinguished by the large dilated rostral process, the lack of spines and setae on the lateral margin of the uropodal exopod, and by the more complex pleopods. *Eurylana* has pleonite 5 with lateral margin encompassed by pleonite 4, has the frontal lamina with the ventral surface flat, and the clypeus while projecting, tends to project forward rather than down.

All species have penial processes on sternite 7. Comparison between the different species suggests that the penial processes are too similar to be useful in separating species.

The genus has so far been recorded only from the Australian and Papua New Guinea coasts, with only one species extending to Western Australia. *Pseudolana brevifimbria* is the only species taken outside Australian waters (Bruce, 1982a).

Key to Genus *Pseudolana*

1. Pleonite 4 with lateral margin rounded. *P. brevifimbria*
—Pleonites 3–5 with lateral margins acute. 2
2. Antennule flagellum longer than antenna. *P. dactylosa*
—Antennule flagellum not longer than antenna. 3
3. Pereopods 1–2 with prominent recurved processes on ischium. *P. elegans*
—Pereopods 1–2 without processes. 4
4. Antenna and antennule subequal in length. *P. towrae*
—Antenna (including flagellum) distinctly longer than antennule. 5
5. Posterior margin of pleotelson emarginate. *P. concinna*
—Posterior margin of pleotelson smoothly rounded. 6
6. Pereopod 7 sparsely setose, appendix masculina slender. *P. ovalis*
—Pereopod 7 with abundant setae, appendix masculina club shaped. *P. menertae*

Pseudolana concinna (Hale)

Figs 25, 30G

Cirolana concinna Hale, 1925; 152, fig. 12.—Nierstrasz, 1931: 157; Bruce, 1979: 112.

Pseudolana concinna.—Bruce, 1979: 112; 1980c: 154, figs 1, 2; Holdich, Harrison & Bruce, 1981: 590, fig. 13; Dexter, 1983a: 99, figs 5–24; 1983b: 464, 465, 468; 1984: 663; 1985: 281, 282.

Not *Cirolana concinna*.—Menzies, 1962a; 123, fig. 40A–E (= *Euryllana arcuata*, see Bowman et al., 1981).

Material examined. Male (5.7 mm), 11 females (5.2–7.5 mm, 5 ovig.), Currimundi Beach, Sunshine Coast, Qld, 3 Dec. 1978, above berm, at high water level, coll. NLB. Manca (3.2 mm), Currumbin Beach, Gold Coast, Qld, 3 Apr. 1979, coll. NLB. 2 males (3.8, 5.0 mm), 4 females (3.9, 5.0, 5.5, 5.6 mm), 2 mancas (3.5, 3.7 mm), Currimundi Beach, Sunshine Coast, Qld, 21 Apr. 1979, coll. NLB. Male (6.7 mm), Miami Beach, Gold Coast, Qld, July 1971, coll. D.F. Boesch. 8 males (3.6–5.2 mm), 10 females (3.9–5.3 mm), Belongil Creek beach, Byron Bay, NSW, 25 Aug. 1979; female (6.9 mm), Broken Head, NSW, 24 Aug. 1979; 2 males (5.0, 5.3 mm), 4 females (3.8, 4.4, 4.5, 4.5 mm), Wategos Beach, Cape Byron, NSW, 25 Aug. 1979, in 45 cm depth of sand, coll. NLB. 7 males (4.8–6.7 mm), 3 females (5.3, 6.5, 6.9 mm), Goolwah Beach, SA, 9 Oct. 1973, coll. M. King. Female (5.8 mm), Seven Mile

Beach, S.E. Tas., 18 Mar. 1979, sand at edge of incoming tide, coll. A.J.A. Green. Male (6.3 mm), 3 females (6.5, 6.6, 7.6 mm), Blackmans Bay, Tas., 3 Sept. 1975, coll. T.M. Walker. 4 males (5.7, 6.2, 6.3, 8.1 mm), 3 females (6.8, 7.5, 11.3 mm), Eddystone Point, Tas., 1 May 1978, coll. D. Hoggins. Male (6.9 mm), female (7.6 mm), 10 mancas (2.6–4.9 mm), Cottesloe, WA, 25 May 1980, in sand upper beach; 38 males and females (4.5–7.9 mm), Nancy Cove, Rottnest Is., WA, 3 June 1980, in sand pools; 45 males, females, mancas (from 2.6 mm–8.1 mm), Parker Point, Rottnest Is., WA, 3 June 1980, upper range of wave action, coll. NLB.

Types. Held at the Australian Museum, Sydney.

Type locality. Cottesloe, WA, designated by Hale (1925).

Remarks. Detailed descriptions of this species have been given by Bruce (1980c) and Holdich et al. (1981). The species can be distinguished from all others in the genus by the emarginate hind margin of the pleotelson, the shape and length of the appendix masculina, together with the comparative lengths of the antennule and antenna and the arrangement of spines and setae of the antenna. The specimens from Western Australia have a broader body shape, and the pleon is noticeably more encompassed by pereonite 7, pleonite 1 being scarcely visible in mature males. The species was found to be abundant on the beaches of Rottnest Island.

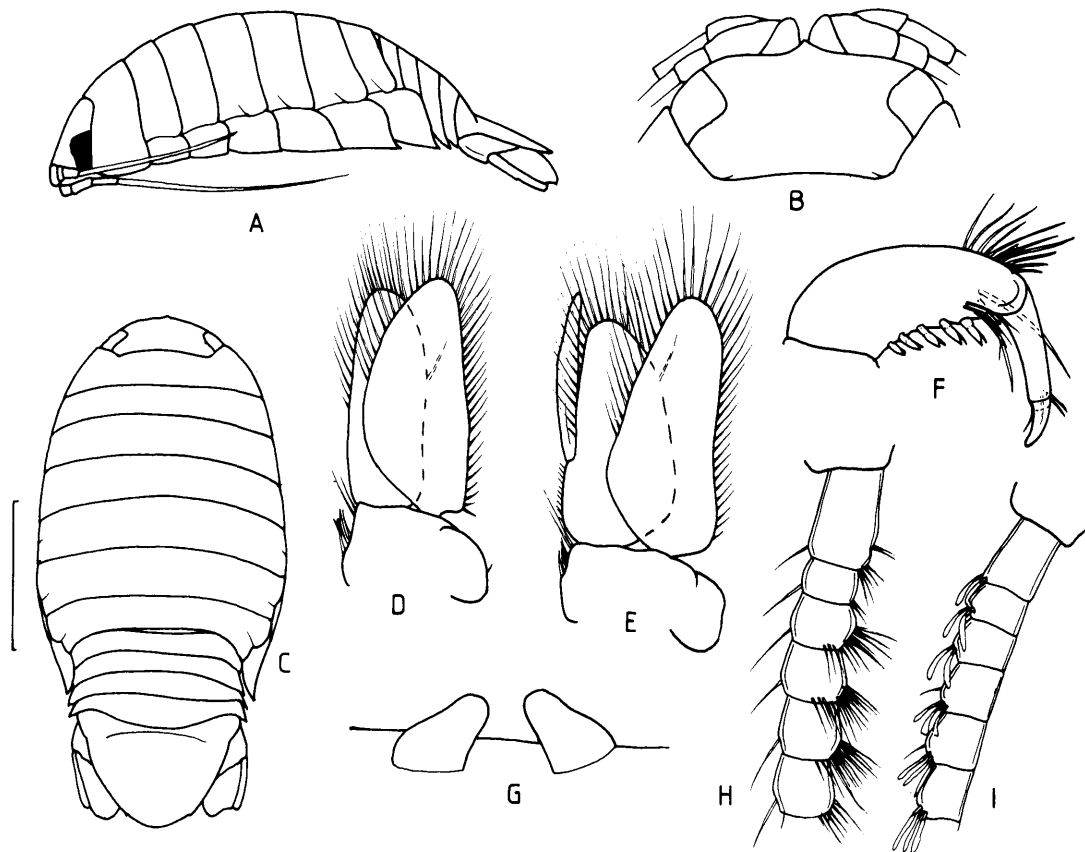


Fig. 25. *Pseudolana concinna*, male 6.9 mm, Cottesloe. A, lateral view; B, cephalon dorsal view; C, dorsal view; D, pleopod 1; E, pleopod 2; F, pereopod 1, propodus and dactylus; G, penes; H, antenna, proximal flagellar articles; I, antennule, proximal flagellar articles. Scale 2.0 mm.

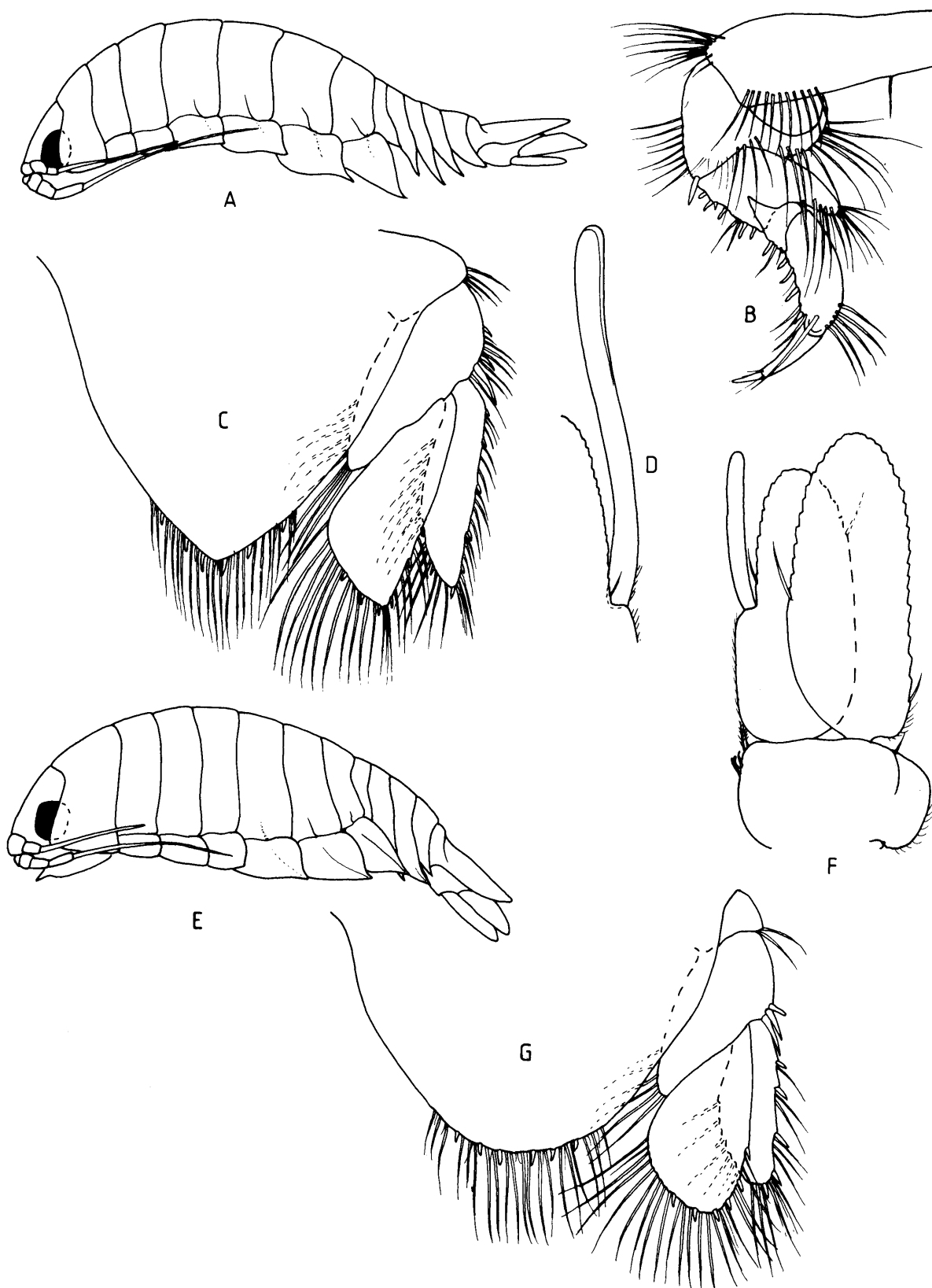


Fig. 26. *Pseudolana elegans*: A, lateral view; B, pereopod 1; C, pleotelson and uropod; D, appendix masculina. *Pseudolana ovalis*: E, lateral view; F, pleopod 2 (setae omitted); G, pleotelson and uropod. Scale 1.0 mm.

Colour. In life, translucent with black chromatophores, some brown chromatophores on pleon.

Size. Queensland material 3–7 mm. Material from Hinchinbrook did not exceed 5 mm. Tasmanian specimens 5–7 mm, one female reaching 10 mm.

Distribution. Common on Queensland beaches as far north as Hinchinbrook Is. (Bruce, 1980c; Holdich et al. 1981); also Byron Bay and Broken Head, northern NSW; Sydney beaches, NSW (Dexter, 1984, 1985); Goolwah Beach, SA; several localities in Tasmania; and Cottesloe and Rottnest Island, WA.

Pseudolana elegans Bruce

Figs 26A–D, 30F

Pseudolana elegans Bruce, 1980c: 157, fig. 3.

Material examined. Manca (4.8 mm), Alexandra Bay, Noosa Heads, Qld, 11 Oct. 1980, at mean tide level; 2 mancans (2.8, 4.8 mm), Belongil Creek, Byron Bay, NSW, 25 Aug. 1979, at creek outflow; male (5.8 mm), female (7.2 mm), 2 mancans (3.6, 5.0 mm), Wategos Beach, Cape Byron, NSW, 23 Aug. 1979, towards low tide level; 6 males (5.7–7.0 mm), 3 females (7.0, 7.5, 7.6 mm), Broken Head, NSW, 24 Aug. 1979, just subtidal; all coll. NLB. Male (6.9 mm), 2 females (5.6, 6.9 mm), east of Belmont Beach, NSW, 33°02'36"S, 151°40'56"E, 20 July 1975, 500 m off beach, depth 6–14 m; 4 males (6.9, 6.9, 7.6, 8.0 mm), female (8.2 mm), east of Stockton Beach, NSW, 32°53'55"S, 151°47'31"E, 30 Nov. 1975, 500 m off beach, 6 m, coll. AM HDWBS.

Types. Held at the Queensland Museum, Brisbane.

Type locality. Frenchmans Bay, North Stradbroke Island, Qld.

Remarks. Distinctive features of *P. elegans* are the

abundant setae on the posterior pereopods, the straight outer margin of the uropodal exopod, the shape of the hind margin of the pleotelson, and the unique process on the ischium of pereopods 1 and 2.

Distribution. On high exposure fine sand beaches (where all the sand passes through a 1.0 mm sieve) at Noosa and Stradbroke Island, Qld; Cape Byron and Broken Head, NSW; and subtidally near Sydney, NSW; at depths of 6–14 metres.

Pseudolana ovalis Bruce

Fig. 26E–G

Pseudolana ovalis Bruce, 1980c: 159, fig. 4.

Material examined. 6 males (3.8–6.9 mm), Toorbul Point, Pumicestone Passage, Moreton Bay, Qld, 7 Sept. 1979, south of bridge, in sand, coll. R.H. Quinn.

Types. Held at the Queensland Museum, Brisbane.

Type locality. Serpentine Creek, Moreton Bay, Qld.

Remarks. Males of *P. ovalis* can be identified from characteristics of the appendix masculina. Both sexes may also be identified by the relative paucity of pereopodal setae, and their ovoid body shape.

Distribution. Serpentine Creek and Pumicestone Passage, Moreton Bay, Qld.

Pseudolana dactylosa Bruce

Fig. 27

Pseudolana dactylosa Bruce, 1980c: 161, fig. 5.

Material examined. 5 males (4.5–7.2 mm), female (8.2 mm), Trinity Inlet, Cairns, Qld, 29 Nov. 1979, from night plankton, coll. Qld State Fisheries Service. 2 mancans (2.5, 3.2 mm),

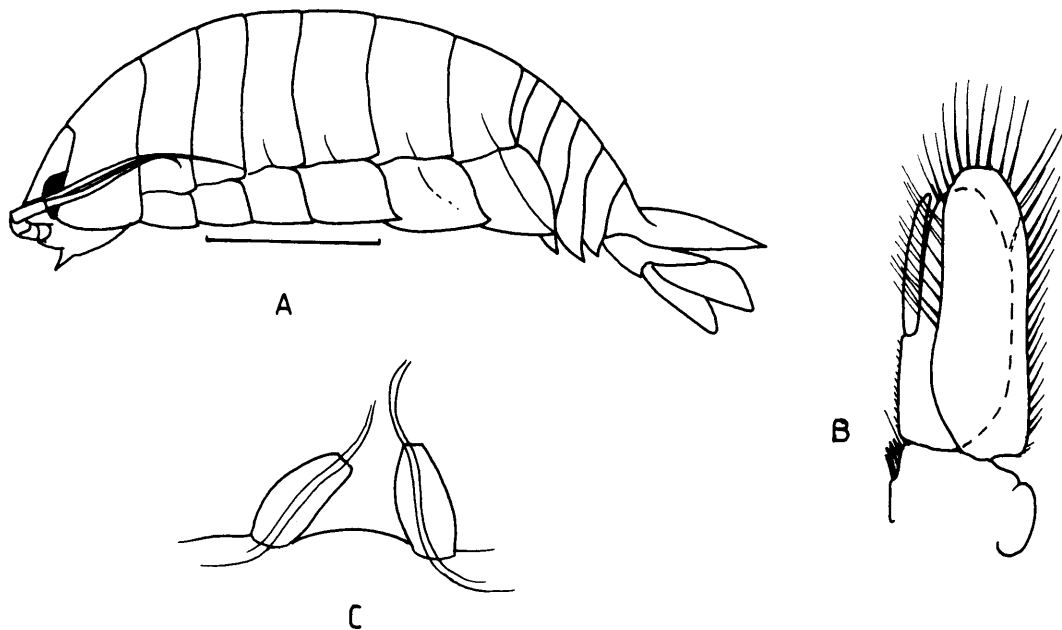


Fig. 27. *Pseudolana dactylosa*, male 9.5 mm, Mary River. A, lateral view; B, pleopod 2; C, penes. Scale 2.0 mm.

Herbert River, Qld, June 1976, in drift net, coll. R. Pearson. 3 females (4.9, 5.0, 5.2 mm), Calliope River, Gladstone, Qld, 1975, coll. P. Saenger. 3 females (6.8, 6.9, 7.3 mm), Crab Is. Creek, Mary River, Qld, 13 Apr. 1982, in intertidal mobile sand bank, coll. NLB & E.J. Fields. 6 males (5.0, 5.7, 6.3, 8.2, 8.3, 9.5 mm), female (5.0 mm), Middle Crab Is., Crab Islands Creek, Mary River, Qld, 16 Apr. 1982, buried below sand surface, intertidal, coll. NLB & E.J. Fields.

Types. Held at the Queensland Museum, Brisbane.

Type locality. Little Ramsay Bay, Hinchinbrook Island, Qld.

Size. Longest male 9.5 mm, longest female 8.2 mm.

Remarks. *P. dactylosa* is the only species of the genus in which the antennule exceeds the antenna in length, a cirolanid character otherwise shown only by the genera *Pseudaega* and *Pontogelos*. The straight outer margin of the uropodal exopod separates this species from *P. concinna* and *P. ovalis*, while the short appendix masculina, rounder posterior margin of the pleotelson, together with the long pereopod dactyls clearly separate this species from others of the genus.

Distribution. Estuarine or variable salinity creeks from Mary River in the south to north of Cairns.

Pseudolana brevifimbria Holdich, Harrison & Bruce
Figs 28, 30E

Pseudolana brevifimbria Holdich, Harrison & Bruce, 1981: 593, fig. 14.—Bruce, 1982a: 614.

Material examined. Male (4.3 mm), holotype, Pallarenda, Cleveland Bay, Townsville, Qld, 3 Aug. 1976, on beach by mouth of 'Three Mile Creek', coll. D.M. Holdich. 2 males (5.3, 6.0 mm), Motupore Is., Gulf of Papua, Papua New Guinea, 1 Nov. 1980, trapped on beach, coll. A.J. Bruce (reported by Bruce, 1982a).

Types. Holotype held by Queensland Museum, Brisbane.

Type locality. Pallarenda, Cleveland Bay, Townsville, Qld.

Remarks. This species can be separated from the others of the genus by lack of acute posterolateral pleonite margins on pleonite 3, and by the posterior lateral margin of pleonite 4 being rounded. It is also distinguished by the broadly rounded uropodal endopod, and the appendix masculina, which is slightly longer than the endopod, broadening distally.

Examination of the holotype reveals that the number of spines on the posterior margin of the pleotelson is 4, and these are very short. The uropod exopod has 4 spines on the lateral margin and 3 on the medial margin. The posterior margin of the uropod endopod has only 5 spines.

Distribution. Townsville area, Qld; also southern Papua New Guinea (Bruce, 1982a).

Pseudolana towrae Bruce
Figs 29, 30A–D

Pseudolana towrae Dexter, 1983a: 99, *nomen nudum*.

Pseudolana towrae Bruce, 1983: 200, fig. 1.—Dexter, 1983b: 466; 1984: 665, 669; 1985: 281, 282.

Material examined. Male (4.9 mm), 2 females (5.0, 5.5 mm), Upper West Arm, Port Hacking, Sydney, NSW, 13 Nov. 1974, coll. V. Wadley. 5 males (5.0–6.7 mm), 7 females (6.3–6.9 mm, all ovigerous), ca. 60 manca (1.9–3.2 mm), Towra Point, Botany Bay, NSW, 17 Aug. 1980; male (4.7 mm), 6 females (4.4–7.2 mm), manca (3.2 mm), Towra Point, Botany Bay, NSW, 26 Aug. 1980; 2 males (5.5, 6.0 mm), 4 females (5.1–6.9 mm), ca 50 manca (2.0–3.8 mm), Towra Point, Botany Bay, NSW, 6 Jan. 1981; male (4.2 mm), female (5.6 mm), 8 manca (2.2–3.5 mm), Snappermans Bay, NSW, 3 Jan. 1981, all in sand, coll. D.M. Dexter. Male (6.9 mm), Salamander Bay, Port Stephens, NSW, 15 Jan. 1981, coll. G.C.B. Poore. Also examined 25 manca from Ettalong, NSW, 29 Dec. 1980, and 15 manca from Clontarf, NSW, 6 Dec. 1980, coll. D.M. Dexter. Male (6.9 mm), female (7.2 mm, ovig.), Andersons Inlet, Vic., 17 Dec. 1981, coll. R. Patra.

Types. Held by the Australian Museum; additional paratypes held at the Museum of Victoria.

Type locality. Towra Point, Botany Bay, Sydney, NSW, 33°57'S, 151°10.5'E.

Description of male. A preliminary diagnosis was given by Bruce (1983); a full description is now provided. Body about 3 times as long as wide. Cephalon with median rostral point. Pereonite 6 longest; coxal plates of pereonites 2–4 scarcely produced, 5–7 with acute posterior point; coxae of pereonite 7 with indistinct partial oblique furrow. Pleonites 3–5 lateral margins acutely produced. Pleotelson with anterodorsal depression, posterior margin subtruncate, with 6 spines interspersed amongst plumose marginal setae.

Antennule flagellum composed of 13 articles, extending to posterior of pereonite 1. Antenna peduncle articles 4–5 proportionally shorter than others of genus, flagellum composed of 11 articles, extending to pereonite 1.

Frontal lamina posterior half slightly broader than anterior; clypeus with rounded projecting blade.

Pereopod 1 with long setae along distal half of anterior margin of basis and at posterior distal angle; anterodistal angle of ischium and merus with abundant setae; posterior margin of merus with 7 spines and stout flat seta; carpus with single spine and seta; propodus with 4 spines. Pereopod 2–3 similar to 1, but with additional and larger spines on all articles except propodus which has fewer, and basis which has none. Pereopod 7 with dense cluster of setae along anterior margin of ischium, merus and carpus; anterodistal angles of ischium to carpus with 1 or more spines; posterior margins of ischium to carpus setose, with spine on margin and at distal angles.

Penes slender, well separated, slightly angled medially.

Pleopod 2 appendix masculina arising approximately half way along endopod; extending beyond endopod by half its length, apex rounded, slightly bent laterally. Uropod with 3 conspicuous spines on distolateral angle of peduncle. Exopod with 5 spines and 10 plumose setae on lateral margin, medial margin with 1 spine, and long plumose setae. Endopod with 4 spines on lateral margin, 2 on medial margin; continuous marginal setae from medial margin to halfway along lateral margin.

Female. Similar to male, but pereon slightly broader.

Colour. Translucent with black and white chromatophores.

Size. Average length of males 5.7 mm, of females 5.4 mm. Largest male was 6.9 mm, largest female, 7.2 mm.

Remarks. Only one other species, *Pseudolana elegans*, has an elongate appendix masculina. *Pseudolana elegans* is readily separated by the recurved process on pereopods 1-2, and by the acute apex of the pleotelson.

Characters which serve to separate females of *P. towrae* include the antennule and antenna being almost equal in length, with the antennal peduncle being markedly shorter than in other species, the shape of uropods, and the subtruncate posterior margin of the pleotelson. This species appears to prefer sheltered sand beach habitats. (Dexter, 1983b, 1984).

Distribution. From Sydney, NSW, to Aireys Inlet, Vic.

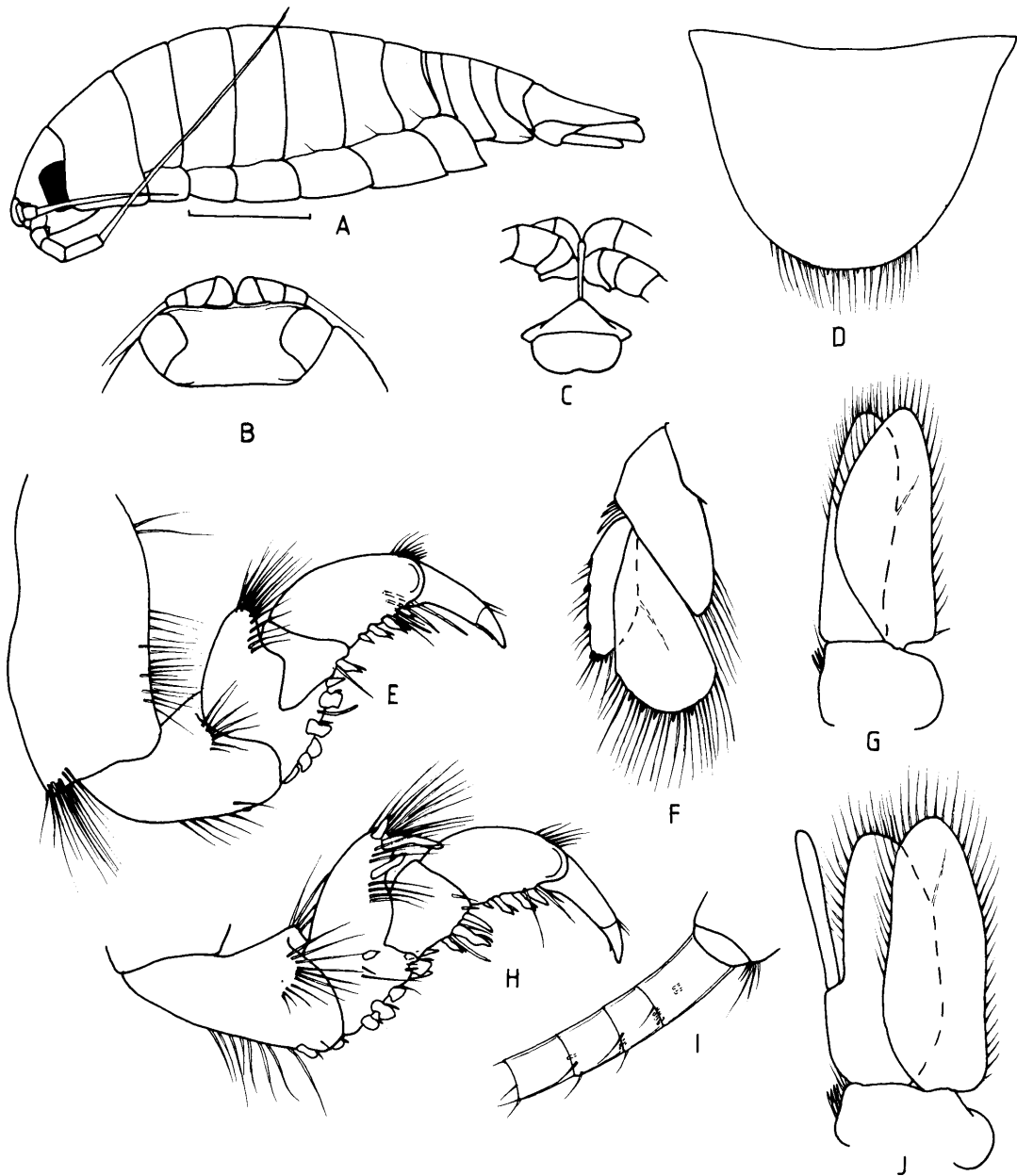


Fig. 28. *Pseudolana brevifimbria*. A-D holotype; remainder, male 5.0 mm. A, lateral view; B, cephalon, dorsal view; C, clypeal region; D, pleotelson; E, pereopod 1; F, uropod; G, pleopod 1; H, pereopod 2; I, antennule flagellum, proximal articles; J, pleopod 2. Scale 1.0 mm.

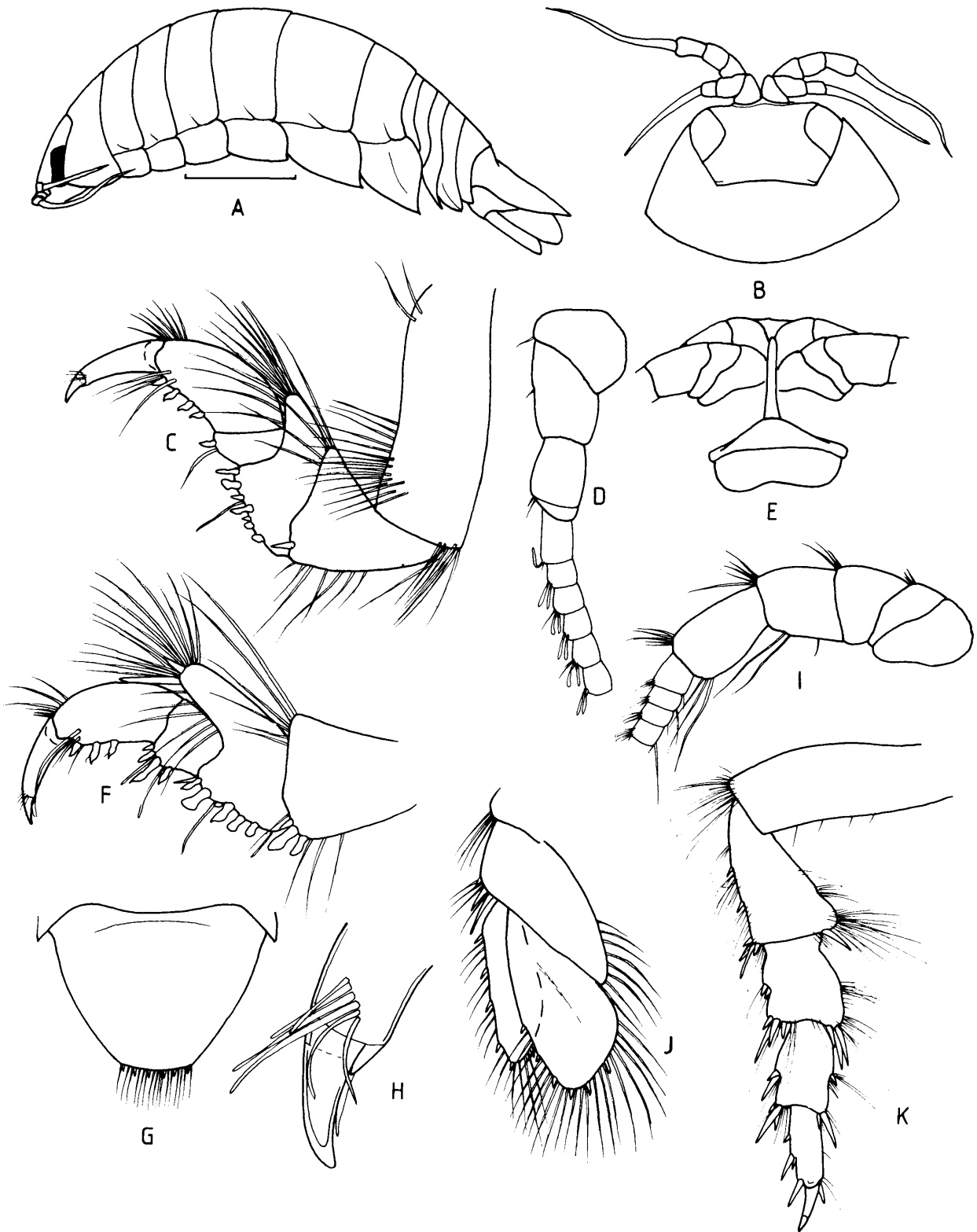


Fig. 29. *Pseudolana towrae*. A, B, G, holotype; J, female paratype; remainder male paratype. A, lateral view; B, cephalon, pereonite 1, dorsal view; C, pereopod 1; D, antennule peduncle; E, clypeal region; F, pereopod 2; G, pleotelson; H, pereopod 1, dactylus apex; I, antennal peduncle; J, uropod; K, pereopod 7. Scale 1.0 mm.

Pseudolana menartae n. sp.

Figs 31, 32

Material examined. 3 males (4.8, 5.1, 6.0 mm), 9 females (5.3–7.9 mm, mean 6.5 mm), 4 mancas (2.9–3.5 mm), Danger Point, Port Bremer, Cobourg Peninsula, NT, 1 May 1982, beach isopod trap, coll. NTM. 2 males (5.0, 5.5 mm), female (5.8 mm), manca (3.7 mm), Coral Bay, Port Essington, NT, 11°11.3'S, 132°3.75'E, 20 July 1981, intertidal pools at low water, coll. NTM.

Types. Holotype, male NTM Cr000225, paratypes NTM Cr000226–Cr000228.

Type locality. Cobourg Peninsula, NT.

Description of male. Body about 2.5 times as long as wide. Coxal plates of pereonites 2–3 with posterior margins rectangular; coxae of pereonites 4–7 with posterior ventral margin produced to form an acute point; coxae of pereonites 6–7 with complete diagonal furrow. Pleon with lateral margins of pleonites 1–2 scarcely produced. Pleotelson shorter than long, posterior margin smoothly rounded, with 4 spines and abundant marginal setae.

Antennule flagellum, composed of 13 articles, extends to posterior of pereonite 2. Antenna peduncle articles relatively short; posterodistal margins of articles 4–5

with long setae; flagellum composed of 17 articles, about first 10 of which have abundant setae, extending to pereonite 3.

Frontal lamina slightly dilated anteriorly.

Pereopod 1 with abundant setae along anterior margin of basis and anterodistal angles of ischium and merus; posterior margin of merus with 3 blunt and 3 acute spines, carpus with 1 acute spine, palm of propodus with 2 acute spines, and third spine opposing dactylus. Pereopod 2 similar to 1, but spines larger and more abundant; anterodistal margin of merus more strongly produced, provided with 3 prominent spines as well as long setae. Pereopod 7 with abundant setae along anterior margins of ischium, merus and carpus; anterior margins of ischium to propodus with spines at distal angle only; posterior margins of ischium to propodus with 3 groups (ischium, propodus) or 2 groups of spines (merus, carpus).

Slender penes present on sternite 7.

Pleopod 2 appendix masculina slightly shorter than length of endopod; apex expanded, spatulate, extends beyond endopod by slightly more than one third of its length (0.37). Uropods extending slightly beyond apex of pleotelson. Exopod lateral margin nearly straight, medial convex; lateral margin with 4 spines, medial with

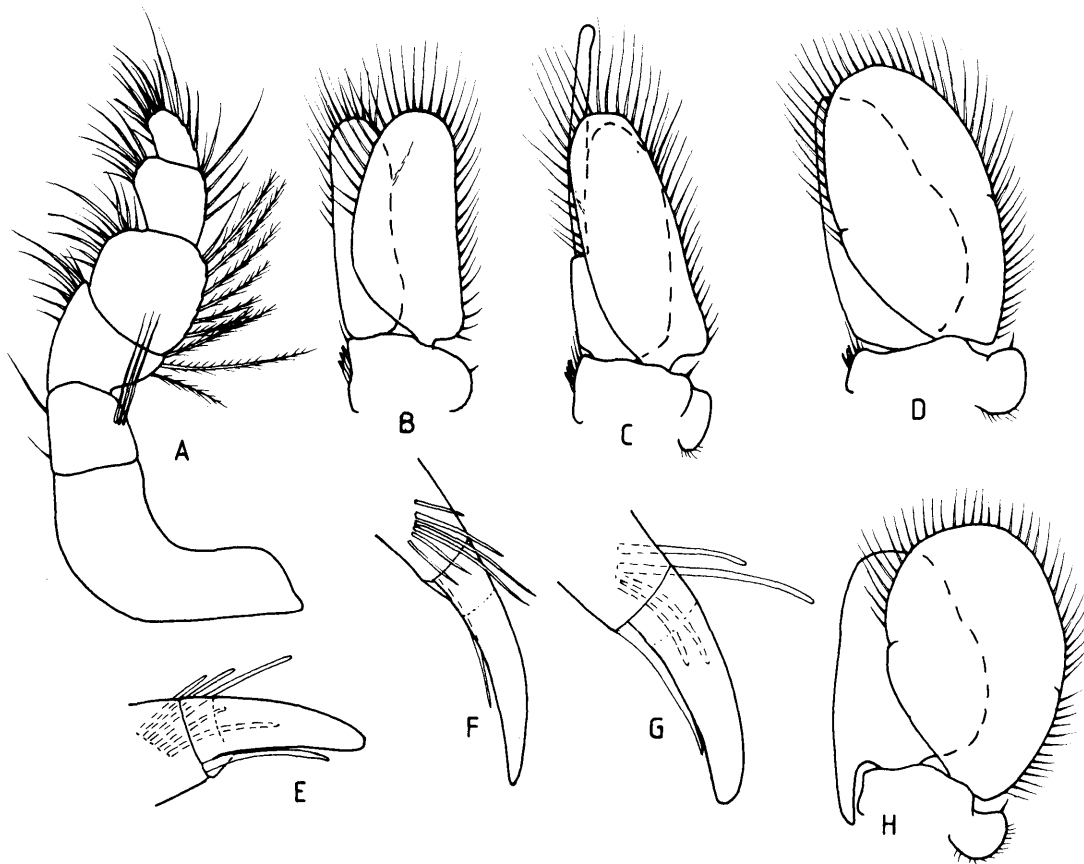


Fig. 30. *Pseudolana towrae*, male paratype: A, maxilliped; B, pleopod 1; C, pleopod 2; D, pleopod 4; H, pleopod 5. Dactylus apex of pereopod 1: E, *P. brevifimbria*; F, *P. elegans*; G, *P. concinna*.

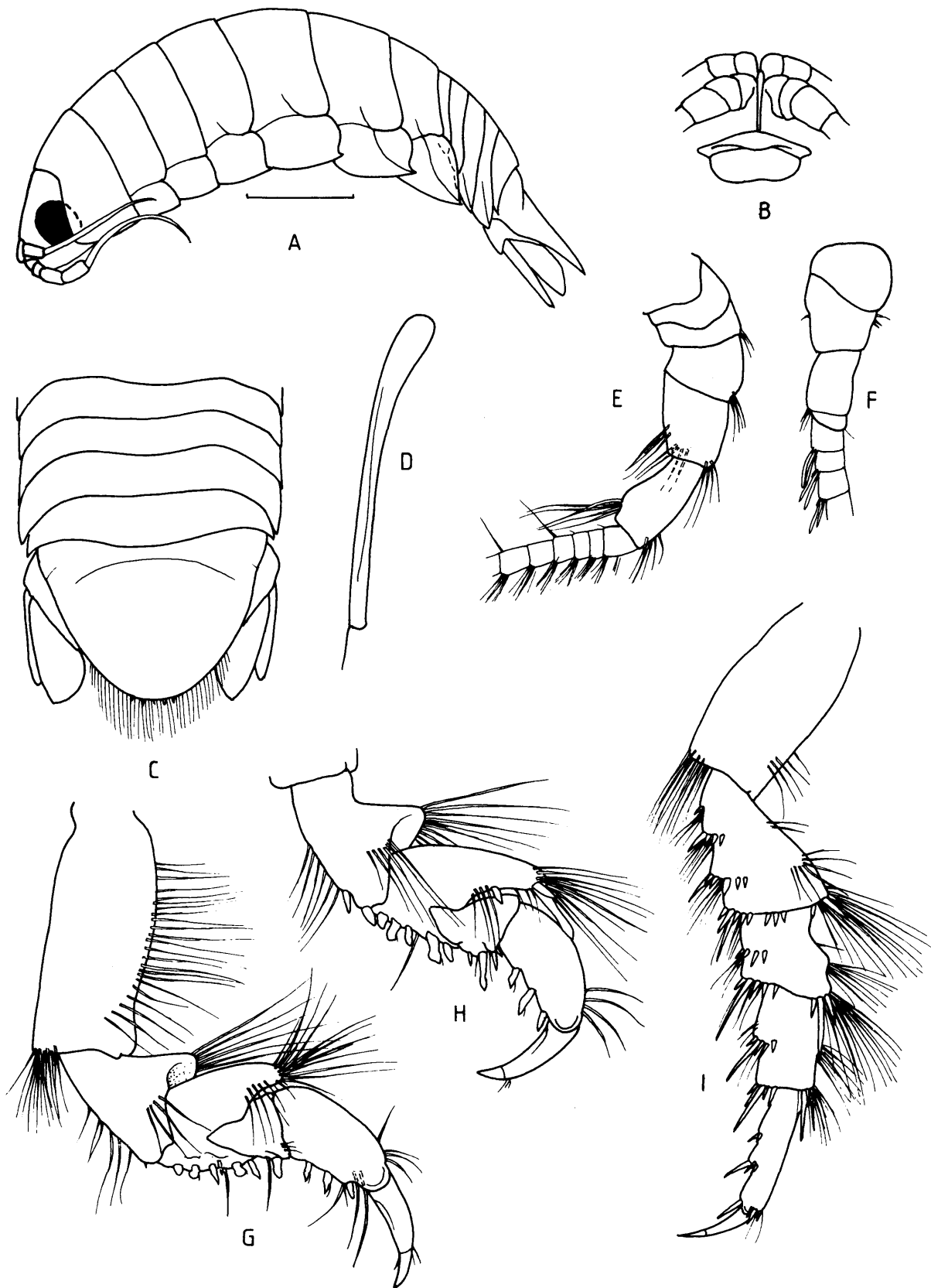


Fig. 31. *Pseudolana menertae* n. sp. A, B, holotype; C, female 7.9 mm; remainder male paratype. A, lateral view; B, clypeal region; C, pleon and pleotelson; D, appendix masculina; E, antennal peduncle; F, antennule peduncle; G, pereopod 1; H, pereopod 2; I, pereopod 7. Scale 1.0 mm.

2, both margins with setae. Endopod lateral margin convex, with setae along distal half only, provided with 3 spines, medial margin entirely setose, with 3 spines.

Female. Similar to male except for sexual characters. Apparently reaching somewhat larger size. Pleon of females slightly longer, and antenna flagellum articles not as setose.

Colour. In alcohol, white with sparse black chromatophores.

Size. Largest male 6.0 mm, largest female 7.9 mm, largest manca 3.7 mm.

Remarks. This species is the most similar to *Pseudolana brevifimbria*. It is readily separated from that species by a longer and spatulate appendix masculina, lateral margins of pleonite 3 being produced, and by the very different shape setation and spination of the uropodal endopod. *Pseudolana ovalis* is similar, but has a shorter appendix masculina, and far fewer setae on the pereopods.

Distribution. Known only from the Cobourg Peninsula, NT.

Etymology. From *menarte*, an Aboriginal word meaning blunt, and alludes to the shape of the appendix masculina.

Natatolana Bruce

Natatolana Bruce, 1981b: 957, figs 1d,e; 2c,d; 3e,f; 4c, 5c,d.

Type species. *Cirolana hirtipes* Milne-Edwards, 1840, by designation (Bruce, 1981b). Types held by the Muséum Nationale d'Histoire Naturelle, Paris, Is. 93.

Diagnosis. Antennule peduncle article 3 longest. Antenna peduncle articles 3–5 subequal in length and

longest. Frontal lamina narrow, about 3.5 times as long as wide. Maxilliped endite with 2–3 coupling hooks. Pereopods 1–3 with anterodistal margins of ischium and merus produced, provided with long setae. Pereopods 5–7 with basis markedly flattened, provided with long setae, other articles flattened. Pleopod 1 endopod greater than half width of exopod; pleopod 5 endopod without setae, other pleopods with both rami setose; appendix masculina inserted basally or sub-basally.

Additional characters. Body about 2.5–3 times as long as broad, smooth, without ornamentation. Pleonite 5 with lateral margins encompassed by pleonite 4. Pleotelson usually with abundant marginal setae amongst which are set spines.

Antennule peduncle and flagellum short, flagellum rarely extending beyond posterior margin of cephalon. Frontal lamina ventral surface usually flat; clypeus sessile. Mandible incisor with posterior cusp prominent. Maxillule and maxilla entire. Maxilliped relatively slender. Pereopod 1–3 ambulatory. Dactyls without secondary unguis. Penes usually absent. Pleopods with peduncle broader than long, lateral margin provided with small lobe, rami similar, not elongate; appendix masculina extending a little beyond end of inner ramus. Uropod rami with marginal plumose setae, usually provided with spines; peduncle medial margin produced.

Sexual dimorphism. Virtually no variation other than of sexual characters. Females tend to be larger.

Remarks. The genus *Natatolana* is one of the most readily recognised of the marine genera. The dorsal surfaces are smooth, polished in appearance, and never show any form of sculpting. The flattening of the basis of the posterior pereopods, and the presence of

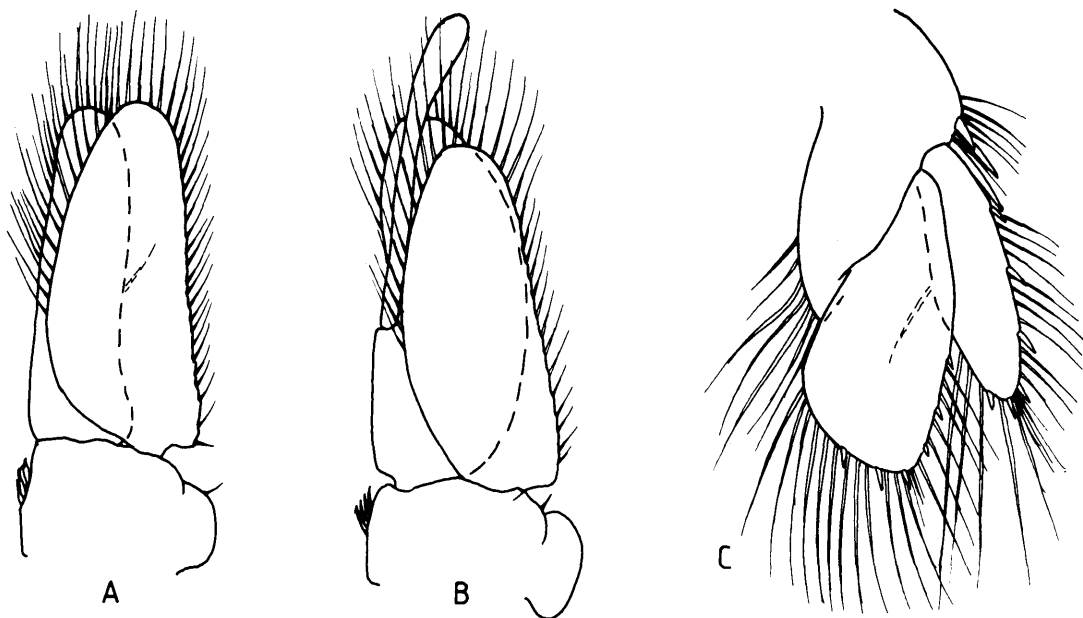


Fig. 32. *Pseudolana menertae* n. sp., male paratype. A, pleopod 1; B, pleopod 2; C, uropod.

abundant, long, natatory setae allows for instant identification. Two genera may be confused with *Natatolana*. The genus *Dolicholana* has similar pereopods, but the frontal lamina structure is very different, and also the endopods of pleopods 3–5 are naked. The genus *Politolana*, which has several characters similar to *Natatolana*, differs in lacking the expanded, setose basis on the posterior pereopods. The appendix masculina of *Politolana* arises sub-medially rather than basally as in *Natatolana*. The genus *Politolana* is discussed by Bruce (1981b).

Three species do not agree entirely with the genus description given here. *Natatolana karkarook* differs in several mouthpart characters. These differences are discussed under the remarks for that species. *Natatolana endota* and *N. prolixa* are clearly related to one another, and are distinguished from others in the genus by having a very acute pleotelson apex, and an extremely long antennal flagellum. The mouthparts of these two species approach those of *N. karkarook*.

Hansen (1890, 1905) first recognized that the species now placed in the genus *Natatolana* formed a group characterised by having a narrow frontal lamina, and pereopods with long natatory setae. Hansen (1905) also commented on the close similarity of the various species to each other, and that great care was needed in determining species identity. The uniformity in appearance of the species led to an appraisal of the species of this group, which left no doubt that a genus should be established (Bruce, 1981b) to contain them. This genus is large, with a total of fifty-four species at the time of writing. This is second in number of species to *Cirolana*. In Australia, *Natatolana* is the largest genus.

The genus is the most widespread of the family, and has more representatives in temperate and cold temperate waters than do other genera. All species are subtidal, and some have been taken at depths in excess of 2,000 metres (Hansen, 1905). Occasional specimens are taken in pools on sand flats at low tide.

Key to Species Groups within *Natatolana*

This key is intended as an aid in identifying species of the genus. At present, six species do not show any particular affinity to these groups. It should be obvious that these species do not belong once comparisons are made to species of the group. The characters of the group are summarised after the key.

1. Pleotelson with distinct dorsal depression. *N. pellucida* group
- Pleotelson without dorsal depression. 2
2. Basis of pereopod 7 narrow; posterolateral margin of pleonite 4 acute. *N. valida* group

—Basis of pereopod 7 broad, posterolateral margin of pleonite 4 rounded. 3

3. Posterior margin of pleotelson rounded. *N. albicaudata* group

—Posterior margin of pleotelson converging to a narrow apex. *N. woodjonesi* group

***Natatolana pellucida* group.** Coxal plates usually with entire furrows; lateral margin of pleonite 3 barely produced; pleotelson with distinct dorsal depression, posterior two thirds flat; pereopod 2 without spines on palm of propodus, pereopod 7 with basis narrow, margins straight. Males with flattened penes on sternite 7. Australian species of this group are *N. pellucida*, *N. corpulenta*, *N. longispina* n. sp., *N. galathea* n. sp., and *N. laewilla* n. sp.

***Natatolana valida* group.** Eyes narrow; coxal plates with furrows feeble or absent; pleonites 3–4 with posterolateral margins acute; pleotelson with posterior margin broad, generally with 8 or more stout spines; palm of pereopod 2 with spines, pereopod 7 with basis broadening distally, margins nearly straight. A further feature of these species are their large size, usually 20–30 mm in length. Australian species of this group are *N. valida*, *N. arcicauda*, *N. lurur* n. sp., *N. matong* n. sp. and *N. thurar* n. sp. Two other species can be placed in this group, *N. rossi* and *N. hirtipes*.

***Natatolana albicaudata* group.** Frontal lamina straight-sided, rounded anteriorly; pleotelson with posterior margin broadly rounded; basis of pereopod 7 broad, but scarcely sinuate; pereopod 2 with spines on palm of propodus. Otherwise similar to the *N. woodjonesi* group. Australian species of this group are *N. albicaudata* and *N. amplocula* n. sp. *Natatolana curta* Richardson fits readily into this group.

***Natatolana woodjonesi* group.** Coxal furrows on all coxae, all incomplete; posterolateral margins of pleonite 3 short, 4 rounded; pleotelson without dorsal depression, apex narrow; palm of pereopod 2 without spines; basis of pereopod 7 broad, anterior margin sinuate. Australian species of this group are *N. woodjonesi*, *N. luticola*, *N. tenuistylis*, *N. variguberna*, *N. angula* n. sp., *N. arrama* n. sp., *N. bulba* n. sp., *N. kahiba* n. sp., *N. nammuldi* n. sp., *N. thalme* n. sp., *N. wowine* n. sp. and *N. wullunya* n. sp.

The species which show no particular affinity to these groups are *N. endota* n. sp., *N. prolixa* n. sp., *N. vieta*, *N. bowmani* n. sp., *N. boko* n. sp. and *N. gorung* n. sp. *Natatolana karkarook*, whilst not belonging to any group, is obviously closer to the *woodjonesi* group.

Key to Australian Species of *Natatolana*

1. Pleotelson with distinct dorsal depression. 2
 —Pleotelson without dorsal depression. 7
2. Antennal flagellum extending to, or beyond pleon. *N. vieta*
 —Antennal flagellum not reaching pleon. 3
3. Posterior margin of pleotelson serrate. *N. galathea*
 —Posterior margin of pleotelson not serrate. 4
4. Coxal plates without furrows. *N. laewilla*
 —Coxal plates with furrows. 5
5. Lateral margins of pleotelson sinuate. *N. corpulenta*
 —Lateral margins of pleotelson convex. 6
6. Posterior margin of pleotelson acute. *N. pellucida*
 —Posterior margin of pleotelson broad. *N. longispina*
7. Antennal flagellum extending beyond pleotelson. 8
 —Antennal flagellum not reaching pleon. 9
8. Lateral margins of pleotelson straight, apex acute with 4 spines. *N. endota*
 —Lateral margin of pleotelson sinuate, apex acute, without spines. *N. proluxa*
9. Labrum with acute laminar projection. *N. karkarook*
 —Labrum flat. 10
10. Propodal palm of pereopod 2 with 1 or more spines. 11
 —Propodal palm of pereopod 2 without spines. 19
11. Sternite 7 of male with penial processes. *N. bowmani*
 —Sternite 7 of male without penial processes. 12
12. Uropodal exopod distinctly shorter than endopod. 13
 —Uropodal rami subequal in length. 14
13. Frontal lamina broadest anteriorly. *N. gorung*
 —Frontal lamina straight sided. *N. lurur*
14. Cephalon without median rostral process. *N. valida*
 —Cephalon with rostral process. 15
15. Pleonite 3 with posterolateral margins produced, acute. 16
 —Pleonite 3 with posterolateral margins not acute. 18
16. Lateral margins of frontal lamina concave. *N. matong*
 —Lateral margins of frontal lamina straight. 17
17. Pleonite 4 with posterolateral margins acute. *N. thurar*
 —Pleonite 4 with lateral margins blunt. *N. arcicauda*
18. Eyes moderate in size. *N. albicaudata*
 —Eyes large in size. *N. amplocula*
19. Pleotelson margins sinuate without spines. *N. boko*
 —Pleotelson lateral margins convex with spines. 20

20. Uropodal endopod with prominent lateral excision. *N. variguberna*
 —Uropodal endopod without lateral excision. 21
21. Pleotelson posterior margin with 4 spines. 22
 —Pleotelson posterior margin with 6 or more spines. 24
22. Uropodal exopod distinctly shorter than endopod. *N. kahiba*
 —Uropodal rami subequal in length. 23
23. Basis of pereopod 7 half as wide as long. *N. thalme*
 —Basis of pereopod 7 more than half as wide as long. *N. woodjonesi*
24. Posterior margins of pleotelson straight, abruptly angled. *N. luticola*
 —Posterior margins of pleotelson smoothly curved. 25
25. Lateral margin of uropodal exopod without spines. 26
 —Lateral margin of uropodal exopod with spines. 27
26. Margins of basis of pereopod 7 strongly convex. *N. arrama*
 —Anterior margin of basis of pereopod 7 with medial part straight. *N. bulba*
27. Frontal lamina slender. 28
 —Frontal lamina medially constricted. 29
28. Pleotelson with 12 spines. *N. angula*
 —Pleotelson with 6 spines. *N. wullunya*
29. Ventrolateral angle of pleonite 2 formed into acute, curved process. *N. tenuistylis*
 —Ventrolateral angle of pleonite 2 not produced. 30
30. Lateral margin of uropodal endopod sinuate. *N. nammuldi*
 —Lateral margin of uropodal endopod convex. *N. wowine*

Natatolana vieta (Hale)

Figs 33, 34

Cirolana vieta Hale, 1925: 150, fig. 11.—1929b: 249, fig. 242; 1940: 288, fig. 1; Nierstrasz, 1931: 157.

Natatolana vieta.—Bruce, 1981b: 958.

Material examined. 2 females (18.2 mm, 1 broken), off Broken Bay, Sydney, NSW, 32°52'S, 152°32'E, 6 Dec. 1978, 144.5 m, coll. B. Rudman, P. Coleman, K. Handley. Manca (4.1 mm), CSIRO Stn G3/175/62, 33°03'S, 154°44'E, 10 Aug. 1962, 156 m, coll. L.R. Thomas. Western Port Bay, Vic., Crib Point, CPBS, Stns: 31E, 3 males (18.0, 11.2, 8.8 mm), manca (8.4 mm); 32E, manca (4.4 mm); 35S, male (12.6 mm), 3 mancas (6.9, 5.0, 5.5 mm); 42N, manca (8.5 mm); 600, manca (5.0 mm); 51N, manca (8.5 mm). Western Port Bay, WBES Stns: 1733, manca (5.8 mm); 979S, broken female. Male (13.8 mm), 3 females (27.7, 25.0, 23.6 mm), SA, 29 Apr. 1978, from school shark, spiral valve, coll. J. Andersen. Manca (5.8 mm), north of Northtown, northern Tas., 10 June 1971, 33.8 m, coll. Sea Fisheries Division. Male (12.6 mm), north of Rottneest Is., WA, 19 Nov. 1962.

Types. South Australian Museum, C278.

Type locality. Encounter Bay, SA.

Descriptive notes. Hale (1925) gave a detailed description which was later slightly expanded (Hale, 1940).

Eyes distinctly narrower anteriorly. Pleon with posterolateral extensions of pleonite 1 and 2 each with 2 distinct spiniform processes; pleonite 2–3 with impressed line. Pleotelson with strong dorsal depression, posterior margin forming point, posterior margin with 4 spines. Frontal lamina narrow, slightly dilated anteriorly, forming an acute point, ventral surface distinctly carinate. Clypeus with 1 median and 2 lateral carinae; labrum with lateral part depressed. Mandible incisor with strongly developed posterior tooth.

Variation. The largest specimens clearly show the pattern of furrows, sculpted clypeus and elongate pleon with a markedly depressed pleotelson. The mancas do not have such distinct characters and are broader in body shape. The smaller specimens can be recognised by the depressed pleotelson and the shape of the uropods. The pleotelsonic depression in smaller individuals lacks the median projection, and the two sub-lateral ridges are less clearly developed.

Sexual variation. Males have longer antennae and narrower body shape.

Size. Largest specimen, female, 27.7 mm. Largest manca 8.5 mm.

Remarks. The wrinkled character of the dorsal

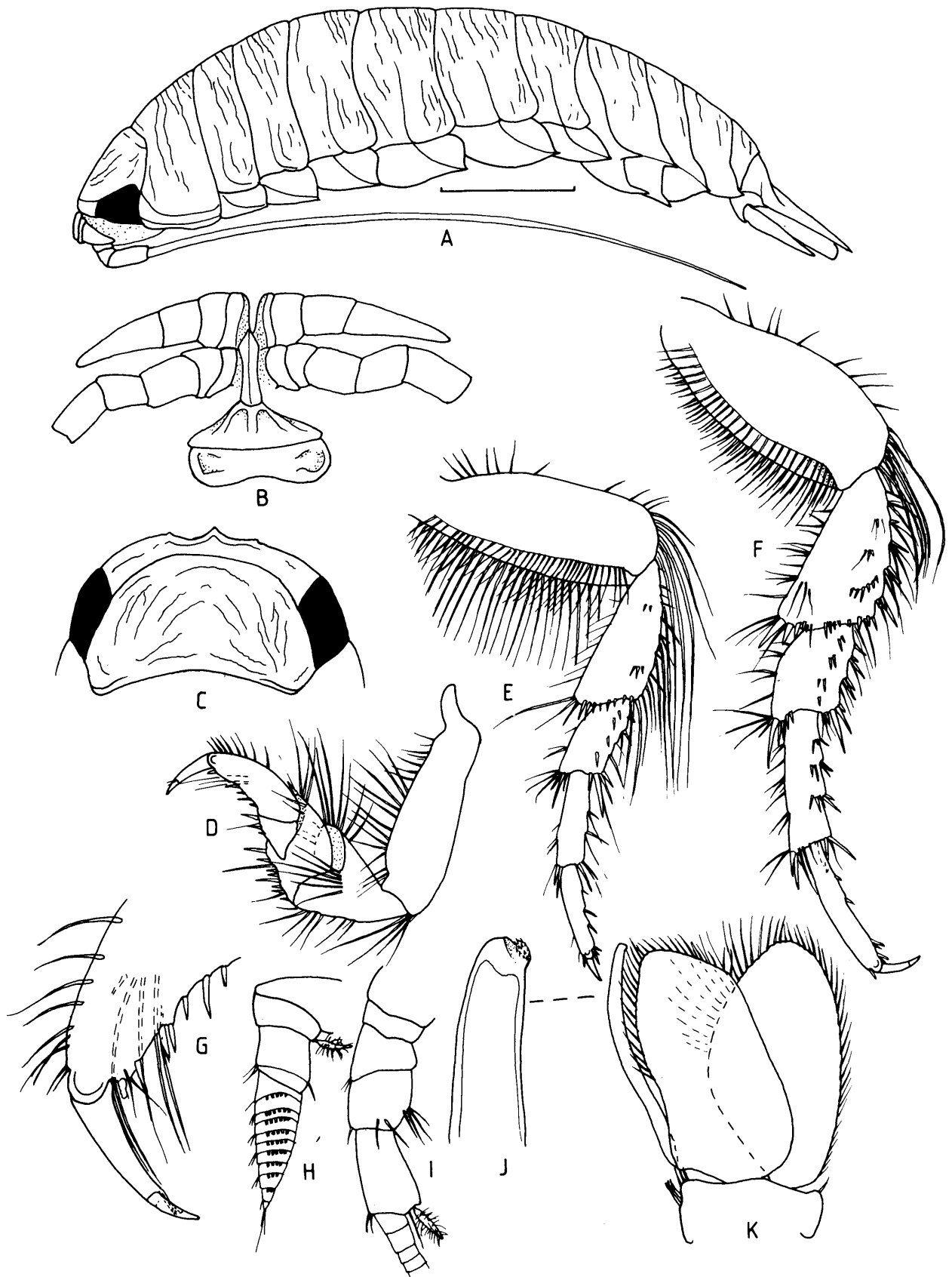


Fig. 33. *Natatolana vieta*. B, male 18.0 mm; remainder male 12.6 mm, WP. A, lateral view; B, clypeal region; C, dorsal surface, cephalon; D, pereopod 1; E, pereopod 7; F, pereopod 6; G, pereopod 1, dactylus; H, antennule; I, antennal peduncle; J, appendix masculina, apex; K, pleopod 2. Scale 3.0 mm.

surfaces of this species at once distinguish it from all others of the genus. These "wrinkles" tend to be more developed in larger specimens. Specimens without the impressed lines can be recognized by the sculpture of the frontal lamina, clypeus and pleotelson, and by the shape of the pleotelson, uropods and lateral margin of the pleon segments. The median longitudinal carina of the pleotelson described by Hale (1940) is absent in all

but one specimen where it is feebly developed.

Distribution. South Australia: Encounter Bay (Hale, 1925), Seaford Bay and south to St Francis Island (Hale, 1940). Present material from Sydney, NSW, Port Phillip Bay, Vic., and Rottnest Island, WA, at depths from 16 metres in Port Phillip Bay to 156 metres off Sydney.

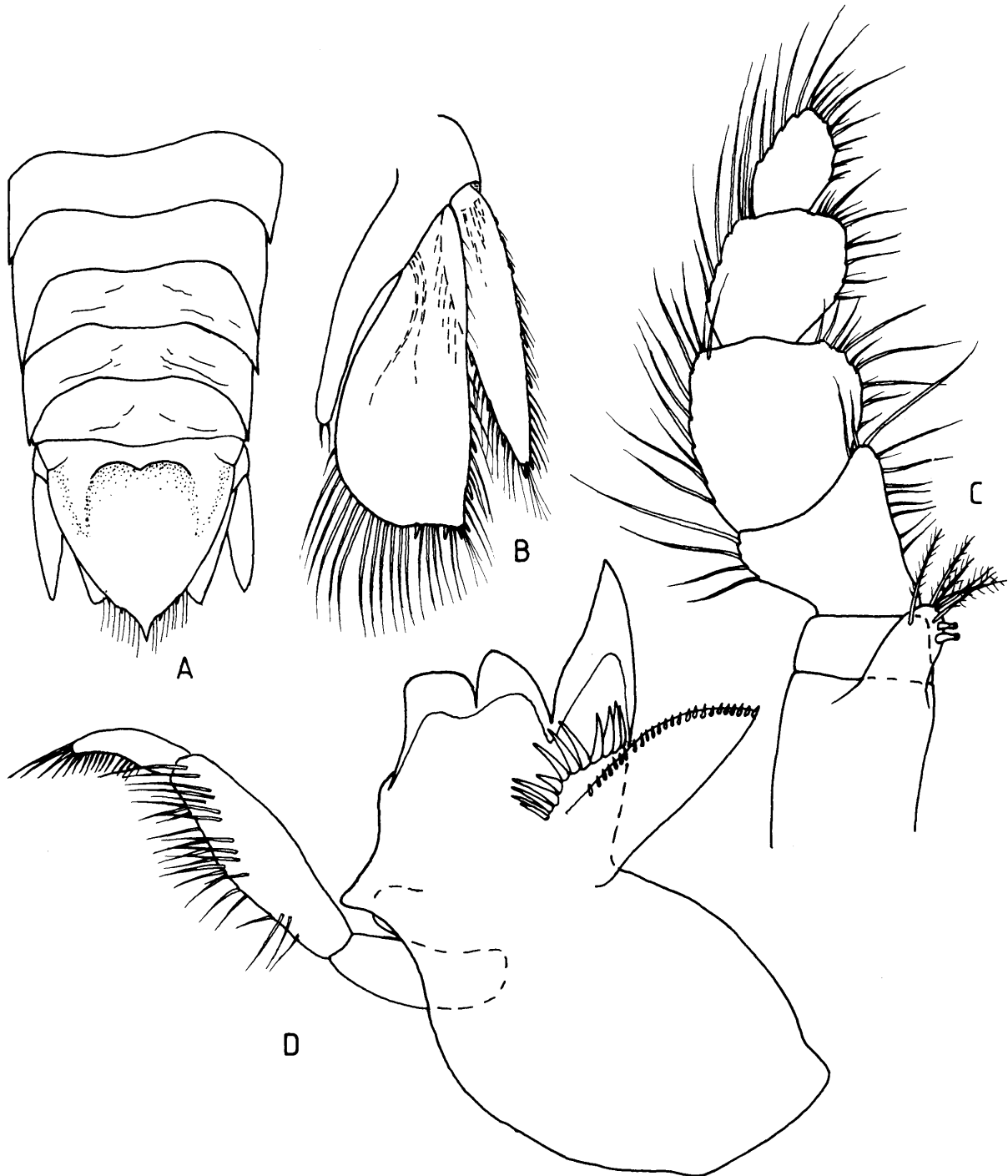


Fig. 34. *Natatolana vieta*. A, male 10.0 mm; remainder male 12.6 mm, WP, Vic. A, pleotelson; B, uropod; C, maxilliped; D, mandible.

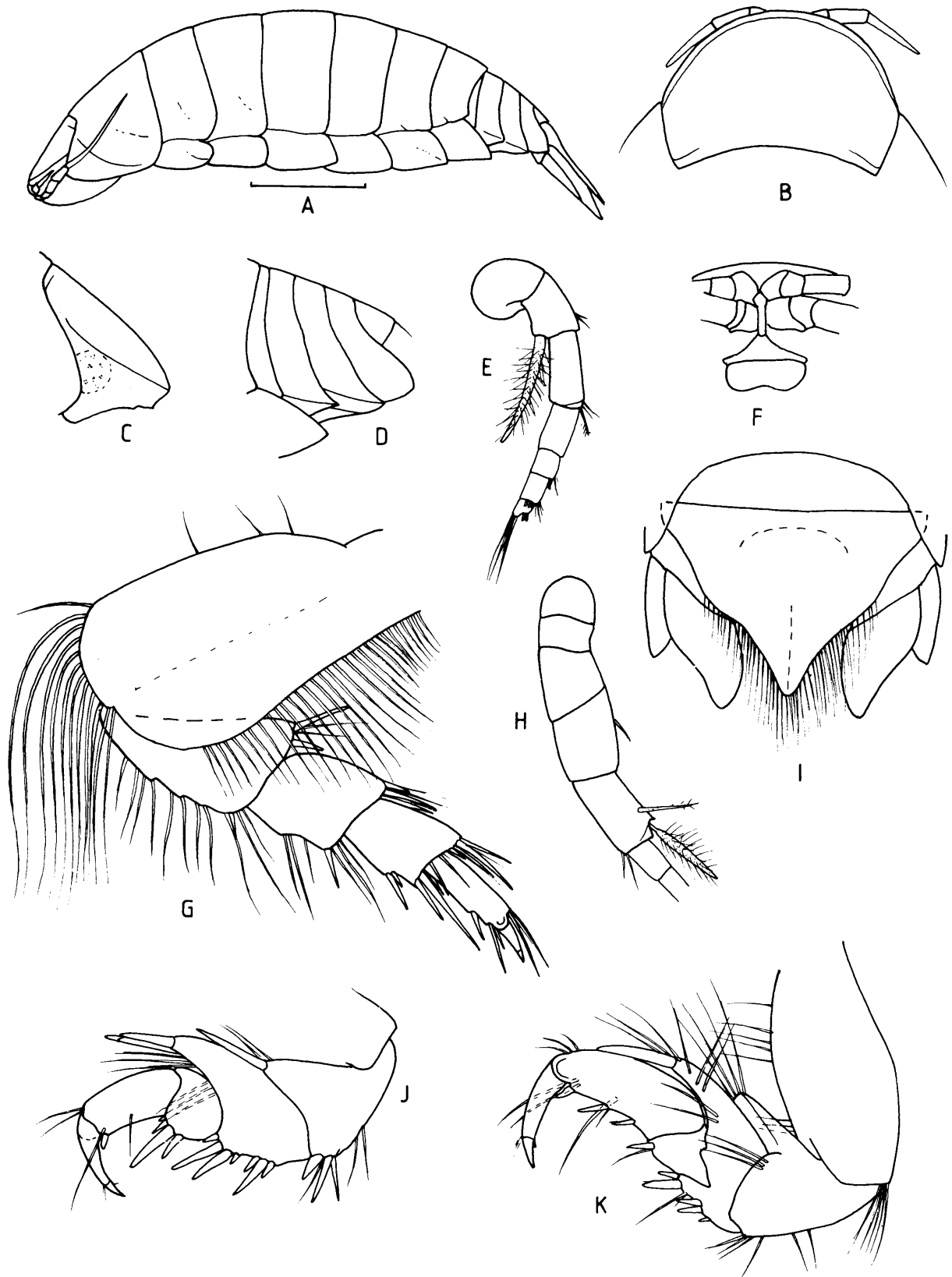


Fig. 35. *Natatolana boko* n. sp. A-D, F, I holotype; remainder paratype. A, lateral view; B, cephalon, dorsal view; C, cephalon, lateral view; D, pleon, lateral view; E, antennule; F, clypeal region; G, pereopod 7; H, antennal peduncle; I, pleotelson and uropods; J, pereopod 3, distal articles; K, pereopod 1. Scale 1.0 mm.

Natatolana boko n. sp.

Figs 35, 36

Material examined. 2 males (5.2, 5.0 mm), 25 miles east of Lady Musgrave Is., Qld, 23°44'S, 152°49'E, 17 Nov. 1977, 357–384 m, shelly grey ooze with forams, coll. F. Rowe & P. Colman.

Types. Holotype, male (5.2 mm) AM P32173; paratype, AM P30382.

Type locality. East of Lady Musgrave Island, Qld, 23°44'S, 152°49'E.

Description of male. Body about 2.5 times as long as wide. Cephalon anterior margin smoothly rounded, rostral point absent. Eyes vestigial; submarginal furrow runs entire length of cephalon. Pereonite 1 with single horizontal furrow. Coxal plates without carinae or impressed lines except for those on pereonite 2 which have faint incomplete lines. Pleonite 1 largely concealed by pereonite 7; pleonite 5 with posterolateral margin produced posteriorly, partially concealing peduncle of uropod in lateral view, without longitudinal furrows. Pleotelson lateral margins markedly sinuate, apex narrow, rounded; posterior half with numerous close-set plumose setae and no spines; anterior dorsal surface

with depression, posterior half formed with acute ridge, visible in angled view, but not from perpendicular.

Antennule peduncle articles 1–2 subequal in length, article 2 with large sensory seta, extending beyond article 3 of peduncle; flagellum short, not reaching pereonite 1, composed of 4 articles, first of which is longest. Antenna flagellum with 12 articles, extending to posterior of pereonite 1.

Frontal lamina with posterior two thirds straight sided, anterior one third formed into acute rhomboid. Maxilliped palp articles 2–3 fused or very nearly so; endite with 2 coupling hooks.

Pereopod 1 with prominent spine on anterodistal angle of merus; posterior margin of merus with 5 spines, carpus with 1 spine and propodus with 2 spines on palm, and 1 opposing dactylus. Pereopods 2 and 3 similar to 1, but anterodistal angle of ischium and merus with additional spines, and additional and longer spines on posterior margins of ischium, merus and carpus; propodus without spines on palm. Pereopod 7 posterior margin of basis straight, almost without setae, anterior margin setose; posterior margin of merus, carpus and propodus with spines, ischium with setae only; anterior margins of ischium to propodus with spines at distal angles.

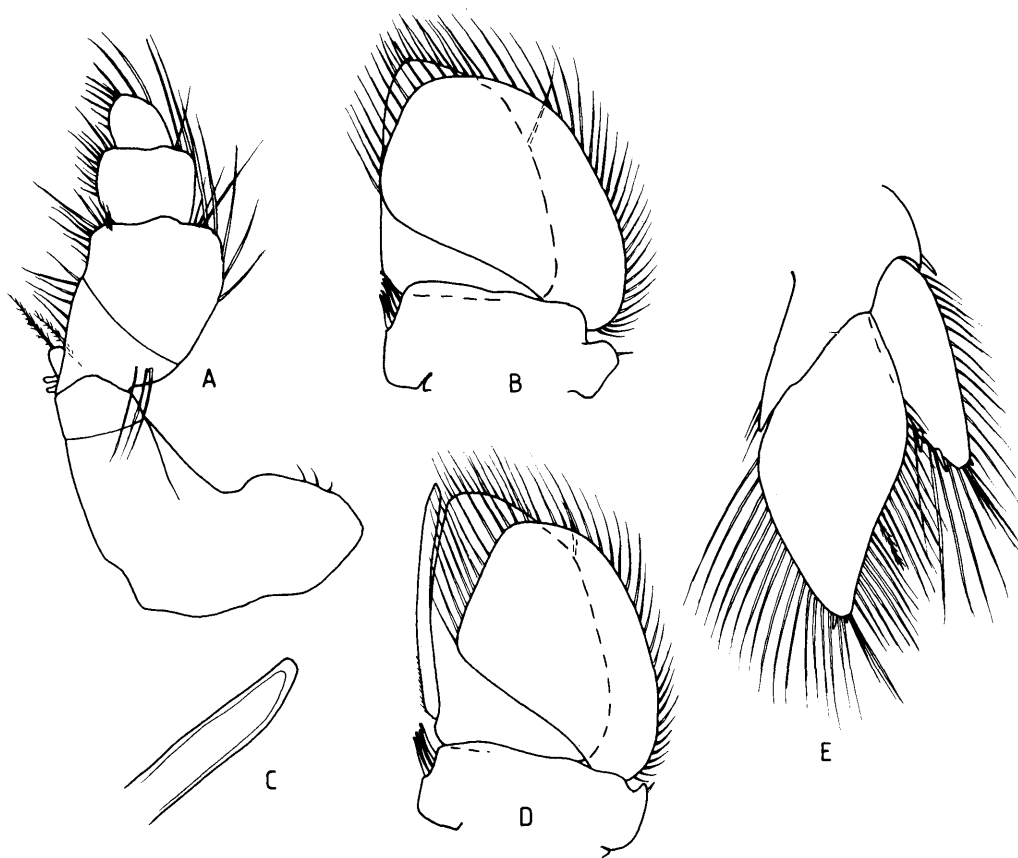


Fig. 36. *Natatolana boko* n. sp., paratype. A, maxilliped; B, pleopod 1; C, appendix masculina, apex; D, pleopod 2; E, uropod.

Vasa deferentia opening flush to surface of sternite 7.

Rami of pleopods 1–2 of approximately equal width. Appendix masculina very slightly curved, extending just beyond tip of endopod. Exopods of pleopods 3–5 without suture. Uropods extending beyond apex of pleotelson. Endopod medial margin smoothly curved, with numerous close setae and 2 subapical spines, lateral margin strongly sinuate, setose for distal two thirds of margin. Exopod two thirds as long as endopod, both margins convex, setose, lateral with single apical spine, medial with 2 spines.

Female. Not known.

Size. Holotype, 5.2 mm.

Colour. Pale brown in alcohol, chromatophores not visible.

Remarks. This species is easily recognised by its flat cephalon without a rostral point, and by the unusual form of the pleotelson and uropods. The eyes appear to be effectively absent, but very faint traces of ocelli are discernable.

Distribution. Known only from the type locality.

Etymology. *Boko* is an Aboriginal word meaning blind.

Natatolana bowmani n. sp.

Fig. 37

Material examined. Male (13.1 mm), 6 manca (4.4–5.0 mm), east of Port Jackson, NSW, 33°32'S, 152°08'E, 10 Dec. 1980, 892–900 m, coll. R. Springthorpe & P. Coleman. Male (13.8 mm), 2 females (8.7, 9.8 mm), east of Port Jackson, NSW, 33°36'S, 152°05'E, 10 Dec. 1980, 1090–1125 m, sledge dredge, coll. R. Springthorpe & P. Coleman. 3 males (9.5, 10.2, 10.7 mm), 4 females [6.9, 10.7, 10.8 (crushed), 14.0 mm ovig.], 4 manca (4.5, 4.9, 5.0, 5.6 mm), east of Port Jackson, NSW, 33°38'S, 152°03'E, 10 Dec. 1980, 880–909 m, sledge dredge, coll. R. Springthorpe & P. Coleman. 2 females (10.0, 13.2 mm), 4 manca (4.0, 5.2, 5.5, 5.8 mm), east of Port Kembla, NSW, 34°27'S, 151°27'E, Dec. 1976, 1200 m, coll. J.K. Lowry.

Types. Holotype, AM P33555; paratypes, AM P31573–P31576, P31905.

Type locality. East of Port Jackson, NSW, 33°36'S, 152°05'E.

Description of male. Body about 2.5 times as long as wide. Cephalon with small rostral point, distinct furrow running from medial margin of each eye; distinct furrow. Eyes vestigial, faint traces of unpigmented ocelli visible. All coxae with complete furrow. Pleonites 1–2 with lateral margins not produced; pleonite 3 with lateral margin slightly produced; pleonite 4 with lateral margins encompassing pleonite 5. Pleotelson with posterior two thirds of dorsal surface distinctly flat, lateral margin smoothly curving to apex on either side of which lie 2 spines set amongst plumose marginal setae.

Antennule peduncle article 2 three quarters length of article 1; long sensory spine at posterodistal angle;

flagellum composed of 10 articles, first of which is longest. Antenna with flagellum of 19 articles, extending to pereonite 3.

Frontal lamina dilated anteriorly, about 4 times as long as wide.

Pereopod 1 slender; merus with 1 spine and abundant setae on anterodistal margin, posterior margin with about 6 acute spines; carpus with 3 acute spines; propodus with 3 acute spines on proximal half of palm and small spine opposing dactylus. Pereopods 2–3 similar to 1, but carpus proportionally longer, posterior margins of ischium, merus and carpus with more abundant and longer spines; propodus with single stout spine on palm. Pereopod 7 slender, basis with posterior margin slightly convex, anterior margin nearly straight, ischium with setae on both margins, slender spines on posterior margins and distal angles; merus and carpus with abundant spines along posterior margins and at distal angles.

Penes present on sternite 7 as 2 well separated flattened lobes.

Pleopod 1 with exopod distal margin very nearly truncate; pleopod 2 appendix masculina arising sub-basally, smoothly curving in towards ramus, only just exceeding apex of endopod. Pleopods 3–5 with feeble trace of transverse suture across exopods. Uropods extending slightly beyond apex of pleotelson. Peduncle similar to others of genus in shape, but medial margin comparatively short. Exopod distinctly shorter than endopod, both margins with fringing setae; lateral margin with 5 spines, medial with 3. Endopod lateral margin very slightly sinuate, with 3 short spines and short marginal setae; medial margin with 5 spines and long setae.

Female. Similar to the male, but pereon slightly broader.

Colour. Yellowish grey in alcohol. Chromatophores not apparent. Eyes with vestigial ocelli appearing white.

Size. Males up to 13.8 mm, females up to 14.0 mm, largest manca 5.8 mm.

Remarks. This species shows no particular affinity for any of the species groups within the genus. The morphology of the cephalon most closely approaches that of *Natatolana gorung*, but the morphology of the pereopods is more similar to that of the *N. rossi* complex. Characters by which this species can be identified are the lack of obvious eyes, the presence of penes, and the morphology of the pleon, pleotelson, uropods and the male appendix masculina.

Distribution. New South Wales coast between Port Jackson and Port Kembla, at 880–1200 m.

Etymology. The epithet honours Dr Tom E. Bowman of the Smithsonian Institution, reknowned for his contribution to cirrolanid taxonomy.

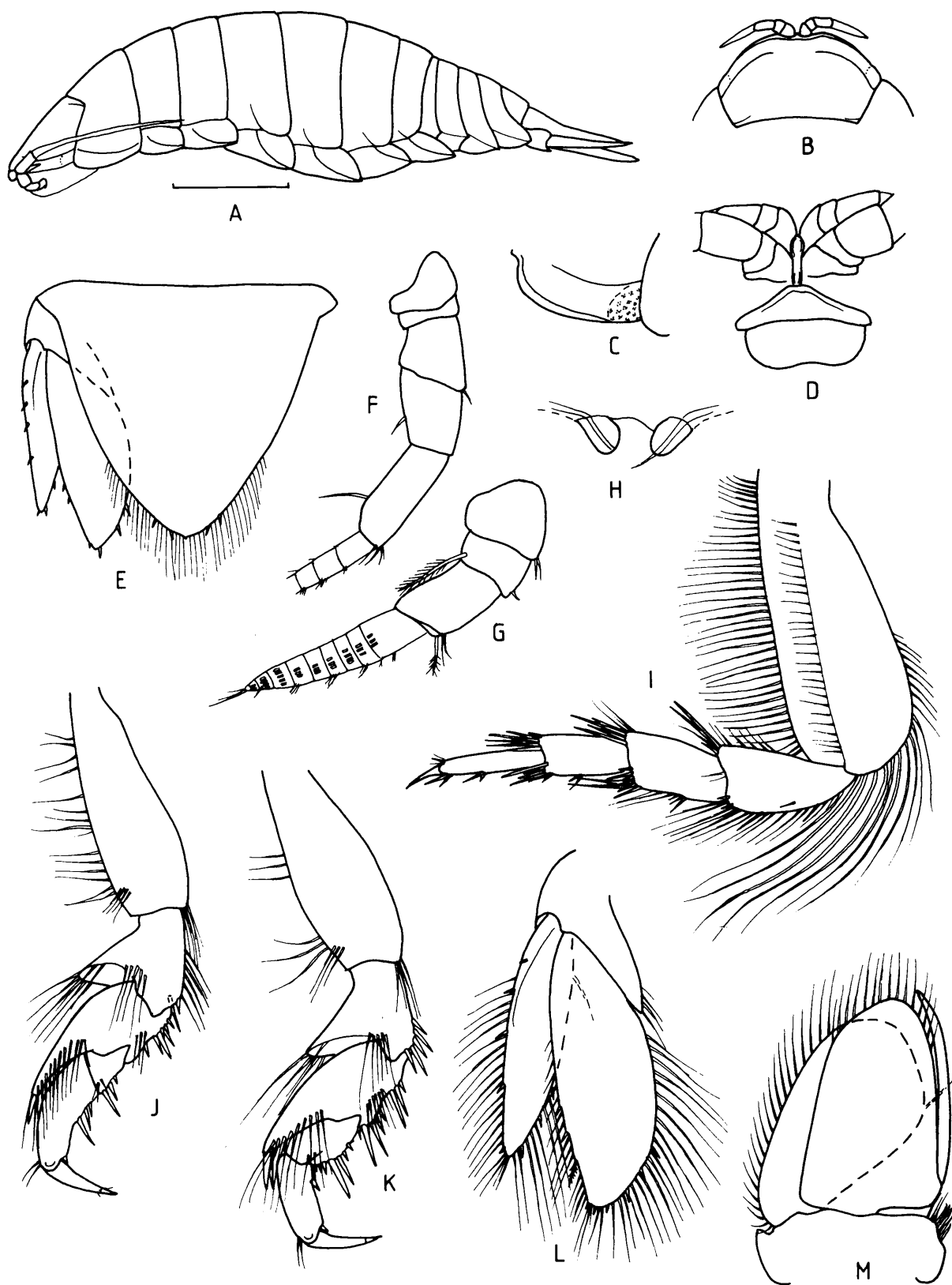


Fig. 37. *Natatolana bowmani* n. sp. A, B, D, E holotype. Paratypes: C, L, 13.5 mm; H, I, M, male 10.7 mm; F, G, J, K, male 13.1 mm. A, lateral view; B, cephalon; C, cephalon, lateral perspective; D, clypeal region; E, pleotelson and uropod; F, antennal peduncle; G, antennule; H, penes; I, pereopod 7; J, pereopod 1; K, pereopod 2; L, uropod; M, pleopod 2. Scale 3.0 mm.

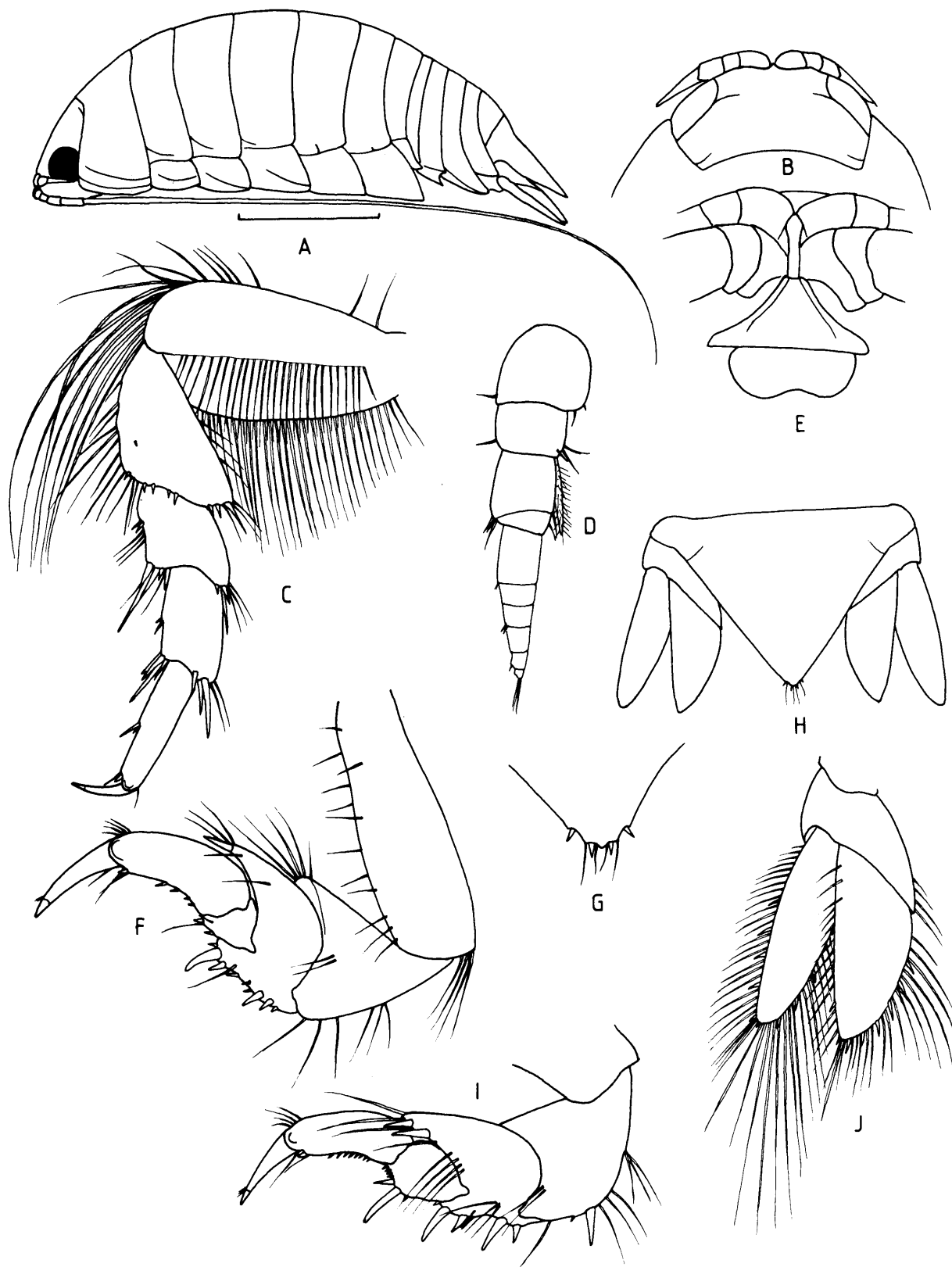


Fig. 38. *Natatolana endota* n. sp., paratype 7.5 mm. A, lateral view; B, cephalon, dorsal view; C, pereopod 6; D, antennule; E, clypeal region; F, pereopod 1; G, pleotelson, apex; H, pleotelson; I, pereopod 3; J, uropod. Scale 2.0 mm.

Natatolana endota n. sp.

Figs 38, 39

Material examined. Male (12.8 mm), female (12.6 mm), Aug. 1929, 10.8 m; female (13.9 mm), Jan. 1930, 9 m, all off Sow and Pigs Shoal, Port Jackson, NSW. Manca (7.5 mm), Stn 16, off Point Corell, northern Tas., 23 m, 10 June 1971, coll. Wesley Vale Offshore Survey, Sea Fisheries Division, Department of Agriculture.

Types. Holotype, male, AM P32172. Paratypes, AM P10693, P10689; TM G1505.

Type locality. Port Jackson, NSW, 33°20'S, 151°16'E.

Description of male. Body strongly vaulted, 2.5 times as long as wide. Cephalon with distinct rostral point; partial furrow running from dorsal margin of each eye. Eyes round in lateral view. Pereonite 1 with 2 lateral furrows. Coxae of pereonites 2-4 with partial furrows, coxae of pereonites 5-6 without furrows. Pleonites all

visible, posterolateral margin of pleonite 3 acute, produced posteriorly, with single longitudinal furrow; posterolateral margin of pleonite 4 acute, less produced than 3, without furrow. Pleotelson little more than two thirds as long as wide, lateral margins straight, converging to form acute apex armed with 4 spines and 4 setae.

Antennule short, peduncle articles 1-3 subequal in length, flagellum longer than peduncle, extending to posterior of eye, composed of 6 articles. Antenna flagellum remarkably elongate, extending beyond telson by one third of body length, composed of about 80 articles.

Frontal lamina straight-sided, expanded anteriorly with blunt, angled anterior margin. Clypeus triangular, broader than labrum. Mandible with moderately narrow incisor, lacinia with 12 stout spines; molar process with about 40 fine teeth. Maxillule with spines on endopod

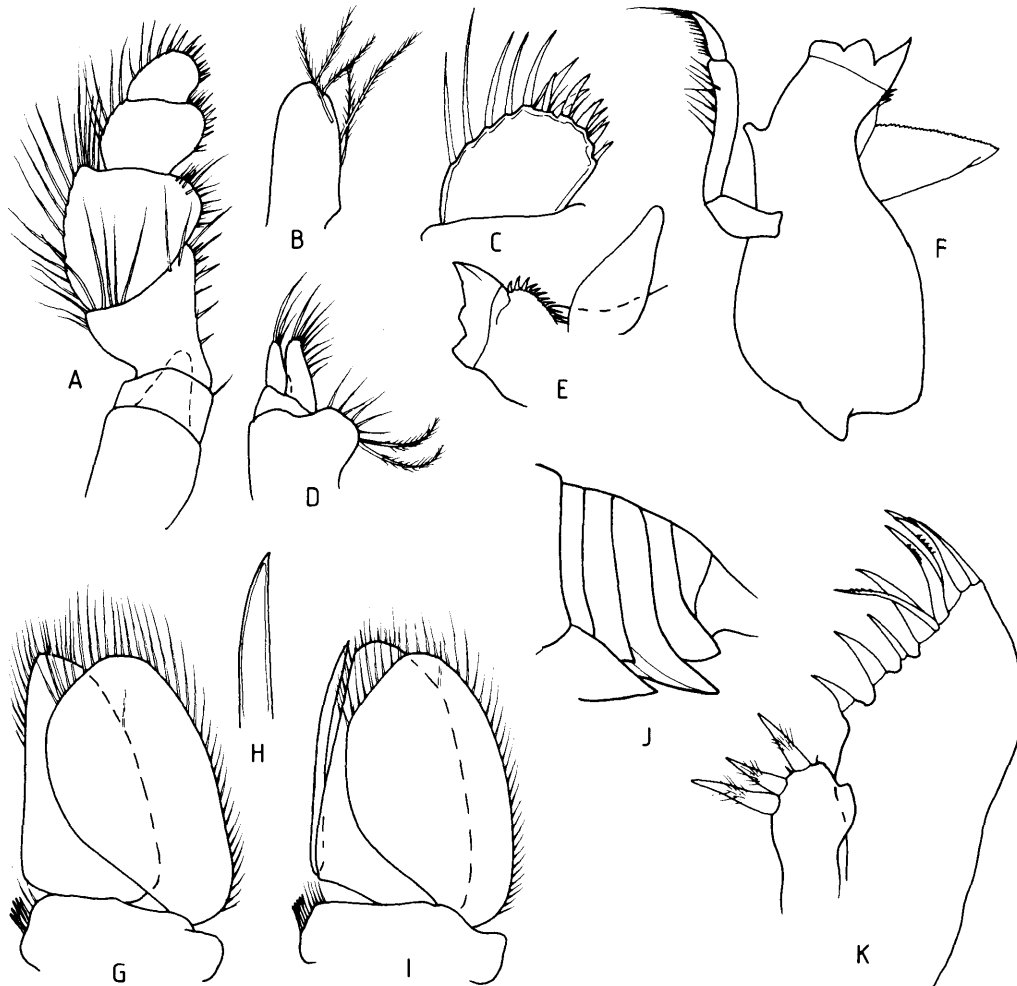


Fig. 39. *Natatolana endota* n. sp., holotype. A, maxilliped; B, maxilliped endite; C, maxilliped palp, terminal article; D, maxilla; E, right mandible, distal part; F, left mandible; G, pleopod 1; H, appendix masculina, apex; I, pleopod 2; J, pleon, lateral view; K, maxillule.

sparsely plumose. Maxilla with 3 and 9 setae on palp and exopod respectively, endopod with 6 simple and 2 long plumose setae. Maxilliped with short setae and spines along medial margin of palp; endite short, with 5 plumose setae and no coupling hooks.

Pereopod 1 with setae along anterior margin of basis; posterodistal angle with group of setae; ischium with anterior margin setose, few setae on posterior margin; merus with 4 large and 5 small spines on posterior margin, anterior margin produced, apex with single stout spine and setae; propodus with 4 small spines on proximal half of palp and single spine opposing dactylus. Pereopods 2 and 3 similar, but with additional spines on all articles except basis; carpus with 2 large spines, row of 4 small spines distal to these; propodus with row of 8 spines on proximal half of posterior margin. Pereopod 7 with remarkably long setae on anterior margin and medial carina of basis, as well as long natatory setae on distal extremity; distal angle of all articles except basis with spines and setae.

Vasa deferentia opening flush to surface of sternite 7.

Appendix masculina not extending beyond apex of endopod. Uropod extending beyond apex of pleotelson, exopod slightly longer than endopod, distal extremity rounded; lateral margin with 5 spines, medial with 4; setae on medial margin very long. Endopod with lateral margin straight, armed with 3 spines amongst marginal setae, medial margin convex, armed with 6 spines and marginal setae.

Female. Similar to male.

Colour. In alcohol, cream.

Size. Up to 13.9 mm.

Remarks. The shape and spination of the pleotelson is unique within the genus. The shape and setation of the uropods is also unusual. Only one species, *N. narica*, has the exopod longer than the endopod, and that species is otherwise very different. The setae on the basis of pereopod 7 are longer, and the number of spines on the propodus of pereopods 2 and 3 is greater than is normal for the genus. In all other species, the propodus of pereopods 2 and 3 have 0–2 spines on the palm, while this species has 8. Only two other species possess long antennal flagellae, *N. vieta* and *N. prolixa*. In the present species, the flagellae are proportionally longer than in *N. vieta*.

The most similar species is *Natatolana prolixa* with which *N. endota* shares numerous points of similarity. Both species have an extremely narrow pleotelson apex, very long antennal flagellum, similar mouthparts, deep coxal plates and a similar pleon morphology.

Distribution. Port Jackson, NSW, and northern Tasmania, in fine sand at 9–23 metres.

Etymology. *Endota* is an Aboriginal word meaning beautiful.

Natatolana prolixa n. sp.

Figs 40, 41

Material examined. Male (21.0 mm), Hay Point, Mackay, Qld, 7 Aug. 1975, fine sand and mud, 15–21 m, coll. Milligan.

Types. Holotype, QM W6738.

Type locality. Off Hay Point, Mackay, Qld, 21°17'S, 149°18'E.

Description of male. Body about 2.5 times as long as wide. Cephalon with small median rostral process; dorsal interocular furrow incomplete. Coxal plates deep, only those of pereonites 2–3 with furrow. Lateral margins of pleonites 1–2 not produced, those of pleonite 3 strongly produced, those of pleonite 4 acute, curving dorsally. Pleotelson totally without spines or setae, lateral margins slightly sinuate, converging rapidly to extremely acute point.

Antennal flagellum extending beyond pleotelson by nearly half its length, composed of about 95 articles. Frontal lamina narrow, pentagonal; clypeus with medial part strongly produced. Mandible moderately narrow, molar process large, with about 78 fine teeth. Maxillule with 12 stout spines on gnathal surface of exopod, endopod with 4 robust, sparsely plumose spines. Maxilliped with medial margins of palp articles 2–5 provided with stiff setae; endite without coupling hooks.

Pereopod 1 with setae along anterior margin of basis and along submarginal furrow; merus with spine at anterodistal angle, and 10 spines, 6 large, along posterior margin; carpus with 2 spines on posterior margin; propodus with 5 short spines on palm, and 6th spine opposite dactylus. Pereopods 2 and 3 similar, with more and larger spines than pereopod 1, except propodus which has only 2 spines on palm. Pereopod 7 with posterior margin of basis convex, anterior margin sinuate, all margins setose, remaining articles generally with few spines.

Vasa deferentia opening flush with surface of sternite 7.

Pleopod 1 peduncle with 8 coupling hooks; appendix masculina straight, tapering gradually towards apex, not extending beyond ramus. Uropod peduncle with medial margin of strongly produced, ventrolateral margin with 4 spines and several setae. Exopod rounded, paddle shaped, lateral margin with 3 small spines, medial margin with 2, all margins setose. Endopod lateral margin nearly straight, with setae along distal two thirds of its length, medial margin smoothly curved, with 6 stout spines set amongst marginal setae.

Female. Not known.

Colour. Pale brown in alcohol.

Size. 21.0 mm.

Remarks. This species is easily identified by the acutely narrow apex of the pleotelson, which totally lacks setae and spines. Other characters that aid in identification of this distinctive species include the extreme length of the antennal flagellum, the shape of the clypeus, frontal lamina and the rounded uropods.

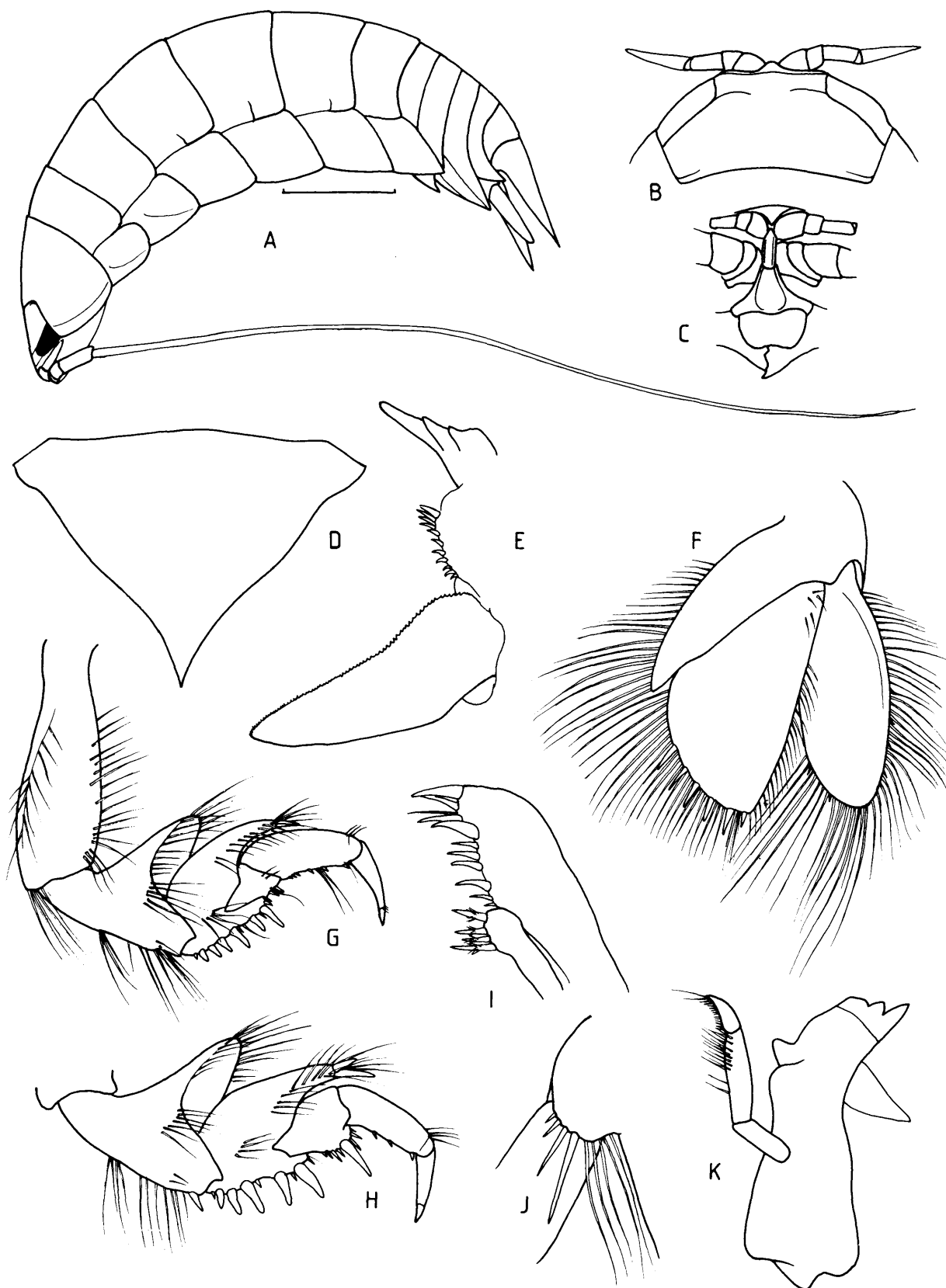


Fig. 40. *Natatolana prolixa* n. sp., holotype. A, lateral view; B, dorsal view, cephalon; C, clypeal region; D, pleotelson; E, mandible, molar process and lacinia mobilis; F, uropod; G, pereopod 1; H, pereopod 2; I, maxillule; J, uropod peduncle, ventral view; K, mandible. Scale 4.0 mm.

Distribution. Known only from the type locality.

Etymology. The epithet is the Latin word meaning long, stretched out, and refers to the length of the antennal flagellum.

Natatolana gorung n. sp.

Figs 42, 43

Material examined. Female (18.6 mm), 33°58'S, 151°17'E, east of Malabar, Sydney, NSW, 26 June 1973, 66 m., coll. AMSBS. Male (14.5 mm), Stn 983, Port Phillip Bay, Vic., 11 Oct. 1971, 19 m, bottom 90% sand, coll. Marine Pollution Studies Group.

Types. Holotype, male, NMV J1340; paratype, AM P24324.

Type locality. Port Phillip Bay, Vic., 38°19'S, 144°47'E.

Description of female. Body about 3 times as long as wide; cephalon with small rostral point, and strongly developed interocular ridge; distinct ridge runs from dorsal surface of each eye, and deflects anteriorly towards mid-point of cephalon. Eyes small, with few ocelli, without pigment. Pereonites 1, 5 and 6 subequal in length and longer than pereonites 2-4 and 7; pereonite 2 with submarginal furrow; coxal plates of pereonites 1-2 each with distinct furrow, those of pereonites 3-6 with furrows; pereonite 7 with partial furrow on coxal plate, part of furrow being indistinct. Pleonites all visible; posterolateral margin of pleonite 3 strongly produced, forming acute point, with 2 longitudinal furrows; posterolateral margin of pleonite 4 rounded. Pleotelson slightly shorter than maximum width, posterior margin angled slightly to form point, provided

with 12 spines set amongst plumose setae.

Antennule short, not reaching anterior margin of pereonite 1. Antenna short, flagellum of about 18 articles, extending midway along pereonite 1.

Frontal lamina narrow, widening distally to rounded anterior margin, clypeus triangular. Maxilliped more setose than in other species, with medial setae and spines more robust than normal, terminal article with pectinate spines.

Pereopod 1 with row of setae along anterior margin of basis; groups of setae on posterodistal angle; anterior margins of ischium and merus produced, that of ischium provided with setae, merus with single terminal spine as well as stiff setae along lateral margin; carpus and propodus without setae; posterior margins of ischium with setae, merus with 6 long, 4 short spines, carpus with 1 long and 2 short spines, propodus with 5 acute spines on proximal half of palm and small spine opposing dactylus. Pereopods 2 and 3 similar but more spinose, with carpus proportionally longer. Pereopod 2 with 2 small spines on proximal part of propodial palm, pereopod 3 with none. Pereopods 5-7 similar, propodus of pereopod 6 longer than 7, basis of pereopod 6 less broad than pereopod 7. Pereopod 7 with basis widest at about two thirds of its length, anterior margin straight with continuous fringe of setae, posterior margin with incomplete fringe of setae; distal part of posterior margin with long plumose setae; ischium and merus with setae on anterior margins, distal angles with spines; carpus subequal in length to propodus, with spines at distal angles and on posterior margin; propodus with medial group of spines on

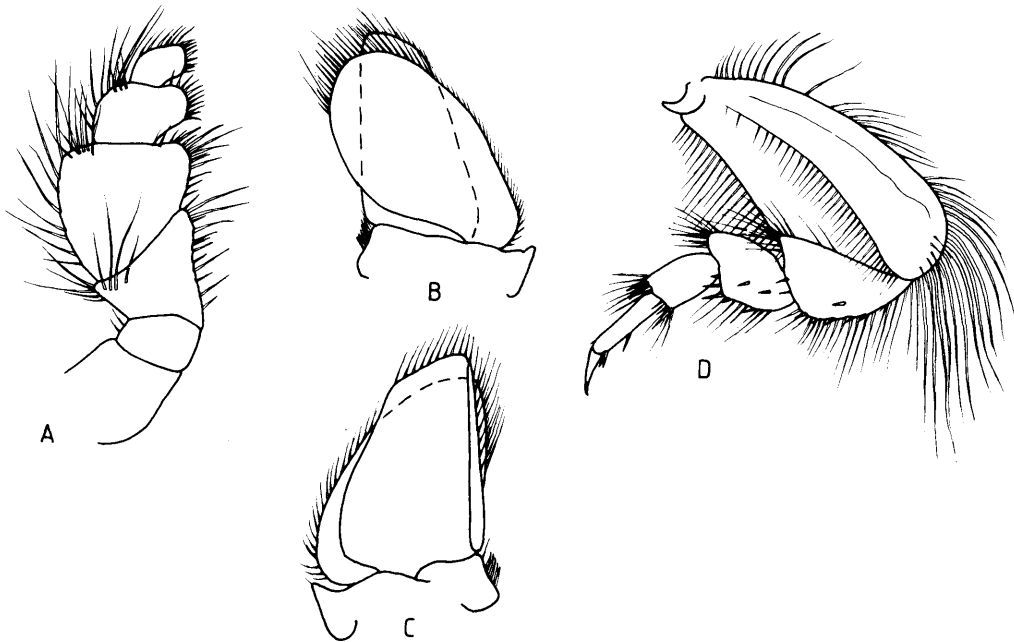


Fig. 41. *Natatolana prolixa* n. sp., holotype. A, maxilliped; B, pleopod 1; C, pleopod 2; D, pereopod 7.

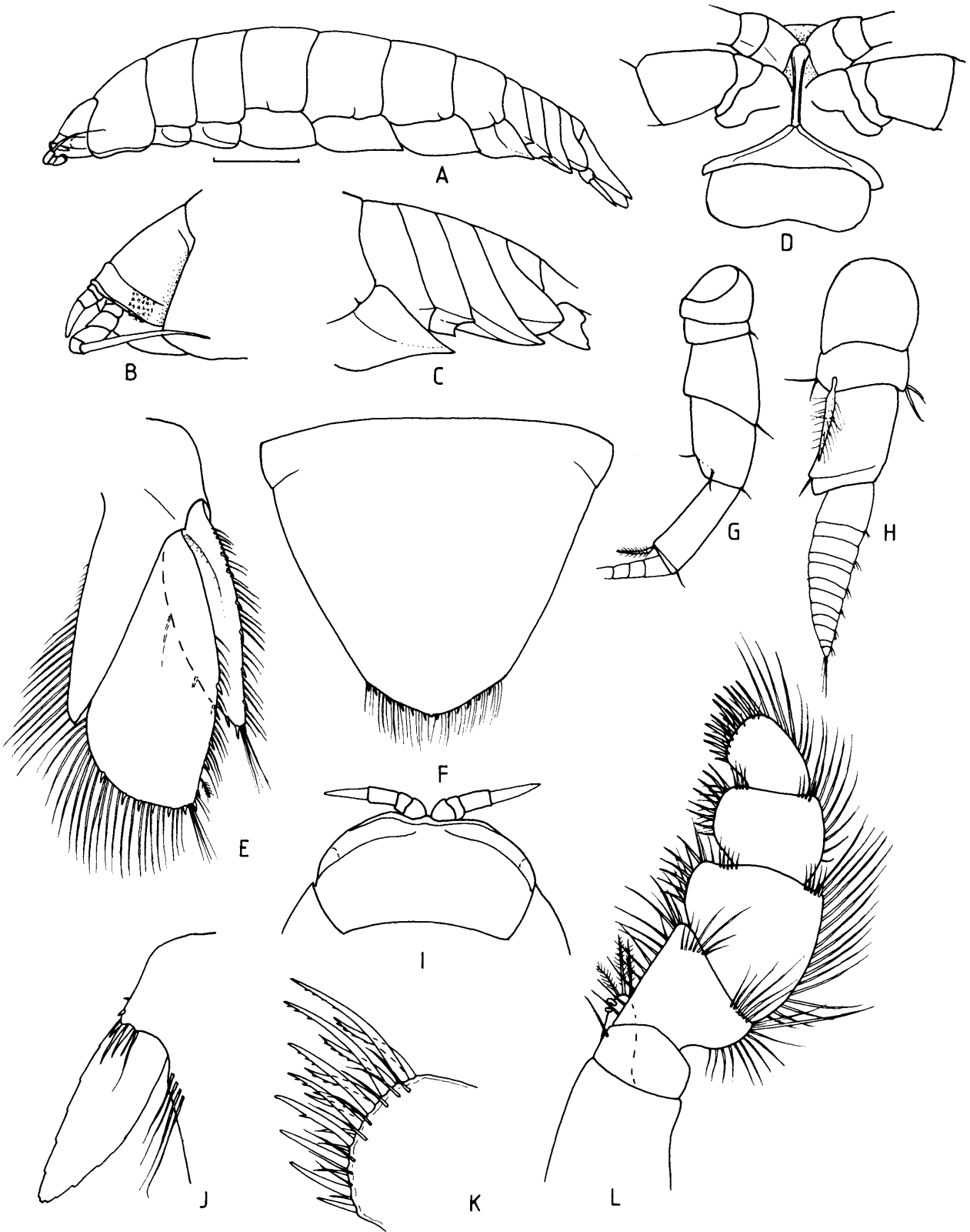


Fig. 42. *Natatolana gorung* n. sp. A-D, I, holotype; remainder male paratype. A, lateral view; B, cephalon, lateral view; C, pleon, lateral view; D, clypeal region; E, uropod; F, pleotelson; G, antennal peduncle; H, antennule; I, cephalon, dorsal view; J, uropod exopod, ventral view; K, maxilliped palp, terminal article; L, maxilliped. Scale 2.0 mm.

posterior margin and 2 spines opposing dactylus.

Pleopod 1 with exopod rounded. Uropod peduncle strongly produced, medial margin provided with fringe of setae; ventral lateral angle with 3 spines and 2 setae, further setae on lateral margin. Exopod three quarters length of endopod, marginal setae along entire length of lateral margin and three quarters of medial margin; lateral margin with 7 spines, medial with 4. Endopod with marginal setae along entire length of medial margins and three quarters of lateral margins; lateral margin angled at midpoint, posterior half very slightly concave; armed with 6 spines and single sensory seta; medial margin rounded with 6 spines.

Male. Lacks penes on ventral surface of sternite 7. Pleopod 2 appendix masculina arising basally, straight sided, bent inwards slightly at apex; not extending beyond apex of inner ramus. In other characters, resembles female.

Variation. The only difference between the two specimens is that the male has 10 spines on the posterior border of the pleotelson, while the larger female has 12.

Colour. Tan to white in alcohol, chromatophores not visible.

Size. Up to 18.6 mm.

Remarks. The most distinctive feature of this species is the development of the ridges on the anterior margin of the cephalon, and the very small pigmentless eyes. The maxilliped is unusual in being far more spinose than is normal for the genus. The furrows on the coxae, the form and details of the uropods and pereopods are further points of difference to other species.

Distribution. Off Sydney at 66 metres, and from almost pure sand sediment in Port Phillip Bay, Vic.

Etymology. *Gorong* is an Aboriginal word meaning the place where the river runs into the sea.

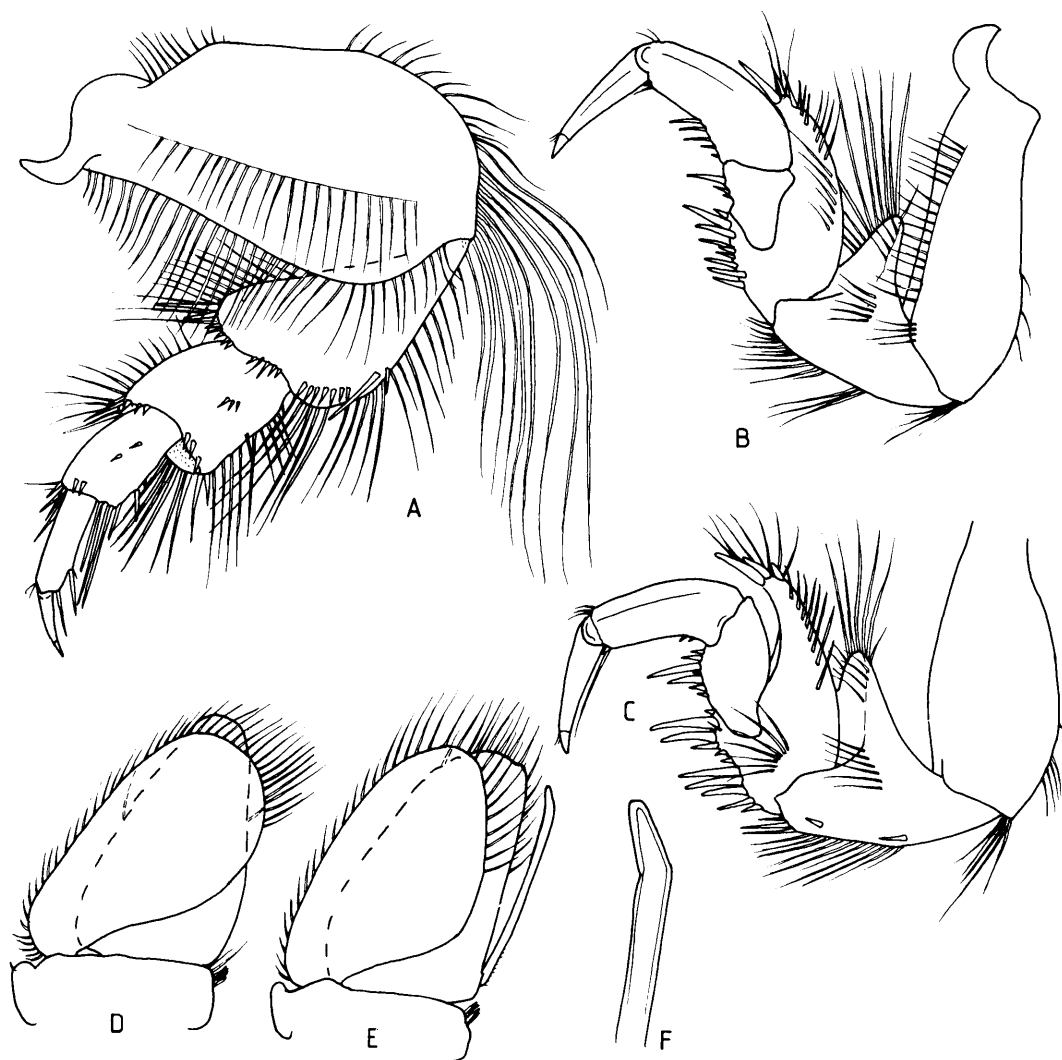


Fig. 43. *Natatolana gorung* n. sp., male paratype. A, pereopod 7; B, pereopod 1; C, pereopod 2; D, pleopod 1; E, pleopod 2; F, appendix masculina, apex.

Natatolana karkarook n. sp.

Figs 44, 45

Material examined. Female (20.8 mm), off Cairns Reef, Cooktown, Qld, 20 June 1973, on sand flats; female (18.2 mm), with mancas, Cairns Reef, Cooktown, Qld, 29 June 1973, coll. I. Lock.

Types. Holotype, female, (20.8 mm) AM P30335; paratype, AM P30336.

Type locality. Cairns Reef, Cooktown, Qld, 15°42'S, 145°33'E.

Description of female. Body about 3 times as long as wide; cephalon with small rostral point. Pereonites 1, 5 and 6 subequal in length, and longer than pereonites 2-4 and 7. Pereonite 1 with lateral furrow; coxae of pereonites 2-3 with partial longitudinal furrows, coxae of pereonites 4-7 without furrows. Pleonites all visible,

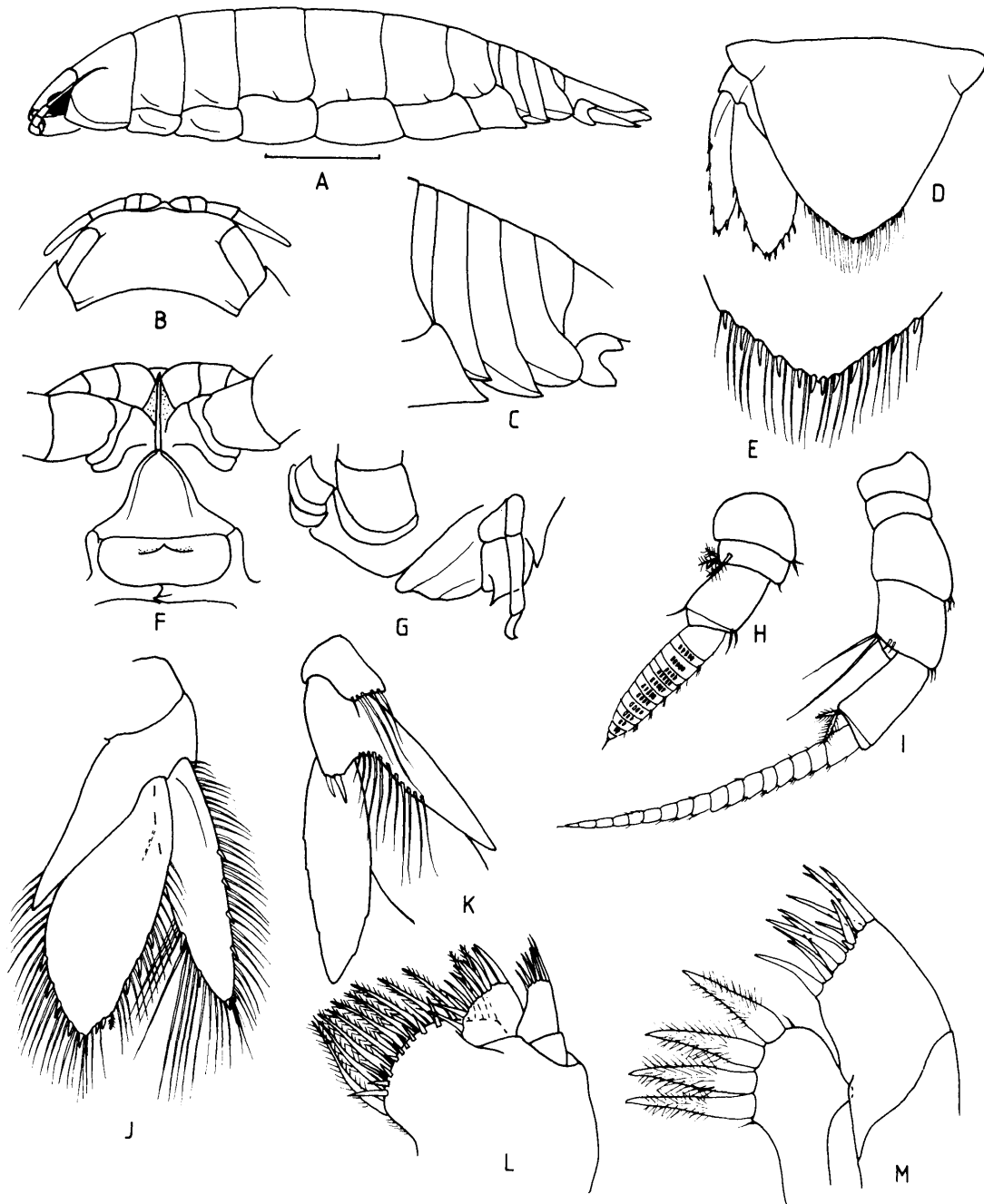


Fig. 44. *Natatolana karkarook* n. sp. A-G, holotype; H-M, paratype. A, lateral view; B, cephalon, dorsal view; C, pleon, lateral view; D, pleotelson, dorsal view; E, pleotelson, posterior margin; F, clypeal region; G, clypeal region, lateral view; H, antennule; I, antenna; J, uropod; K, uropod peduncle, ventral view; L, maxilla; M, maxillule. Scale 4.0 mm.

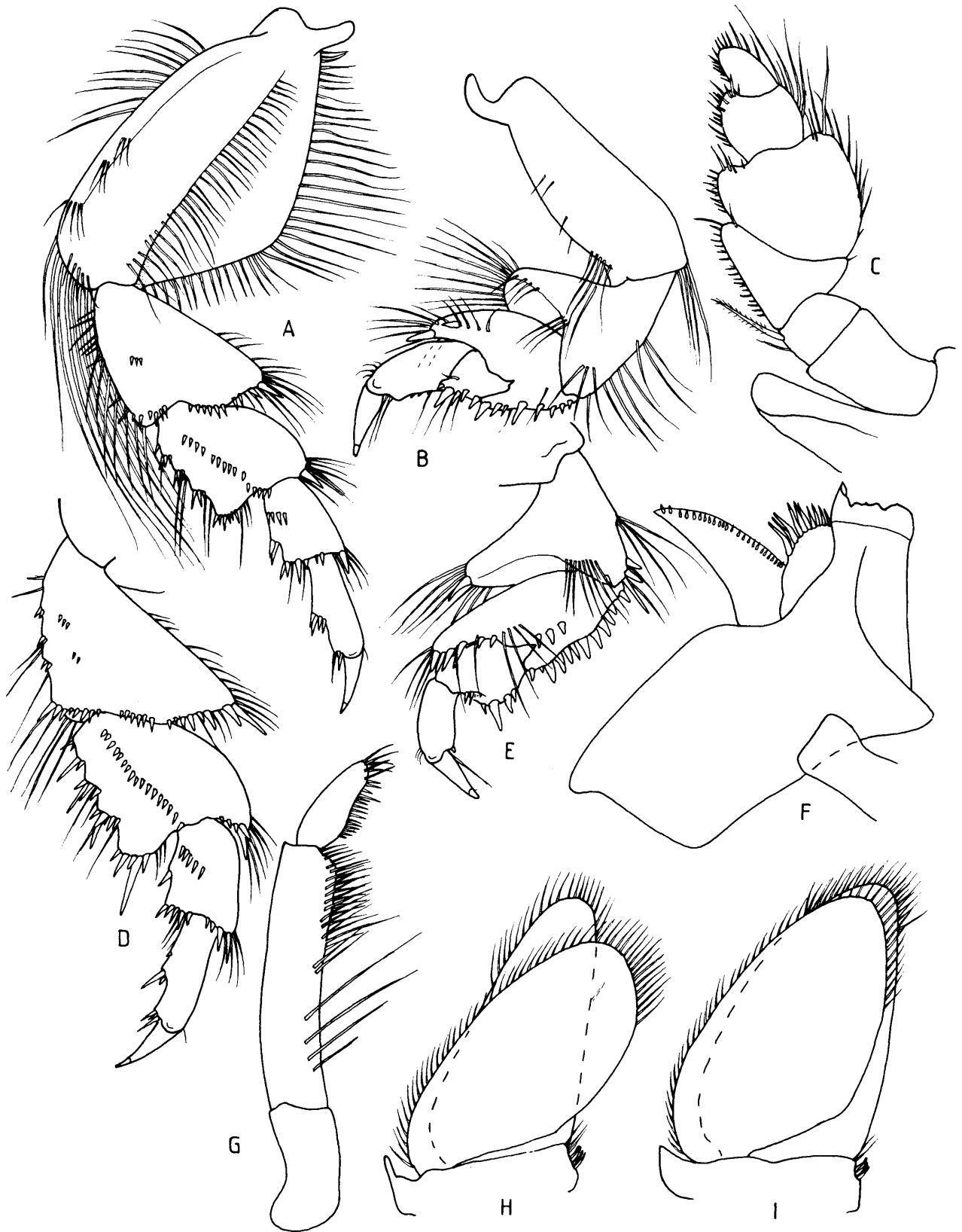


Fig. 45. *Natatolana karkarook* n. sp., paratype. A, pereopod 7; B, pereopod 1; C, maxilliped; D, pereopod 6; E, pereopod 3; F, left mandible; G, mandibular palp; H, pleopod 1; I, pleopod 2.

pleonite 4 with posterolateral margins rounded, those of pleonites 2 and 3 acute; posterolateral margins of pleonites 2-4 with longitudinal furrow. Pleotelson slightly shorter than maximum width, dorsal surface slightly domed, posterior margin with 12 spines set amongst plumose setae; 2 spines set close together at apex of pleotelson, without setae between them.

Antennule extending to posterior margin of eye, peduncle article 3 as long as combined lengths of articles 1 and 2; flagellum as long as peduncle, composed of about 14 articles and provided with numerous aesthetascs. Antenna with 2 stiff setae projecting from posterodistal margin of peduncle article 4, article 5 with 2 sensory setae at posterodistal angle; flagellum composed of about 17 articles, extending about half way along pereonite 1.

Frontal lamina linear, coming to point anteriorly, clypeus projecting strongly forwards, set distinctly away from ventral surface of cephalon; labrum with triangular downwardly projecting process. Mandible incisor narrow, tridentate; molar process and lacinia mobilis normal; palp article 2 greater than twice length of articles 1 or 3, provided with numerous setae. Maxillule exopod relatively slender, provided with about 12 spines on gnathal surface, endopod with 4 large plumose spines. Maxilla palp and exopod reduced, provided with 7 and 10 spines respectively; endopod with row of short simple spines on ventral surface of medial margin and row of 11 large plumose spines. Maxilliped terminal palp article narrow; medial margins of palp with numerous short spines except for article 1 which has 1 large plumose seta and 1 simple seta; lateral margins with marginal setae; endite with 6 short plumose setae and no coupling hooks.

Pereopod 1 with marginal setae on both margins of ischium; merus with 2 spines on anterior margin as well as row of setae, posterior margin with 7 spines; carpus with 5 spines on posterior margin; propodus with 3 spines on palm as well as small spine opposing dactylus, anterodistal angle with row of small setae. Pereopod 2 similar to pereopod 1, but more spinose, and carpus proportionally longer; palm of propodus with only 1 spine opposing dactylus. Pereopod 7 with basis broad, anterior margin angled midway along its length, entire length with marginal setae; posterior margin with proximal row of setae, 3 groups of submarginal setae, and long plumose setae at distal extremity; ischium broad, posterior margin provided with slender spines and setae, distal margin with spines only, anterior margins of merus, carpus and propodus irregular, with groups of spines. Pereopods 5 and 6 similar to 7 but basis more slender, ischium and merus distinctly broader and more spinose. Propodus of all pereopods proportionally shorter, more robust than others of genus.

Pleopod 1 endopod distinctly narrower at apex. Uropods extending beyond posterior of pleotelson. Exopod slightly shorter than endopod; lateral margin setose along entire length, with 5 spines; medial margin with 3 spines, setae present on 0.8 of length. Endopod

lateral margin with setae along 0.75 of lateral margin, armed with 5 spines, medial margin with 5 spines set amongst marginal setae. Peduncle with 2 spines on ventral posterolateral angle, setae along ventrolateral margin.

Male. Not known.

Colour. Brown in alcohol, chromatophores not evident.

Size. Largest female 20.8 mm.

Variation. Both specimens agree closely; the paratype has one uropodal exopod totally devoid of spines.

Remarks. This is a rather atypical member of the genus, and has several unique characters. The pointed projection on the labrum is unique, and not known in any other Cirolanidae. The linear form of the frontal lamina is also distinctive. The mouthparts are all unusual: the mandible has a narrow incisor; the maxillule has a relatively slender exopod and has 4 spines on the endopod rather than the more normal 3; the maxilla has the palp and exopod reduced, and all articles are spinose; the maxilliped lacks coupling hooks on the endite, and on the medial margins short spines replace the usual setae. Of these characters, only the narrow mandible is known to occur elsewhere in the family, in *Neocirolana* Hale. This does not suggest that there is any affinity between species of *Neocirolana* and the present species.

Distribution. Known only from the type locality, presumably an intertidal sandflat dweller.

Etymology. *Karkarook* is an Aboriginal word meaning sand and refers to the habitat from which the specimens were taken.

Natatolana albicaudata (Stebbing)

Figs 46, 47

Cirolana albicaudata Stebbing, 1900: 631, pl. lxxviiB.—Richardson, 1910: 5; Barnard, 1936: 152, fig. 2a-c.

Cirolana albicaudata var. *japonica* Thielemann, 1910: 8, figs 1-4.—Nierstrasz, 1931: 152; Iwasa, 1965: 14.

Natatolana albicaudata.—Bruce, 1981b: 958.

Material examined. Syntypes: 4 males (3.8-5.3 mm), 2 females (3.9, 4.2 mm), 5 manca (2.0-3.8 mm), Barawon, Blanche Bay, New Britain, coll. A. Willey, BM(NH) 1906.4.19: 44-54. 4 males (8.3-8.7 mm), 72 females (6.3-9.8 mm), manca (5.0 mm), Java Is., anchorage, 14 Dec. 1908, coll. H. Richardson, USNM 41490. 2 females (9.2, 6.9 mm), 3 manca (2.7, 3.5, 3.9 mm), Wistari Reef channel, Heron Is., Qld, 6 Sept. 1978, 1830 hrs, night plankton, coll. D. Fisk. Male (7.3 mm), female (7.6 mm), Barrow Is., WA, 2 Sept. 1954, night plankton, 2000 hrs, coll. K. Sheard.

Types. Syntypes held at the British Museum (Natural History).

Type locality. Blanche Bay, New Britain.

Description of male. Body about 3 times as long as wide. Cephalon with small rostral point; 2 impressed lines run across cephalon, 1 originating from dorsal surface of each eye, and 1 running along anterior margin. Pereonite 1 with lateral longitudinal furrow.

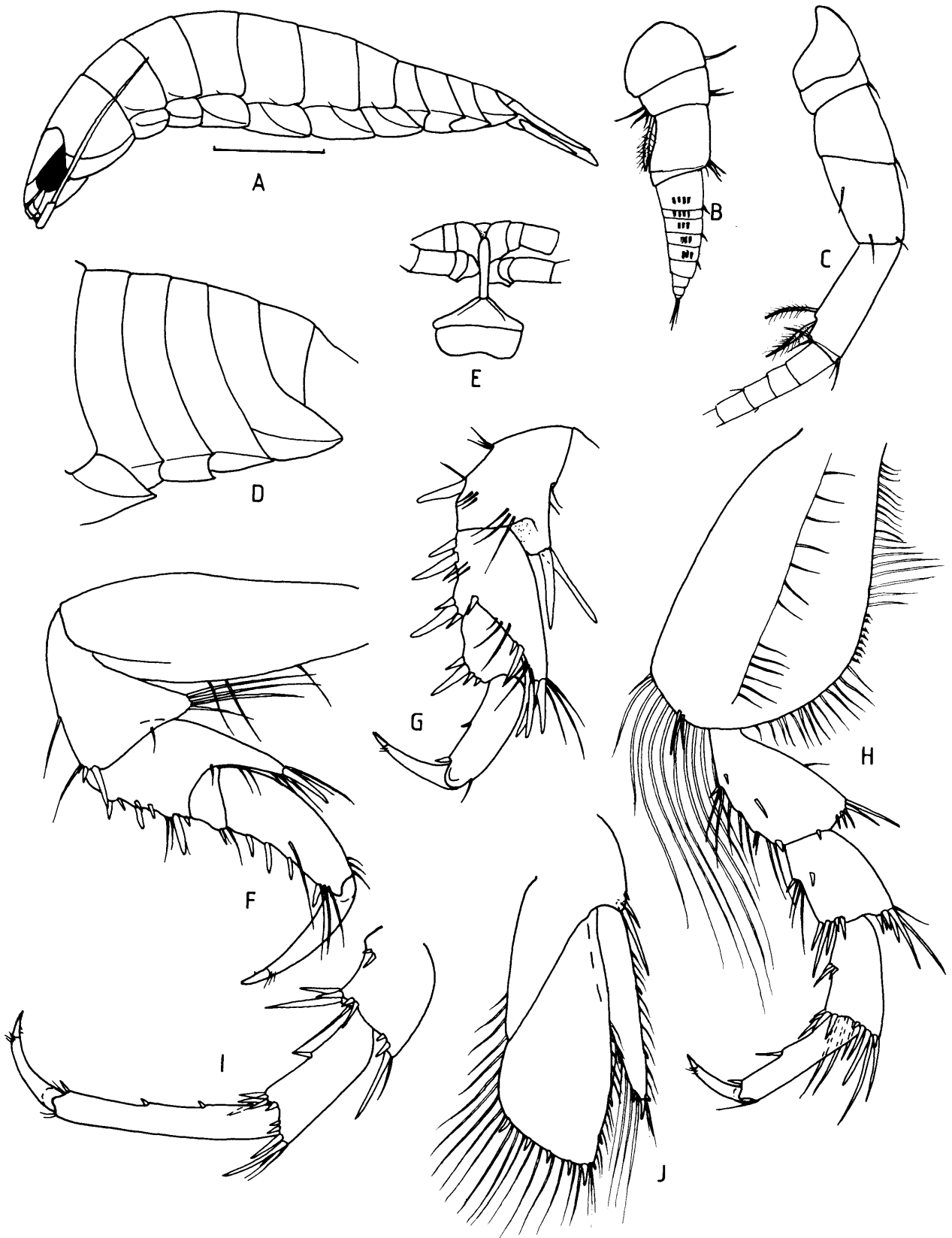


Fig. 46. *Natatolana albicaudata*, male syntype 5.3 mm. A, lateral view; B, antennule; C, antennal peduncle; D, pleon; E, clypeal region; F, pereopod 1; G, pereopod 3; H, pereopod 7; I, pereopod 5, distal article; J, uropod. Scale 1.0 mm.

Coxae of pereonites 2-7 each with diagonal furrows. All pleonites visible, lateral margin of each with longitudinal furrow; posterolateral margins of pleonite 4 coming to point. Pleotelson as long as greatest width, posterior margin slightly angled, provided with 9 or 10 spines set amongst plumose setae; dorsal surface without distinct depression.

Antennule short, just reaching anterior margin of eye; flagellum composed of about 10 articles. Antenna peduncle article 4 slightly longer than 3; peduncle article 5 with 2 conspicuous sensory setae on posterodistal margin; flagellum with about 22 articles, extending to anterior of pereonite 3.

Frontal lamina about 4 times as long as broad, sides parallel, anterior margin rounded; clypeus triangular.

Pereopod 1 with anterodistal angles of ischium and merus provided with setae, merus with single distal spine; posterior margins of ischium with 1 large and 2 small acute spines at distal angle, merus with 3 large and 4 small spines, carpus with single distal spine, and propodus with 3 acute spines and blunt spine opposing dactylus; dactylus long, subequal in length to propodus. Pereopods 2 and 3 similar to pereopod 1 but with carpus

proportionally longer, all articles with more numerous and larger spines; palm of propodus of pereopod 2 with 2 spines, that of pereopod 3 with 1 spine. Pereopod 7 with anterior margin of basis with continuous fringe of setae, posterodistal angle with long plumose setae, posterior margin without setae; anterior margins of ischium, merus, carpus and propodus without setae, but with groups of spines at each distal angle; posterior margin of ischium with spines and setae; posterior margins of merus, carpus and propodus with medial group of spines and further group of spines at each distal angle. Pereopod 6 similar to 7, but basis less broad, and propodus proportionally longer. Similarly, pereopod 5 with basis less broad than 6, and propodus longer than those of pereopods 6 and 7. Pereopods 4-7 progressively decrease in spinosity.

Vasa deferentia opening flush on surface of sternite 7.

Pleopod 2 appendix masculina arising sub-basally, parallel sided, not extending beyond inner ramus of endopod. Uropod exopod 0.75 length of endopod, lanceolate, each margin with 3 spines; endopod lateral margin slightly convex, curving in slightly just before apex, provided with 3 spines, medial margin rounded

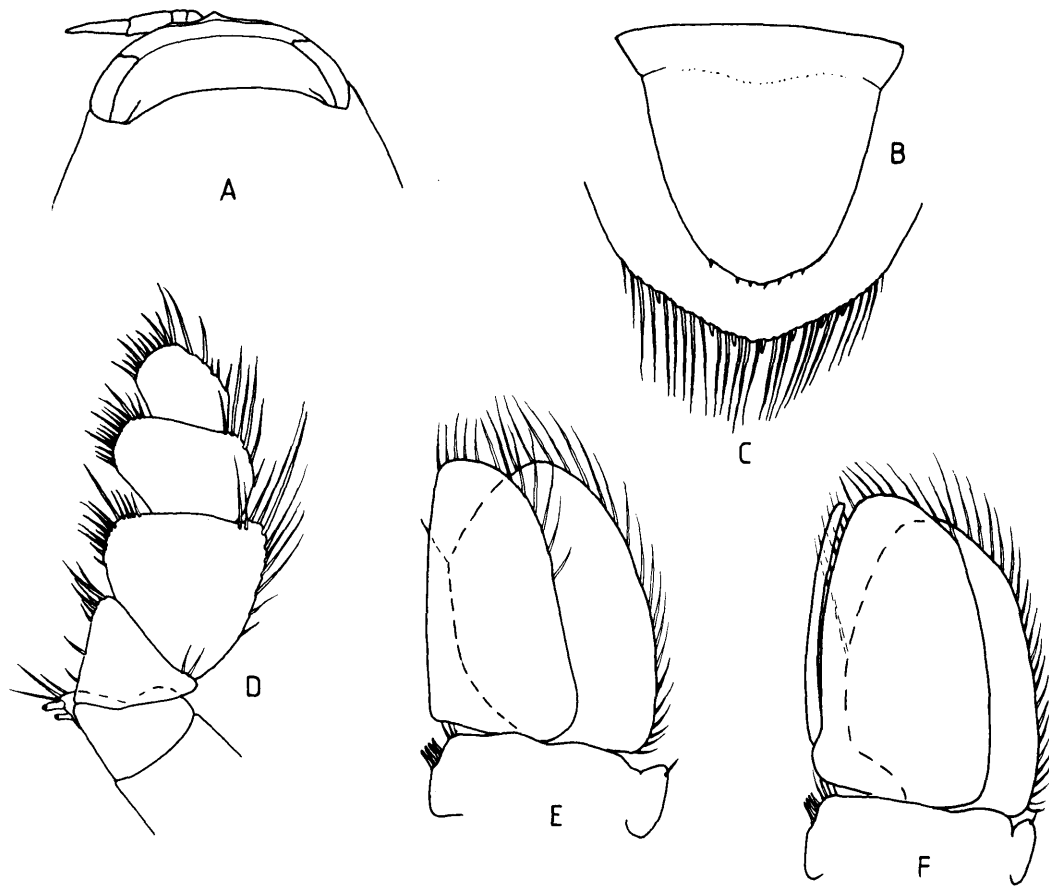


Fig. 47. *Natatolana albicaudata*. A-D, female 9.2 mm, Heron Is.; E, F, male syntype 5.3 mm. A, cephalon, dorsal view; B, pleotelson; C, pleotelson, posterior margin; D, maxilliped; E, pleopod 1; F, pleopod 2.

and provided with 5 spines. All margins with setae. Peduncle with 1 lateral spine, and 2 spines on ventral lateral angle.

Female. Similar to male, but slightly larger.

Variation. In some specimens the antennal flagellum extends to pereonite 5. Stebbing's specimens are all small, and these have a more acute apex to the telson and uropodal endopod. In larger specimens the telson apex is far more distinctly rounded, as are the uropods.

Colour. Tan to brown in alcohol. Freshly preserved specimens show conspicuous and numerous chromatophores.

Size. Type material did not exceed 5.3 mm, but specimens from Heron Island and the Philippines reach 9.8 mm.

Remarks. This species shows several distinctive characters. The chromatophores are obvious, and so too are the conspicuously elongated dactyls, as well as the slender propodus on pereopods 4–6. The combination of frontal lamina, pereopod characters, pleotelson, and uropod characters serve to distinguish this species from others of the genus.

Barnard (1936) recorded this species from Bombay, describing a male with digitiform processes on the flagellum of the antenna. None of the males examined here show this character, and further differences exist between Barnard's figures of the pleotelson, uropods and pereopod 7, when compared to the material treated here. Barnard's (1936) figures and description do not allow a fair assessment to be made of the status of the Bombay material. Thielemann (1910) described the subspecies *Natolana albicaudata japonica*, but the differences seem slight. Thielemann's (1910) subspecies is likely to be the same species as Stebbing's but, as numerous closely similar species exist, this is uncertain.

Distribution. Philippines (Richardson, 1910), Japan (Thielemann, 1910; Iwasa, 1965), east to India (Barnard, 1936). In Australia: Heron Island, Qld; Barrow Island, WA.

Natolana amplocula n. sp.

Fig. 48

Material examined. Female (13.2 mm), Kei Island Expedition, Stn 50, 5°34'S, 132°26'E, 233 m, 4 May 1922, coll. Th. Mortensen.

Type. Holotype, ZMUC.

Type locality. South of Kei Islands, 5°34'S, 132°26'E.

Description of female. Body about 2.5 times as long as wide. Cephalon set deeply into pereonite 1, continuous interocular furrows running from dorsal and anterior margins of eye. Eye conspicuously large, narrower anteriorly. Pereonites 1 and 6 subequal in length, and longer than pereonites 2–5; lateral margins of pereonite 1 with 2 furrows. All coxae with complete furrows. Pleonites all visible; pleonite 3 with posterolateral margins produced posteriorly, acute, dorsal and ventral margins produced beyond posterior margin of pleonite 5, dorsal and ventral margins convex

with 2 carinae, pleonite 4 with posterolateral margins produced beyond posterior margin of pleonite 5, dorsal and ventral margins convex. Pleotelson shorter than greatest width, posterior margin broadly rounded, with small medial projection on either side of which lie 3 spines set amongst plumose setae.

Antennule short, not quite reaching to posterior eye, peduncle article 3 longer than combined lengths of articles 1 and 2; flagellum extending to posterior of pereonite 3, composed of about 22 articles.

Frontal lamina 5 times longer than broad, ventral surface slightly domed, anterior margin rounded; clypeus triangular. Maxilliped endite with 2 coupling hooks.

Pereopod 1 with marginal setae on anterior margin of basis; ischium anterior margin provided with setae, posterior margin with sparse setae; merus anterior margin armed with 3 stout spines and several setae, posterior margin with 3 robust and 5 acute spines; merus with single spine and setae on posterior margin; propodus with row of 5 setae on anterodistal margin, palm with 3 acute spines, and distal spine opposing dactylus. Pereopods 2 and 3 similar to pereopod 1, but with more numerous and larger spines, except propodus with 2 spines on palm. Pereopods 4–6 becoming progressively longer, pereopod 7 slightly shorter than 6. Pereopod 7 with basis posterior margin without setae, except distal extremity which bears long plumose setae; posterior margin with continuous row of setae, further row of setae runs along midline of article; ischium with both margins setose, spines set at distal angle and submarginally on posterior margin; merus and carpus with spines and setae on distal angle and further group on posterior margin; propodus with group of spines midway along palm, and spine opposing dactylus.

Uropods extending slightly beyond apex of pleotelson, exopod distinctly shorter than endopod. Exopod with both margins convex, distal extremity rounded, lateral margin with continuous marginal setae, and 4 small inconspicuous spines, medial margin with 3 spines, 2 close together, third set further apart. Endopod with 2 spines on lateral margin, 6 on medial margin; marginal setae along entire length of medial margin, along half length of lateral margin. Peduncle with 2 spines on ventral external angle.

Male. Not known.

Colour. Pale cream, with scattered reddish brown chromatophores.

Size. Holotype measures 13.2 mm.

Remarks. Two species, *N. curta* Richardson and *N. arcicauda*, possess a broadly rounded pleotelson similar to *N. amplocula*. However, both of these species can be separated from the present species by differences in uropod shape and spination, coxal furrowing, pleon shape and details of the pereopods.

Distribution. Kei Islands, Arafura Sea.

Etymology. The specific epithet is derived by combining the two Latin words *amplus* (= large) and *oculus* (= eye).

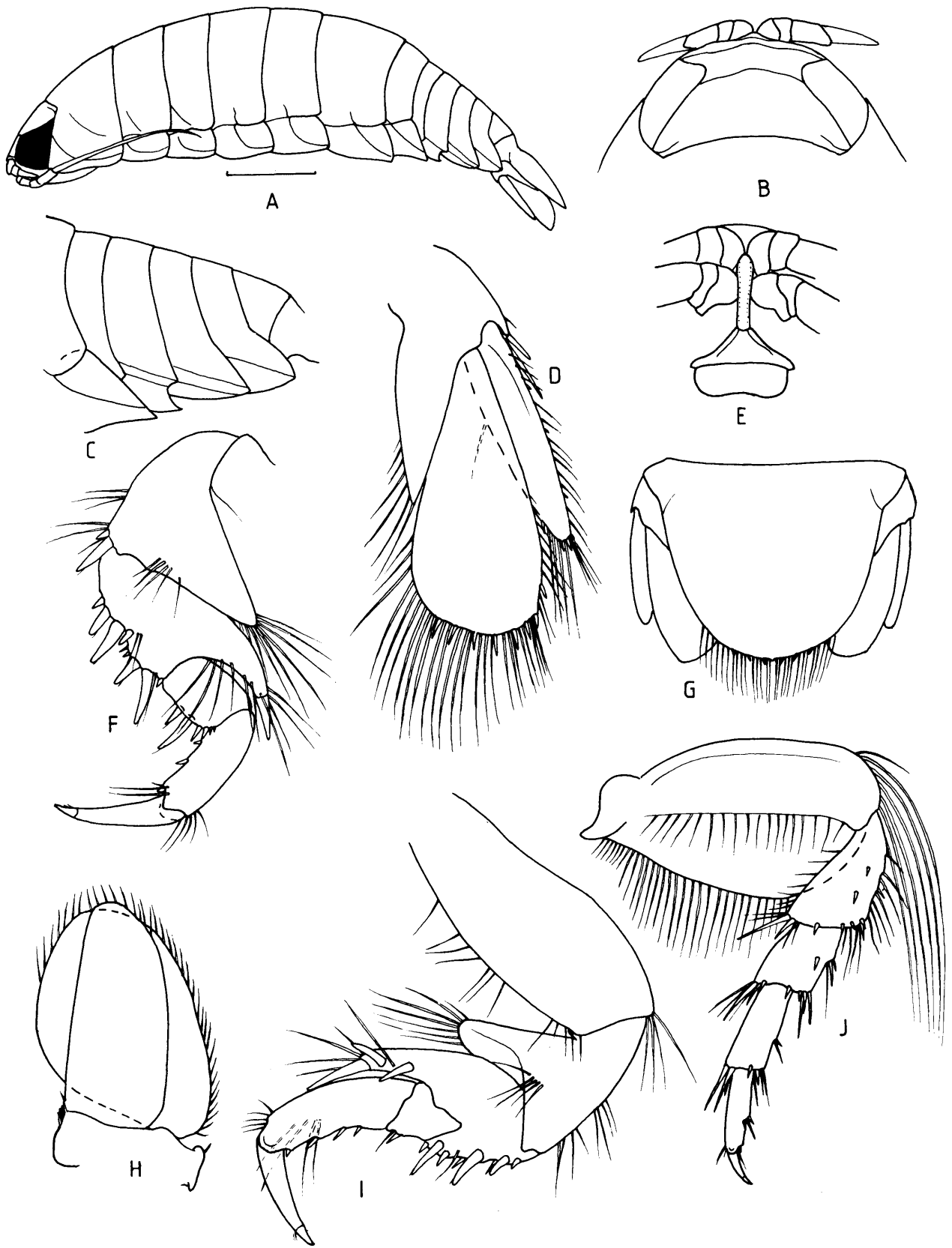


Fig. 48. *Natatolana amplocula* n. sp., holotype. **A**, lateral view; **B**, cephalon, dorsal view; **C**, pleon, lateral view; **D**, uropod; **E**, clypeal region; **F**, pereopod 2 (in situ); **G**, pletelson; **H**, pleopod 1; **I**, pereopod 1; **J**, pereopod 7. Scale 2.0 mm.

Natatolana pellucida (Tattersall)

Figs 49, 50

Cirolana pellucida Tattersall, 1921: 206, pl. II figs 4-10.—

Hurley, 1957: 11; 1961: 267; Nierstrasz, 1931: 158.

Natatolana pellucida.—Bruce, 1981b: 958.

Material examined. Syntypes: male (7.5 mm), 2 females

(11.3, 12.0 mm), "Terra Nova" Expedition, Stn 130, Three Kings Island, New Zealand, BM(NH) Reg. No. 29/11/1921: 22-24. Topotypes, 2 male (7.5, 8.7 mm), 10 females (5.5-10.0 mm), manca (5.0, 5.1 mm), BM(NH) 29/11/1921: 25-44. Female (5.3 mm), Middle Banks, Moreton Bay, Qld, Dec. 1973, coll. S. Cook. Female (5.5 mm), Middle Banks, Moreton Bay, Qld, Sept. 1972. AM SBS series, NSW; female (5.8 mm), east of Malabar, Sydney, 33°58'S, 151°17'E, 30 Aug. 1973, 66

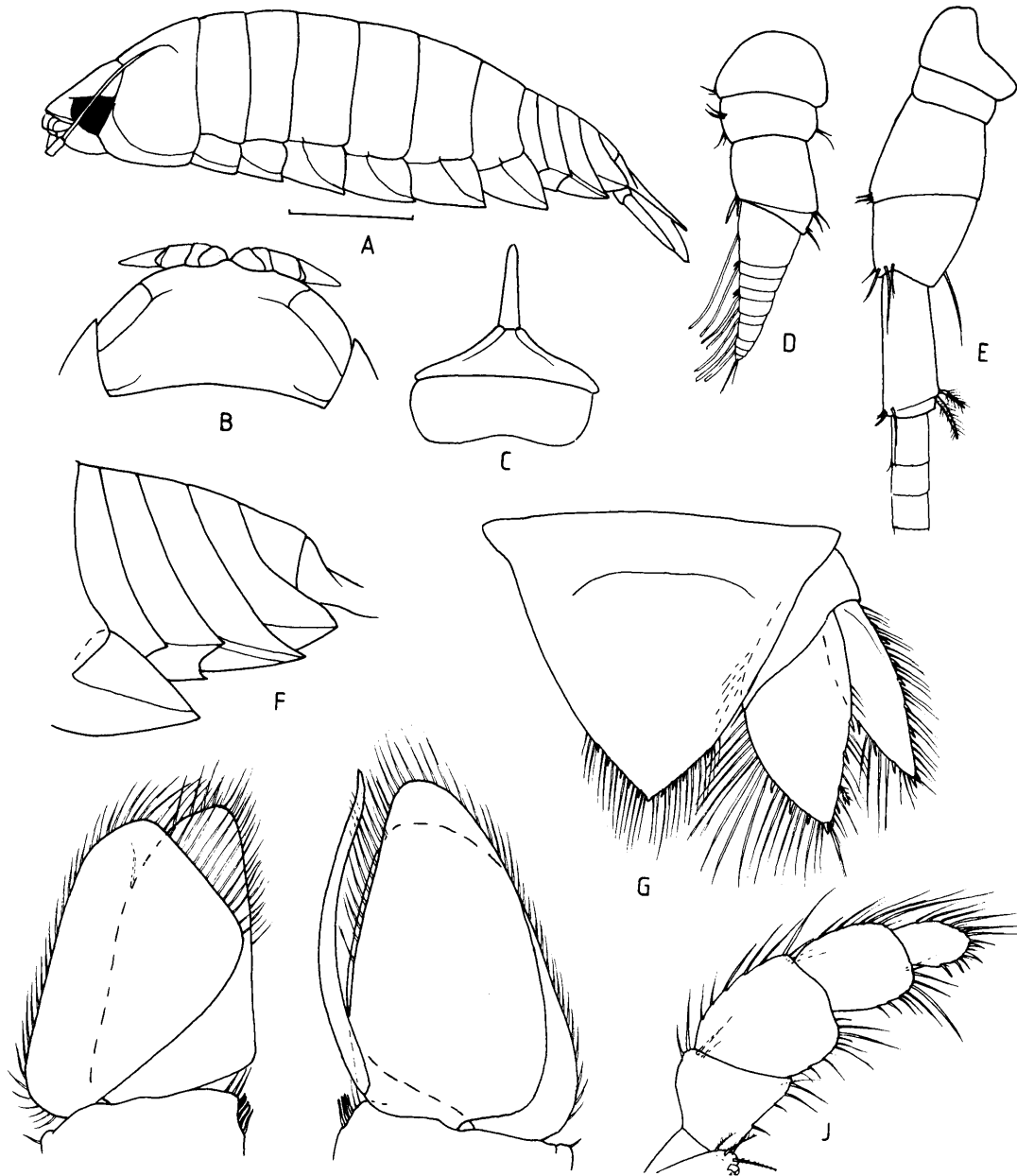


Fig. 49. *Natatolana pellucida*. A-G, female syntype, 11.3 mm; H-J, male topotype 8.7 mm. A, lateral view; B, cephalon, dorsal view; C, clypeal region; D, antennule; E, antennal peduncle; F, pleon, lateral view; G, pleotelson and uropod; H, pleopod 1; I, pleopod 2; J, maxilliped. Scale 2.0 mm.

m; female (7.0 mm), east of Long Bay, Sydney, 33°58'E, 151°17'E, 30 Jan. 1974, 66 m; female (5.6 mm), east of Malabar, Sydney, 33°57'S, 151°19'E, 19 May 1972, 53 m; female (5.6 mm), manca (3.5 mm), east of Malabar, Sydney, 33°57'S, 151°19'E, 1973, 32 m; all coll. AM CSIRO series: male (5.6 mm), 7 females (5.0–10.3 mm), manca (3.5 mm), Stn 92-56-62, off Port Jackson, N.S.W., 18 June 1962, 150 m; male (4.9 mm), Stn G2-35-62, off Port Jackson, NSW, 18 June 1962, 86 m; 3 females (6.9, 5.6, 5.3 mm), off Sydney, NSW, 33°52'S, 150°22'E, 20 June 1962, 150 m, coll. R.L. Thomas; 3 females (5.4, 5.0, 5.6 mm), Stn G2-56-62, off Sydney, NSW, 33°43'S, 151°40'E, 5 Dec. 1978, 156 m, coll. R.L. Thomas; female (6.9 mm), 38°58'S, 151°29'E, 20 June 1962, 152 m, coll. R.L. Thomas; all CSIRO Fisheries. Male (imm. 7.5 mm), 2 mancas (4.4, 5.0 mm), K78-26-02, off Sydney, NSW, 33°43'S, 151°40'E, 5 Dec. 1978, 156 m, coll. B. Rudman, P. Coleman, K. Handley. 3 males (4.0, 5.1, 5.6 mm), manca (3.8 mm), Stn K77-23-01, off Sydney, NSW, 33°47'S, 151°43'E, 5 Dec. 1977, 192 m, coll. FRV *Kapala*. 4 females (5.6, 5.7, 6.9, 5.0 mm), 5 mancas (4.5–5.5 mm), off Port Kembla, NSW, Stn K78-27-11, 13 Dec. 1978, 161 m, coll. B. Rudman, P. Coleman, K. Handley. Female (6.3 mm), 5 mancas (3.0–3.5 mm), 37°05'S, 150°05'E, Bass Strait, 30 Sept. 1914, 55–90 m, Mortensen Expedition. Female (6.0 mm), 4 mancas (3.2–3.7 mm), 39°10'S, 149°05'E, Bass Strait, 17 Sept. 1914, 360–450 m, Mortensen Expedition. Male (7.0 mm), Stn 35, *Kimbla* Cruise 79-K-1, 39°28.4'S, 148°41.8'E, Bass Strait, 28 Mar. 1979, 110 m, coll. G. Poore. 2 males (8.5, 8.2 mm), Stn 32, *Kimbla* Cruise 79-K-1, 39°41.7'S, 148°39.5'E, 27 Mar. 1979, 115 m, coll. G.C.B. Poore. Male (7.0 mm), Stn 21, off Point Sorrell, northern Tas., 10 June 1971, 30 m, coll. Sea Fisheries Division. Female (5.0 mm), Stn 24, N. of Northdown, northern Tas., 11 June 1971, 37 m, coll. Sea Fisheries Division. Female (9.5 mm) Margate Beach, southeastern Tas., 1978, coll. T. Walker. 2 mancas (3.2, 5.1 mm), Point Davis, Perseverance Harbour, Campbell Is., 52°34'S, 169°13'E, 7 Feb. 1980, 23 m, coll. J.K. Lowry.

Types. Syntypes held by the British Museum (Natural History).

Type locality. Three Kings Island, New Zealand.

Description of female. Body suboval in shape, little more than 2 times as long as wide; cephalon with small rostral point; anterior margin of cephalon with interocular impressed line, dorsal surface with impressed line running from the top of each eye. Pereonite 1 longest, 2 and 3 shortest, 5–6 becoming progressively longer. Pereonite 1 with single lateral impressed line. Coxae all with entire impressed line; posteroventral angles of coxal plates formed into small point. Pleonites all visible, lateral margin of pleonites 3 and 4 produced posteriorly, those of pleonite 3 forming acute points, those of pleonite 4 slightly rounded; lateral margins of pleonite 3 with 2 impressed lines, pleonite 4 with 1. Pleotelson lateral margins converging smoothly to point, at which lies minute projection; posterior margin with 10 spines set amongst plumose setae; anterodorsal surface with distinct depression.

Antennule short, reaching to mid point of eye; flagellum with about 10 articles, each article provided with aesthetascs. Antennal peduncle article 5 with 2 conspicuous sensory setae on posterior margin; flagellum reaches pereonite 2, composed of about 18 articles.

Frontal lamina narrow, broader basally, narrowing to acute point, clypeus triangular with anterior margin formed into ridge. Maxilliped with 1 or 2 coupling hooks.

Pereopod 1 with anterodistal angles of ischium and merus produced, that of merus with single stout spine, both with abundant long setae; posterior margin of merus with 7 spines, carpus with 1 and propodus with 4, including blunt spine opposing dactylus. Pereopods 2 and 3 similar to pereopod 1, but palm of propodus lacks spines, and spines on merus and carpus more numerous and larger. Pereopod 4 intermediate in condition between 1–3 and 5–7. Pereopods 5–7 similar, pereopod 6 being the longest. Pereopod 7 with basis relatively narrow, posterior margin sparsely setose, except distal portion which bears long setae; anterior margin with dense row of plumose marginal setae; anterior margin of ischium to propodus without spines or setae, except distal portion which bears long setae; anterior margin with dense row of plumose marginal setae; anterior margin of ischium to propodus without spines or setae, except distal angles; posterior margin of ischium with long marginal setae and submarginal spines; merus, carpus and propodus with spines on posterior margins distal angle.

Pleopod 1 distal margin of exopod markedly truncate. Uropods extending little beyond apex of pleotelson, both rami lanceolate; exopod shorter than endopod, with about 7 spines on lateral margin, 4 on medial margin; endopod with 4 spines on lateral and medial margins. Setae present on entire length of medial margin of endopod, lateral margin of exopod, and distal two thirds of lateral margin of endopod and medial margin of exopod.

Male. Male very similar to female, differing primarily in development of conspicuous elongated spines on pereopods 1–6. On pereopods 1–3 these spines develop on merus, on pereopods 4–5 they occur on merus and carpus. Male appendix masculina sinuate, bending out at apex; little longer than endopod. Flattened penes present on sternite 7.

Variation. Mancas are essentially the same as the females, but may be less spinose. The development of the long pereopodal spines is probably associated with maturity. In some smaller males, these are only feebly developed. The two males from Three Kings Island do not show the same degree of pereopod spine development as Australian males of similar size, these spines occurring only on pereopods 4 and 5.

Colour. Tan to white in preserved specimen. Eyes red, pereon and pleon with sparse chromatophores in live material.

Size. Largest female 12.0 mm, largest male 8.7 mm, largest manca 5.1 mm, smallest adult female 4.1 mm.

Remarks. This species closely resembles *N. corpulenta* and *N. longispina*. It can be distinguished from the former by the lack of chromatophore banding, by never possessing sinuate margins to the pleotelson, and by having the frontal lamina narrowing anteriorly.

Natatolana longispina is even more similar, and *N. pellucida* is separated by the less rounded posterolateral margins of pleonite 4, by having much shorter lateral pereonite furrows, and by having the pleotelson and uropods less rounded.

It is worth noting that these species have apparently disjunct distributions. *Natatolana pellucida* has a depth range from 23 metres to at least 450 metres, with only 3 samples from less than 50 metres. *Natatolana corpulenta* occurs in depths 6–23 metres. *Natatolana*

longispina has not been taken outside the Western Port and Port Phillip Bay systems.

Distribution. Originally described from Three Kings Islands, off the northernmost tip of New Zealand (Tattersall, 1921), the range is now extended along the eastern seaboard of Australia, north to Moreton Bay, with records from Tasmania, off Sydney, off the Hunter River district, and from Bass Strait; two mancae were taken at Campbell Island. Specimens have been recorded at depths of 23–450 metres.



Fig. 50. *Natatolana pellucida*. A–D, F, male topotype, 7.5 mm. A, pereopod 1; B, pereopod 3; C, pereopod 7; D, pereopod 5, distal articles; E, pereopod 1, male 7.0 mm, Bass Strait; F, penes, in situ.

Natolatana corpulenta (Hale)

Figs 51-53

Cirolana corpulenta Hale, 1925: 134, fig. 3.—1929b: 248, fig. 239; 1940: 289; Nierstrasz, 1931: 157; Poore et al., 1975: 33.
Natolatana corpulenta.—Bruce, 1981b: 958.

Material examined. Female (12.0 mm), holotype, SAM C275; paratypes, 2 males (6.8, 6.5 mm), 16 females (5.1–11.3 mm), 18 manca (3.8–5.5 mm). AM Hunter District Water Board Survey series: female (6.3 mm), east of Stockton Beach, NSW 32°54'S, 151°47'E, 30 Nov. 1975, 6 m; male (7.2 mm), east of Stockton Beach, NSW, 32°54'S, 151°47.5'E, 20 July 1975, 15 m; manca (6.3 mm), east of Merewether Beach, NSW, 32°57'S, 151°45'E, 30 Nov. 1975, 15 m; manca (6.3 mm), east of Dudley Beach, NSW, 32°59'S, 151°44'E, 20 July 1975, 10 m; female (7.6 mm), east of Belmont Beach, NSW, 33°02.5'S, 151°42'E, 16 Dec. 1975, 23 m; male (6.3 mm), manca (5.9 mm), east of Belmont Beach, NSW, 33°02.5'S, 151°41'E, 20 Sept. 1975, 22 m; male (7.5 mm), east of Belmont Beach, NSW, 33°02.5'S, 151°41'E, 31 Oct. 1975, 18 m; female (5.4 mm), east of Belmont Beach, NSW, 33°02.5'S, 151°41'E, 29 Nov. 1975, 14 m. 3 females (9.5, ovig., 11.3, 10.7 mm), Point Leo, Vic., 57/01/69, MSGWPT Survey. Female (10.4 mm) with embryos, damaged specimen, 10 mm), Point Leo, Vic., 50/01/69, MSGWPT Survey.

Types. Held at the South Australian Museum, Adelaide.

Type locality. Port Willunga, SA.

Supplementary description of female. Hale (1925) gave a detailed description of the female holotype. A supplementary description is given here, based on the Point Leo specimens. Coxae with posteroventral angle produced to small point, coxae of pereonites 2–4 rectangular in shape, 3–7 with posterior margin produced; all coxae with complete diagonal furrow terminating above posterior ventral point. Pleotelson posterior margin armed with 10 spines, and marginal plumose setae. Dorsal surface of pleotelson with distinct depression, anterior margin of which is distinct, with medial excision; small setae project into dorsal depression.

Antennule peduncle articles short, article 2 with sensory setae; flagellum composed of 10 articles, first of which is longest; 2–9 arranged in form of long article followed by short article, then long again; numerous aesthetascs present; anterodistal angle of long articles with group of short, close set setae. Antenna peduncle article 4 with row of setae on posteroventral margin, and shorter than 5. Article 5 with 2 terminal sensory setae. Flagellum extends to pereonite 2, composed of about 16 articles.

Frontal lamina narrow, slightly dilated anteriorly, where it meets bases of antennular articles; clypeus with central depressed area, with anterior marginal ridges. Maxillule with about 12 robust spines on gnathal surface of exopod; endopod with 3 robust plumose spines. Maxilliped slender, numerous long setae on lateral margins of palp articles; palp articles 3–4 with medial margins scarcely produced. Endite with single coupling hook and 5 plumose setae.

Pereopod 1 with anterodistal angles of ischium and

merus produced and provided with numerous long setae; anterior margin of merus also with single spine; posterior margin of ischium with 2 groups of setae, and single spine; that of merus slightly sinuate, armed with about 13 acute spines of various lengths; merus short, with single acute spine and setae on posterodistal angle; propodus with row of about 9 setae on distal half of anterior margin, posterior margin with 4 acute spines and single robust spine opposing dactylus; lateral surface with 2 groups of setae; dactylus slender, at base of primary unguis lie 2 slender, recurved spiniform processes. Pereopods 2–4 without spines on palm of propodus other than terminal spine opposing dactylus. Pereopod 3, carpus is longer and spines on posterior surface of ischium on merus also longer than pereopod 1; anterodistal angle of ischium more strongly produced than in pereopod 1, with single long spine; anterodistal angle of merus also more produced, armed with about 14 long spines. Pereopods 5–7 similar, pereopod 6 longer than pereopod 7. Pereopod 7 with margins of basis with plumose setae; basis widens slightly distally, twice as long as greatest width; margins of ischium and merus similarly with marginal setae, and additional spines; carpus with 3 setae on anterior margin and single spine on posterior margin; propodus with single spine on posterior margin as well as spines around base of dactylus.

Pleopods with exopod of pleopods 3–5 with complete transverse suture. Uropods not extending beyond apex of pleotelson; rami subequal in length; lateral and medial margins of endopod forming an angle of 35° at apex, entire margin of both rami fringed with plumose setae. Endopod with 4 spines on medial margin, 6 on lateral; exopod with 4 spines on medial margin, 9 on lateral; peduncle with 3 spines and 3 setae on ventral lateral angle.

Male. Similar to female in most respects, but with long spines on pereopods 1–4. Appendix masculina curved, apex recurved, extending slightly beyond apex of endopod. Penes present on sternite 7.

Colour. White with transverse band of black chromatophores across pereon segments, and lateral margin of pleon and pleotelson.

Size. Females 5.1–12.0 mm, males 6.3–7.5 mm, manca 5.9–6.3 mm.

Remarks. The broad oval body shape, the narrow hind margin of the pleotelson and the distinct depression on the telson serves to separate this species from others. Other characters useful in identifying this species are the shape of the uropodal endopod, the characters of the frontal lamina and clypeus, and the presence of coxal points.

Similar species include *N. longispina* and *N. pellucida*. Pleotelson shape immediately separates these species.

Distribution. Port Willunga, SA; Point Leo, Vic.; Sydney, NSW; at depths of 6–23 metres.

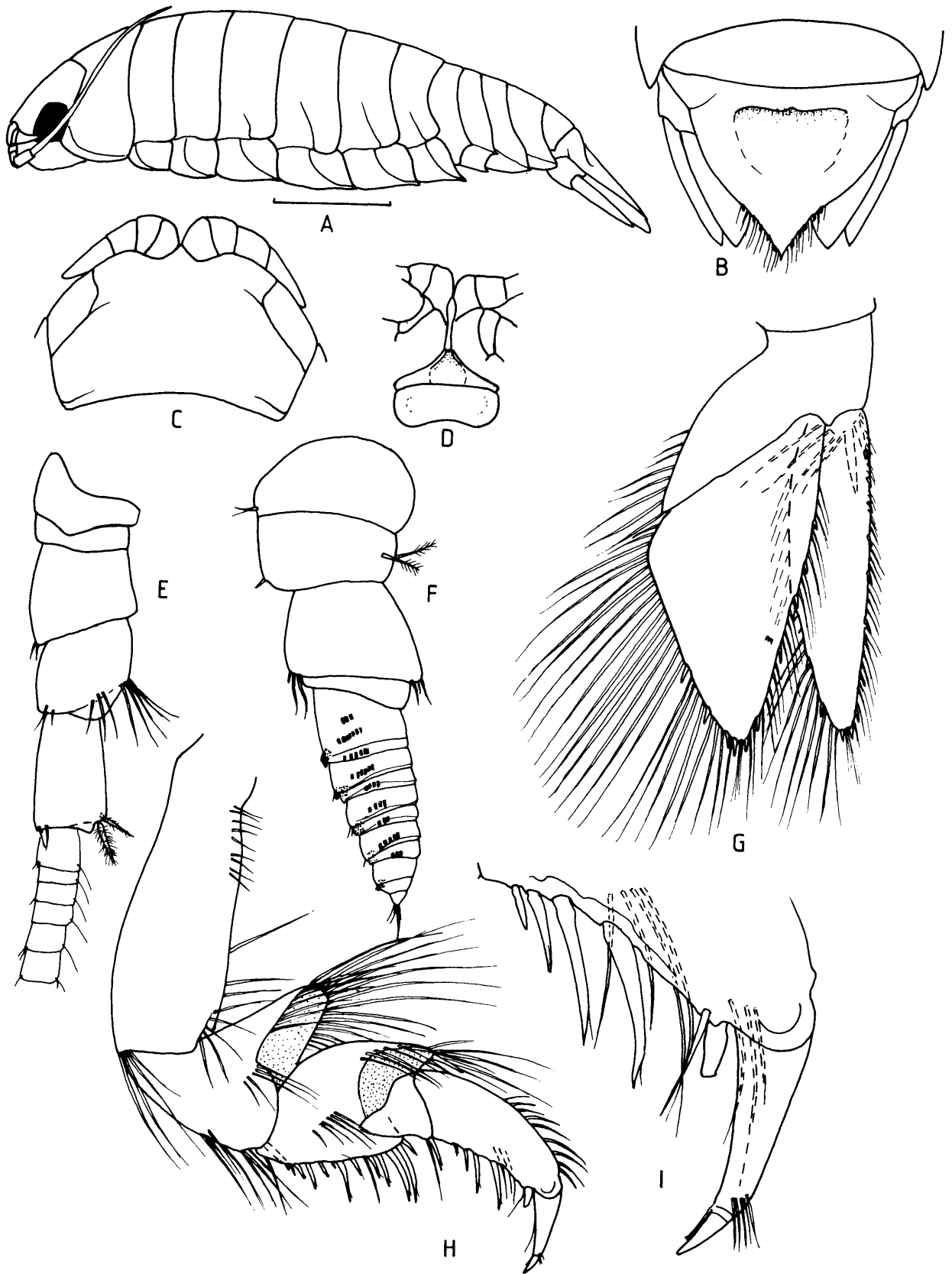


Fig. 51. *Natatolana corpulenta*, female 11.3 mm, Point Leo, Vic. A, lateral view; B, pleotelson, dorsal view; C, cephalon, dorsal view; D, clypeal region; E, antennal peduncle; F, antennule; G, uropod; H, pereopod 1; I, pereopod 1, palm of propodus. Scale 2.0 mm.

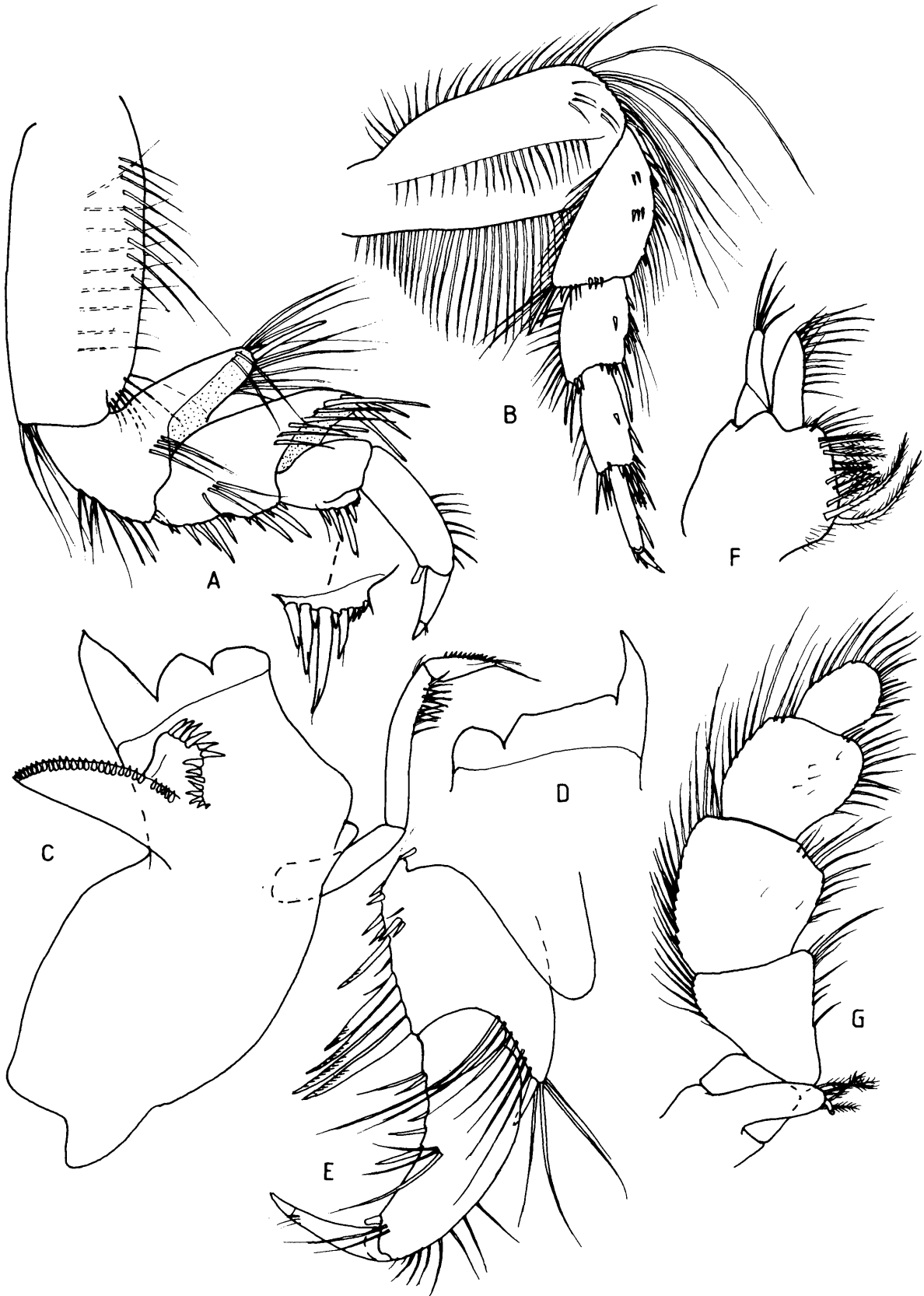


Fig. 52. *Natatolana corpulenta*. A, B, female 11.3 mm; C–G, damaged female, Point Leo, Vic. A, pereopod 3, and detail; B, pereopod 7; C, right mandible; D, left mandible, incisor; E, pereopod 1, male paratype; F, maxilla; G, maxilliped.

Natatolana longispina n. sp.

Figs 54, 55

Material examined. Crib Point Benthic Survey, Western Port, Vic., CPBS Stns: A1/2, male (8.8 mm), female (9.8 mm, non-ovig.); 355, 2 females (8.5, 10.0 mm, non-ovig.); 25N/2, 5 females (5.9–7.8 mm, all non-ovig.), manca (5.6 mm); 25N, male (7.5 mm), 2 females (10.5, 6.9 mm); 1727, female (12.7 mm); 22S/1, male (7.5 mm); 35S, 2 females (10.0, 11.9 mm); 25N/4, 3 males (8.0, 7.5, 6.8 mm), 4 females (8.5, 8.2, 6.9, 6.7 mm); 300/2, 2 males (7.0, 6.3 mm), 4 females (10.7, 7.7 non-ovig., 6.9 with mancas, 5.0 mm); 345, male (7.0 mm), female (10.5 mm), 2 mancas (2.0, 3.0 mm). Port Phillip Bay, Vic., PPS Stns: 946/2, 2 females (8.0, 9.8 mm); 982/2, male (7.8 mm), 2 mancas (2.7–4.2 mm); 980/5, female (8.2 mm); 980/4, male (8.5 mm). Note: This is selected material from about 300 specimens, all from Western Port and Port Phillip Bay, Vic.

Types. Holotype, male 8.8 mm, NMV J1770. Paratypes NMV J1771–J1783; AM P32371–P32374; USNM 190977–190989.

Type locality. Western Port, Vic. 38°27'S, 145°14'E.

Description of male. Body about twice as long as wide, broadly suboval in shape. Cephalon with acute median point; anterior margin partially raised to form

ridge; slightly impressed line runs to slightly beyond anterior dorsal surface of eye. Pereonite 1 longest; pereonite 4 longer than remainder, which progressively decrease in length away from pereonite 4. All coxae with distinct oblique carina running to point just above posteroventral angle. Pereonite 1 and all coxae with posterior ventral angle formed into point. Lateral margins of all pereonites with impressed line. Pleonites all visible, lateral margins of pleonites 3–4 produced, with impressed line. Pleotelson slightly shorter than greatest width, broadly rounded; anterodorsal area with distinct depression, anterior margin of which is clearly delimited, with median excision; posterior margin with 10 spines set amongst marginal setae.

Antennule short, not reaching pereonite 1; posterior angle of peduncle article 2 with conspicuous sensory seta; article 3 with fused 4th peduncular article; flagellum with 11 articles, each with several aesthetascs. Antenna peduncle article 4 with single seta on posterior margin, article 5 with 2 conspicuous sensory setae at distal end, flagellum composed of about 17 articles.

Frontal lamina narrow, slightly narrower at anterior end, clypeus with central depressed area, anterior margin forming into ridge. Mandible, maxillule, maxilla

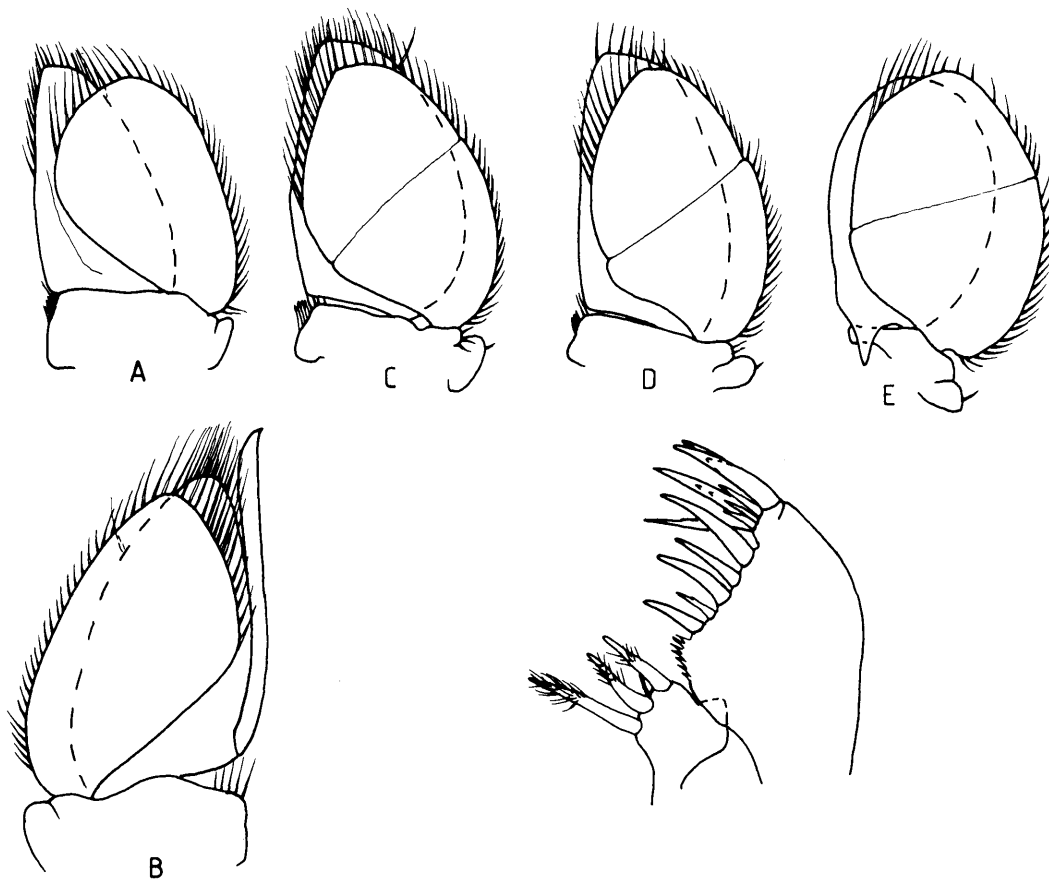


Fig. 53. *Natatolana corpulenta*, male 7.2 mm, Stockton Beach, NSW. A–E, pleopods 1–5 respectively; F, maxillule, female, Point Leo.

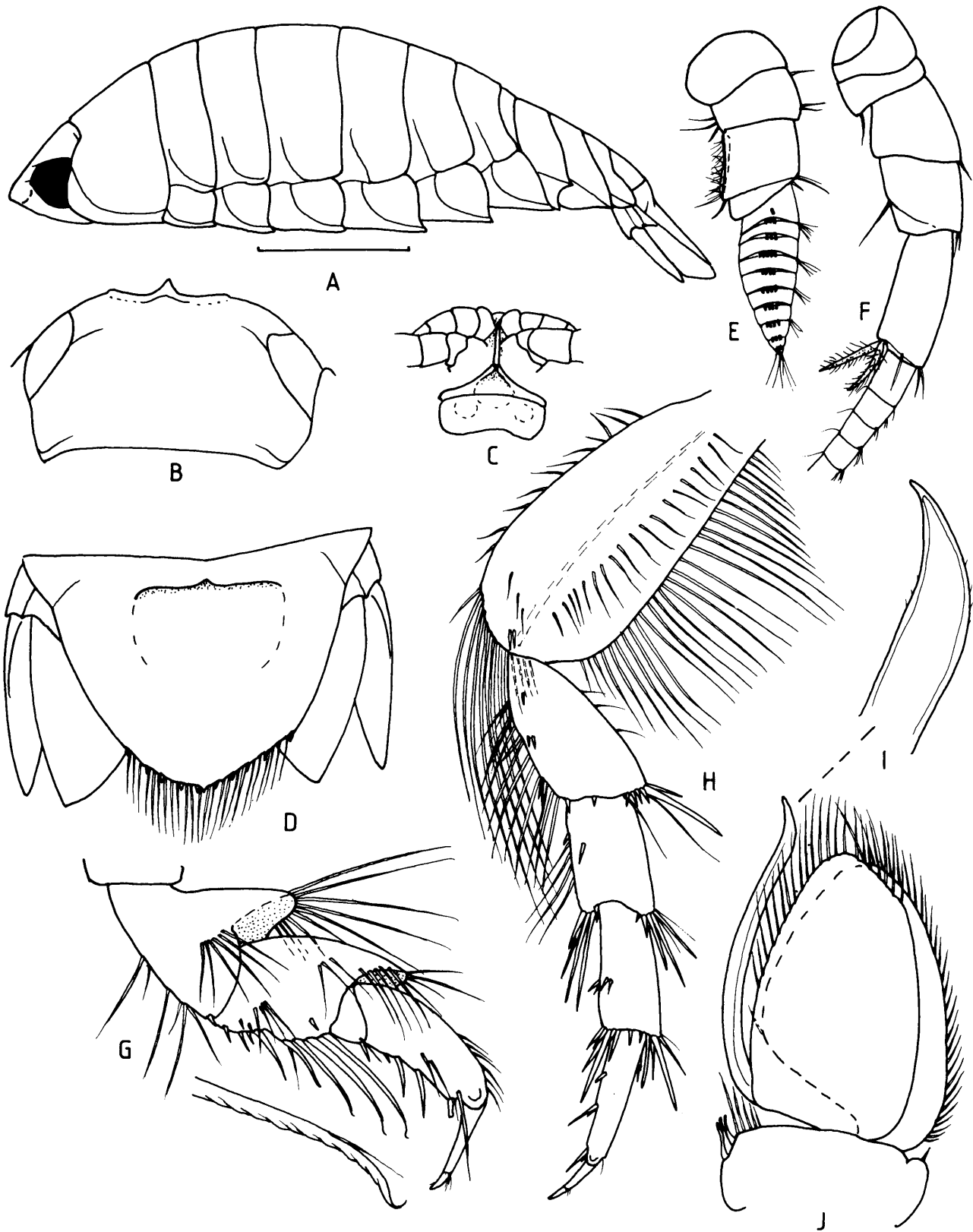


Fig. 54. *Natatolana longispina* n. sp. A-D, holotype; remainder male paratype 8.8 mm. A, lateral view (antennule and antenna removed); B, cephalon, dorsal view; C, clypeal region; D, pleotelson; E, antennule; F, antennal peduncle; G, pereopod 1; H, pereopod 7; I, appendix masculina, apex; J, pleopod 2. Scale 2.0 mm.

and maxilliped not differing from *N. corpulenta*.

Pereopod 1 ischium and merus with anterodistal angles produced, with setae but no spines; posterior margin of merus with about 5 small spines, longest of these extending to midway along palm of propodus; carpus short, with single spine and seta on posterodistal angle; propodus with 3 spines and fourth robust spine opposing dactylus. Pereopods 2 and 3 similar to 1 but palm of propodus without spines, carpus longer with additional spines, and anterodistal angle of merus with about 13 spines. Pereopod 4 with long spines arising at distal angle of carpus and extending beyond dactylus. Pereopods 4-7 similar, pereopod 6 being longest. Pereopod 7 with all margins of basis setose, slightly less than twice as long as greatest width; ischium with 3 setae

on anterior margin; carpus, merus and propodus without setae on anterior margins; ischium and merus with setae on posterior margin; carpus and propodus without setae on posterior margin; groups of spines present at distal angles of ischium, merus, carpus and along posterior margin of all articles except basis. Penes present on sternite 7, angled medially.

Pleopods the same as *N. corpulenta*. Pleopod 2 appendix masculina arising basally, extending beyond inner ramus, tip curved away from ramus. Uropods extending slightly beyond apex of pleotelson. Exopod narrow, lanceolate, little shorter than endopod, lateral margin with 7 spines and numerous setae, medial margin with 4 spines set amongst long plumose setae. Endopod with both margins slightly convex, setae along their

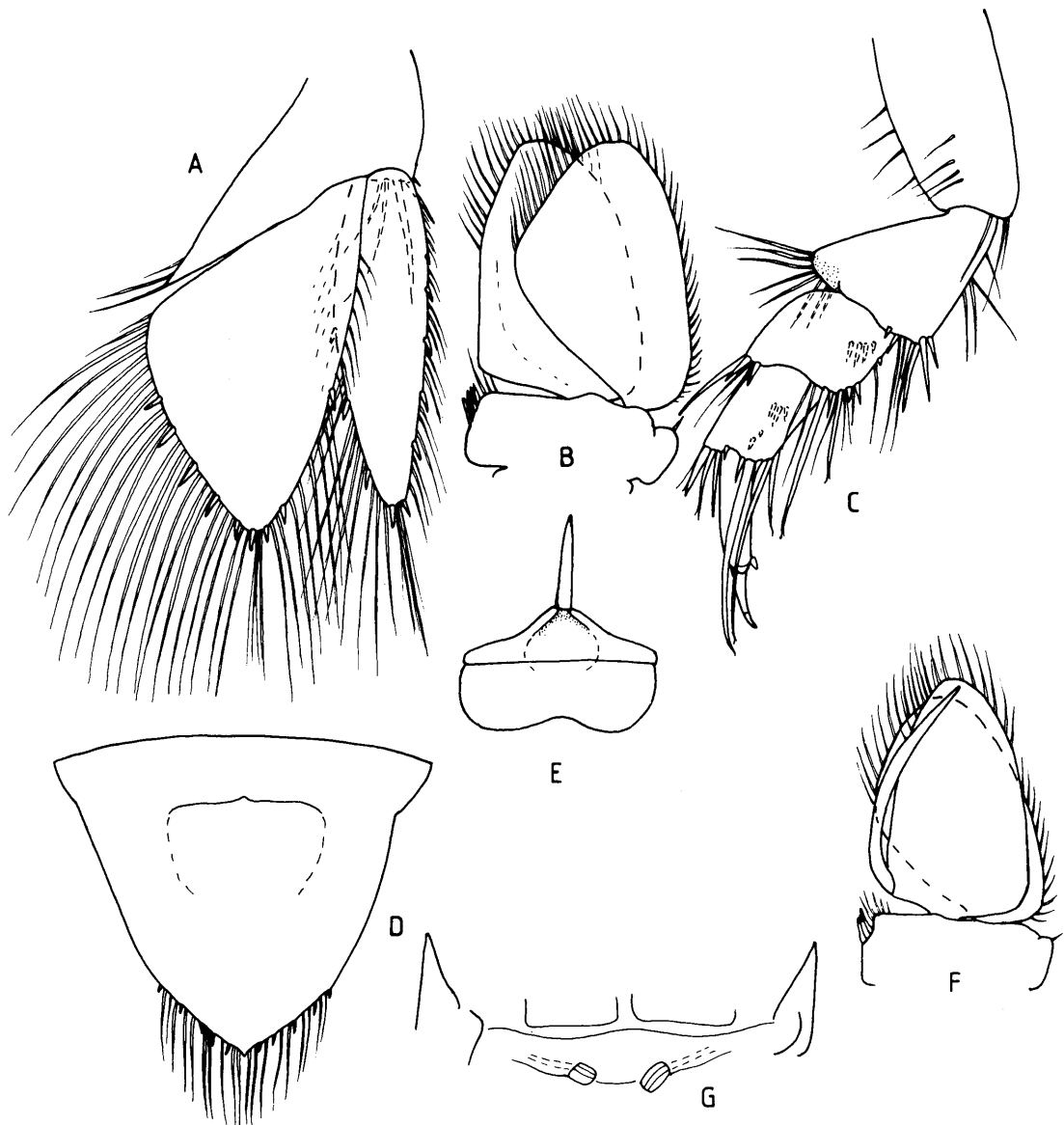


Fig. 55. *Natatolana longispina* n. sp. A-C, male paratype 8.8 mm; D, F, G, PPB male 6.8 mm. A, uropod; B, pleopod 1; C, pereopod 4; D, pleotelson; E, clypeus, frontal lamina PPB male 7.8 mm; F, pleopod 2; G, penes, in situ.

entire length; lateral margin with 3 spines, medial with 6. Peduncle with 3 spines and 2 setae on posterolateral angle.

Female. Males and females very similar but females lack elongate pereopod spines, and appear to have only 1 coupling hook on maxilliped endite whereas males have 2.

Variation. Smaller specimens lack the coxal points, and the anterior part of the pleotelsonic depression may not be as clearly defined. Small males do not have the appendix masculina apex turned out, and may also lack the characteristic long spines.

Colour. Preserved specimens are white to translucent, a few specimens show small black chromatophores which are arranged in bands.

Size. Largest specimen examined was an ovigerous female at 12.7 mm, largest male 8.8 mm; largest immature specimen 5.6 mm.

Remarks. This species shows many points of similarity to *N. corpulenta*, particularly in the form of the mouthparts, pereopods, pleopods, and pereon and pleon segments. Points of distinction include the broad rounded pleotelson, the slightly broader uropodal endopod, which extends beyond the pleotelson apex, the narrow frontal lamina, and details of spination and setation of the pereopod articles. The fifth article of the antennal peduncle is longer, the fourth article lacks the row of setae of *N. corpulenta*.

Distribution. Port Phillip Bay and Western Port, Vic.

Etymology. The specific epithet is derived from the combination of the Latin words *longus* (= long) and *spina* (= spine), and alludes to the presence of long pereopodal spines in the male.

Natatolana laewilla n. sp.

Figs 56, 57

Material examined. Male (7.5 mm), female (8.2 mm), manca (5.1 mm), 33°32'S, 152°08'E, 892–900 m; female (8.2 mm, ovig.), 33°38'S, 152°03'E, 880–900 m; male (9.5 mm), 33°36'S, 152°05'E, 1090–1125 m. All east of Port Jackson, NSW, 10 Dec. 1980, sledge dredge, coll. R. Springthorpe & P. Coleman.

Types. Holotype, female, AM P33551. Paratypes AM P33550, 33552.

Type locality. East of Port Jackson, NSW, 33°36'S, 152°05'E.

Description of female. Body about 2.25 times as long as wide. Eyes vestigial, impressed line running behind anterior margin, and along medial margin of each eye. Coxae without furrows. Pleonite 2 with lateral margins not produced; pleonite 3 posterolateral margins slightly produced, ventral margin sinuate. Pleotelson with acute dorsal depression; lateral margins converging smoothly to apex, provided with 10 spines set amongst marginal plumose setae.

Antennule peduncle article 2 shortest; flagellum short, not reaching pereonite 1, composed of 10 articles, first long, remainder short. Antenna peduncle article 5

longest; flagellum extending to pereonite 2, composed of about 18 articles.

Frontal lamina narrow, lateral margins sinuate, apex acute; anterior ventral surface recessed; frontal lamina and labrum similar to others of group and other mouthparts similar to those of *N. corpulenta*.

Pereopod 1 with setae on anterior margin of basis; ischium without spines; merus with 1 spine at anterodistal angle, posterior margin with 11 acute spines; carpus with 1 acute spine; propodus with 4 acute spines on palm, and robust spine opposing dactylus. Pereopods 2 and 3 similar to 1, but propodus slightly shorter; posterodistal margin of ischium with slender spines; merus and carpus with more and larger spines than pereopod 1; propodus without spine on palm. Pereopods 6 and 7 similar, but pereopod 6 markedly longer and more slender than 7; propodus of pereopod 6, 1.5 times length of carpus, and propodus of pereopod 7, 1.26 times length of carpus. Pereopod 7 basis about 2.25 times longer than greatest width, anterior margin very nearly straight, with continuous fringing setae; posterior margin convex, with few setae except for long plumose setae at posterodistal angle; anterior margins of ischium to propodus without setae; posterior margin of ischium setose; merus, carpus and propodus without setae.

Pleopods similar to those of *N. corpulenta*; distal margin of pleopod 1 exopod broadly rounded. Uropods extending slightly beyond pleotelson apex. Exopod shorter than endopod, both margins converging smoothly to apex; lateral margin with 3 spines and medial margin with 3. Endopod lateral margin very nearly straight, with few setae and 4 spines; medial margin with continuous fringing setae and 3 spines.

Male. Penes present as 2 flattened, well separated lobes on sternite 7. Pleopod 2 appendix masculina strongly bent laterally, apex bluntly rounded, attached basally. Otherwise similar to female. Coxae on pereonite 7 have faint trace of diagonal furrow.

Colour. Creamy white in alcohol, chromatophores not apparent. Ocelli white, except one male whose eye is more distinct and ocelli are tan.

Size. Largest male 7.5 mm, largest female 9.5 mm.

Remarks. This species is an unequivocal member of the *N. pellucida* complex of species. The species is easily separated from others in this complex by the lack of eyes and coxal furrows. The male is easily identified by the appendix masculina and position of the penes.

Distribution. Off Port Jackson, NSW, at depths of 880–1125 metres.

Etymology. The specific epithet is derived from *laewill*, an Aboriginal word for a club that is bent at an angle, and alludes to the appendix masculina shape.

Natatolana galathea n. sp.

Fig. 58

Material examined. Female (7.0 mm, with embryos), Gulf of Carpentaria, 10°37'S, 139°19'E, 27 Sept. 1951, 57 m, *Galathea* Stn 503.

Types. Holotype, ZMUC.

Type locality. Gulf of Carpentaria, 10°37'S, 139°19'E.

Description of female. Body about 2.5 times as long as wide. Cephalon with anterior margin slightly

projecting, with median rostral point; furrow runs from dorsal anterior surface of each eye. Eyes large, with large ocelli. Pereonites 2 and 4 with distinct oblique furrow, pereonites 2-5 with indistinct vertical furrow to posterior of segment; coxae of pereonites 2-7 with complete furrow. Pleonites all visible, pleonite 3 with posterolateral margin produced, with 2 carinae, pleonite 4 with posterolateral margin produced, with 2 carinae, pleonite 4 with posterolateral margin produced, with 2 carinae, pleonite 4 with posterolateral margin moderately narrow, but rounded. Pleotelson two thirds

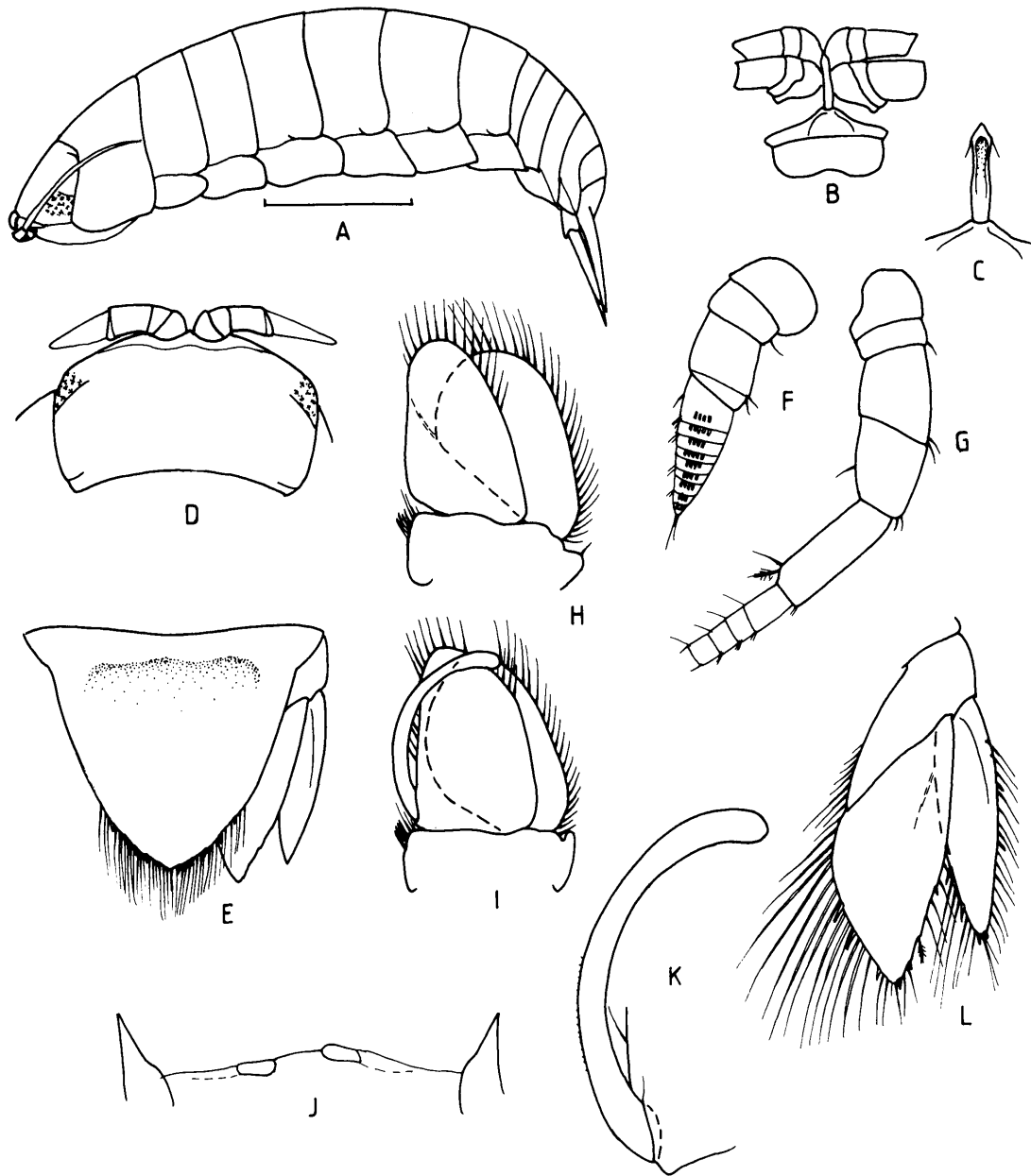


Fig. 56. *Natatolana laewilla* n. sp. A-E, holotype; F, G, L, female paratype; H-K, male paratype. A, lateral view; B, clypeal region; C, clypeus, detail; D, cephalon; E, pleotelson; F, antennule; G, antenna, peduncle; H, pleopod 1; I, pleopod 2; J, sternite 7, penes; K, appendix masculina; L, uropod. Scale 2.0 mm.

as long as greatest width, posterior margin slightly excavate, with 8 spines, each spine set within distinct notch, making posterior margin appear distinctly serrate; 2 setae placed between each spine.

Antennule short, peduncle article 3 slightly shorter than combined lengths of articles 1 and 2, flagellum slightly shorter than peduncle, composed of about 10 articles, reaching to mid-point of eye. Antenna flagellum reaching pereonite 2.

Frontal lamina narrow, anterior slightly expanded to rhomboidal shape. Clypeus triangular.

Pereopod 1 with few setae on basis; ischium with setae on anterodistal margin and along posterior margin; merus with single spine at apex of anterior margin, and about 8 stiff setae on anterolateral margin, posterior margin bisinuate, with about 10 spines; carpus with single seta and spine at posterodistal angle; propodus with 3 acute spines on palm and distal robust spine opposing dactylus. Pereopod 7 basis little more than twice as long as broad, both margins setose, anterior margin slightly sinuate, posterior margin slightly convex; anterior margins of merus, carpus and propodus with few setae; distal angles of all these articles

with groups of spines, posterior margins with additional spines, that of ischium with row of marginal setae. Pereopod 6 similar, slightly longer.

Pleopod 1 exopod with distal margin distinctly truncate. Uropods barely extending beyond apex of pleotelson. Exopod shorter than endopod, lanceolate in shape, lateral margin with 6 spines set amongst marginal setae, medial margin with 4. Endopod triangular, lateral margin with 4 spines and sensory seta, medial with 4 spines; both margins setose.

Male. Not known.

Size. 7.0 mm.

Colour. Cream in alcohol. Chromatophores not apparent.

Remarks. This species is another member of the *N. pellucida* group of species. It can be immediately distinguished from these species by the distinctive serrated posterior border of the pleotelson. The furrowing of the pereonites is also distinctive.

Distribution. Known only from the type locality, in the Gulf of Carpentaria, between the tip of Cape York and Arnhem Land.

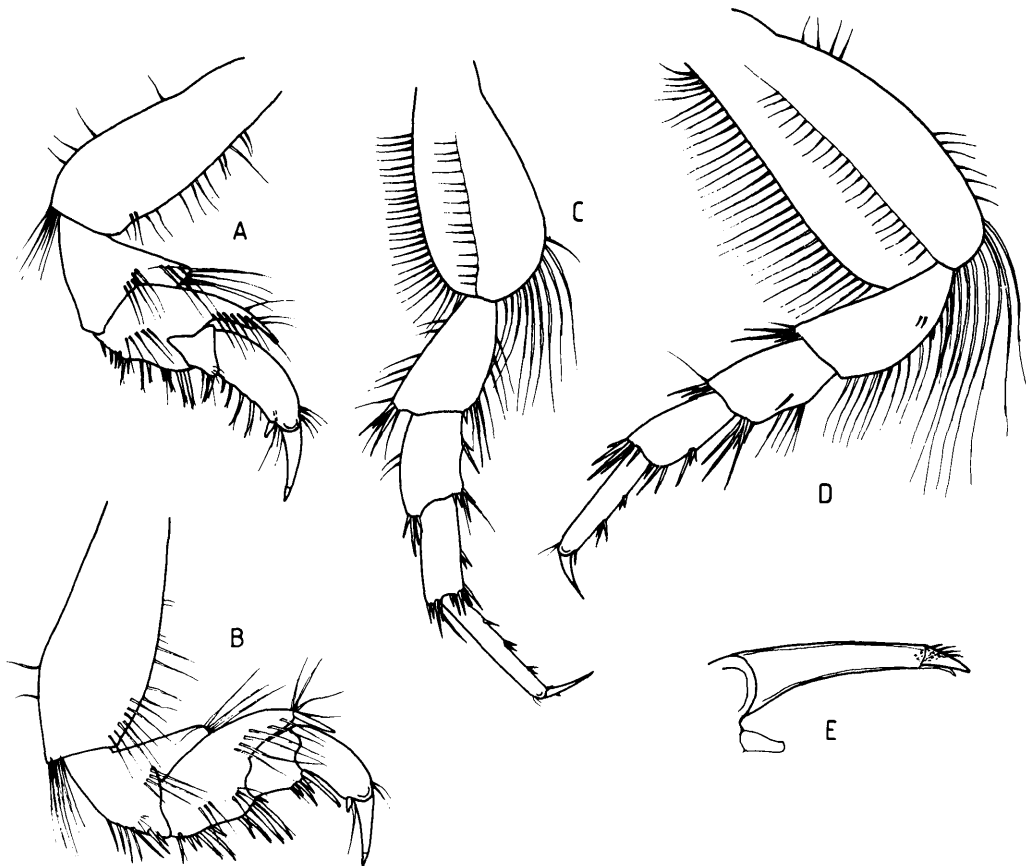


Fig. 57. *Natatolana laewilla* n. sp., female paratype, except C, male paratype. A, pereopod 1; B, pereopod 2; C, pereopod 6; D, pereopod 7; E, pereopod 1, dactylus.

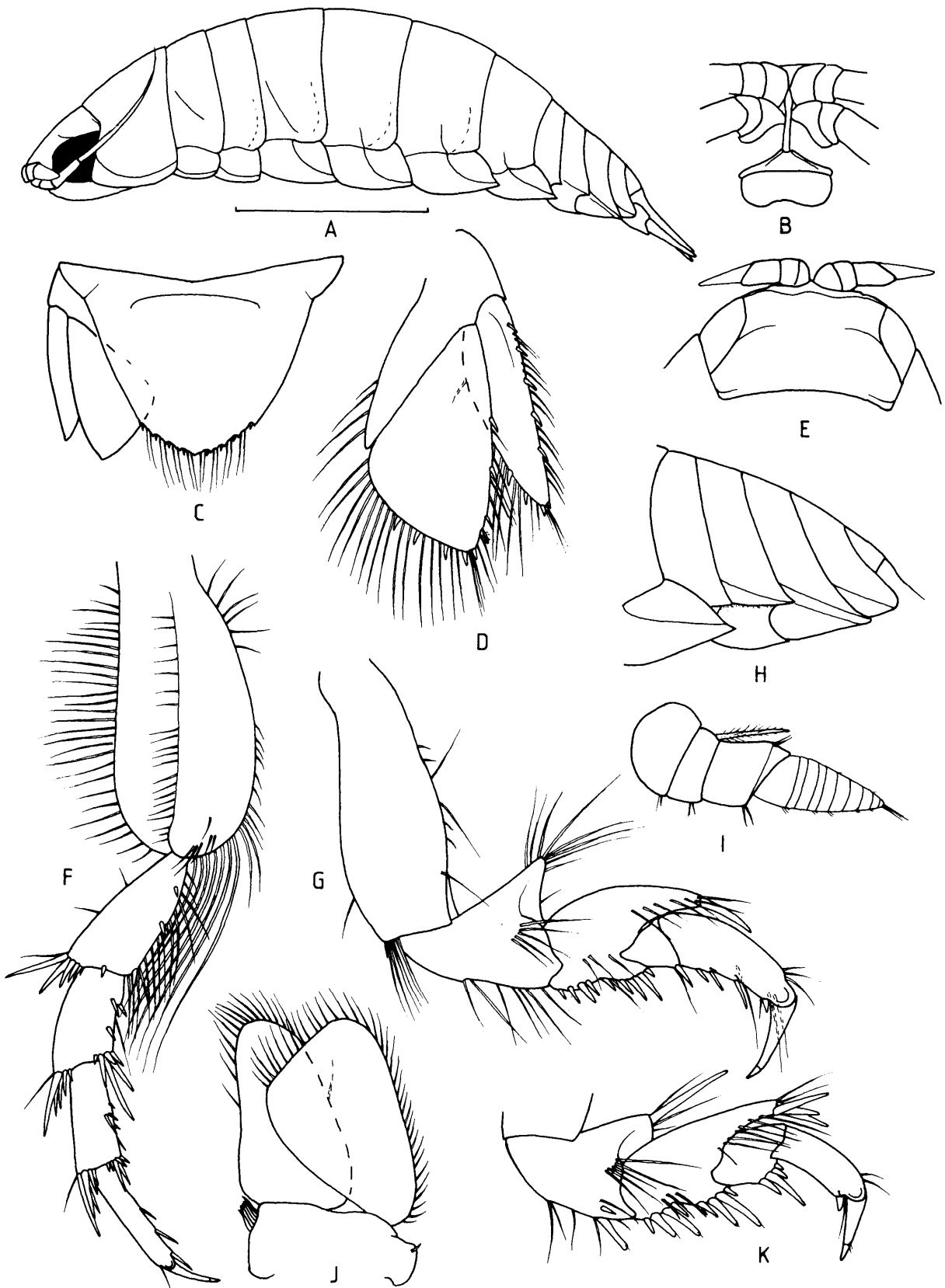


Fig. 58. *Natatolana galathea* n. sp., holotype. **A**, lateral view; **B**, clypeal region; **C**, pleotelson and uropod; **D**, uropod; **E**, cephalon, dorsal view; **F**, pereopod 7; **G**, pereopod 1; **H**, pleon, lateral view; **I**, antennule; **J**, pleopod 1; **K**, pereopod 3. Scale 2.0 mm.

Etymology. The name honours the research vessel *Galathea* from which the specimen was taken.

Natatolana arcicauda (Holdich, Harrison & Bruce)
Fig. 59

Cirolana arcicauda Holdich, Harrison & Bruce, 1981: 563, fig. 14. [Part *Cirolana woodjonesi*.—Hale, 1940: 288. Misidentification, not *N. woodjonesi* (Hale, 1924)].
Natatolana arcicauda.—Bruce, 1981b: 958.

Material examined. Female (11.3 mm), holotype (QM W6335), male (10.5 mm), allotype (QM W6336), Cleveland Bay, Townsville, Qld. Male (9.5 mm), Northwest Island, Capricorn Group, Qld, 9 Dec. 1919, 40 m, brought up on bait while line fishing.

Types. Held by the Queensland Museum.

Type locality. Cleveland Bay, Townsville, Qld.

Remarks. The specimen from the Capricorn group agrees entirely with the original description (Holdich et al., 1981), with the exception of the posterior border of the pleotelson, which is more distinctly angled. The anterior lobe of the merus of pereopod 7 is produced, and has a single spine.

The characters that best separate this species from others of the genus are the form of furrowing on the dorsal surface of the cephalon and on the coxae, the shape of the frontal lamina, uropods, the basis of pereopod 7, and the form of the lateral margin of the pleonites. The appendix masculina is simple, and does not extend beyond the inner ramus.

Hale (1940) recorded *Cirolana woodjonesi* from the Capricorns. The specimens do not belong to that species, but to two species, the one dealt with here, the other being *N. bulba*.

Distribution. Queensland: Townsville, Northwest Island, Capricorns at depths of 2.7–40 metres.

Natatolana valida (Hale)
Fig. 60

Cirolana valida Hale, 1940: 200, fig. 2.
Natatolana valida.—Bruce, 1981b: 958.

Material examined. Holotype, female (31.0 mm), AM E4814.

Types. Holotype held at the Australian Museum.

Type locality. East of Flinders Island, Bass Strait, 400–600 metres.

Supplementary description of female. Hale (1940) mentioned the presence of a 'minute, downbent, median process, not separating the first antennae'. This process does not constitute the rostral point as shown by all other species of the genus.

Coxae of pereonites 4–7 without impressed lines. Posterolateral margins of pleonite 3 with longitudinal carinae, pleonite 4 without. Pleotelson posterior margin slightly more angled than shown by Hale, with 8 spines on either side of small median projection (Hale records a total of 20 spines, some may have since rubbed off).

Frontal lamina straight sided, apex acute, ventral surface carinate; clypeus with central portion strongly produced.

Pereopod 1 with single stout spine on anterodistal angle of merus, as well as setae; posterior margin of merus with 31 spines, carpus with 3, and propodus with 6 and robust spine opposing dactylus. Pereopods 2 and 3 similar to 1, but carpus proportionally longer. Pereopod 2 with single spine on anterodistal angle of merus, and 4 spines on palm of propodus. Pereopod 3 has single spine on anterodistal angle of ischium, 3 on merus; posterior margin of merus with 10 spines and 2 submarginal spines, carpus with 2 long and 1 short spine, propodus with 3 spines.

Pleopods not examined in detail. Uropod exopod slightly shorter than endopod, lateral margin with about 11 spines, medial with 5; setae extend along full length of margin. Endopod with 7 spines each on medial and lateral margins; outer margin with setae on distal one third of its length.

Male. Not known.

Colour. Greyish white in alcohol.

Size. 31.0 mm.

Remarks. The diagnostic points of this species are the lack of a rostral point, lack of impressed lines on coxae 4–7, the straight sided carinate frontal lamina, and the large number of spines (16–20) on the posterior margin of the pleotelson.

The most similar species is *N. thurar*, also from Bass Strait. That species differs in the number of spines on the pleotelson (8 for *N. thurar* and 16–20 for *N. valida*), the shape of the posterolateral margins of pleonite 5, the lack of rostral point, and the coxal carinae.

Distribution. Known only from the type locality.

Natatolana lurur n. sp.
Fig. 61

Material examined. Male (18.9 mm), female (15.8 mm), 27°40'S, 113°03'E, north-west of Bluff Point, Geraldton, WA, 22 July 1963, 150 m, coll. CSIRO.

Types. Holotype, female, WAM 46-80. Paratype, WAM 20-80.

Type locality. Northwest of Bluff Point, Geraldton, WA, 27°40'S, 113°03'E.

Description of female. Body about 3 times as long as wide. Cephalon with 2 entire interocular furrows, and distinct rostral point. Coxae of pereonites 2, 3 and 7 with furrows, those of pereonites 4–6 without; pereonite 1 with single horizontal furrow. Pleonites all visible; posterolateral margins of pleonites 3 and 4 acute, backwardly produced. Pleotelson slightly shorter than wide, posterior margin slightly angled, provided with 10 spines set amongst plumose setae.

Antennule peduncle article 3 slightly longer than combined lengths of articles 1 and 2; flagellum composed of about 14 articles, not reaching anterior margin of pereonite 1. Antenna flagellum of about 28

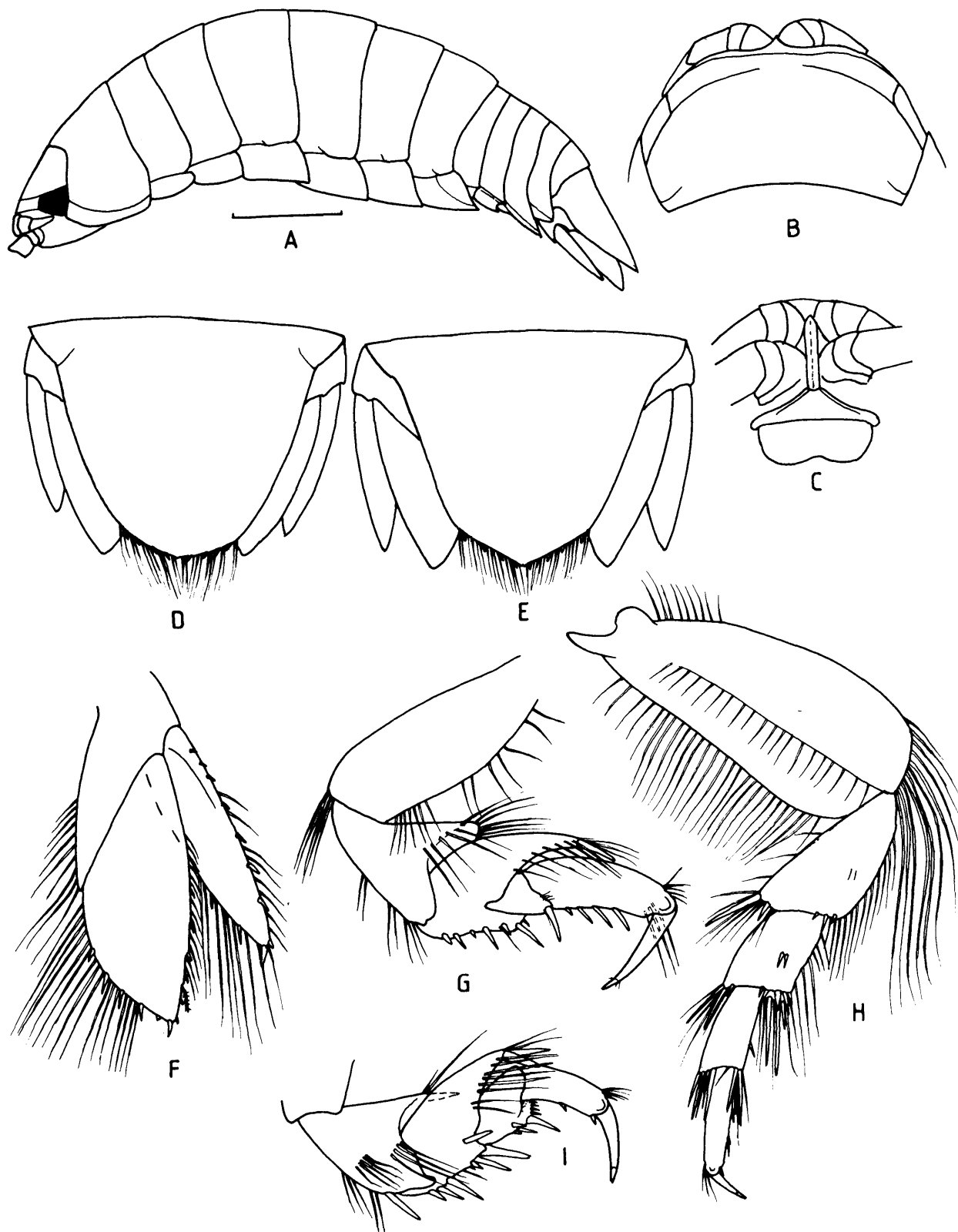


Fig. 59. *Natatolana arcicauda*. A-D, female holotype; E-I, female Northwest Is. A, lateral view; B, cephalon, dorsal view; C, clypeal region; D, pleotelson and uropods; E, pleotelson and uropods; F, uropod; G, pereopod 1; H, pereopod 7; I, pereopod 3. Scale 2.0 mm.

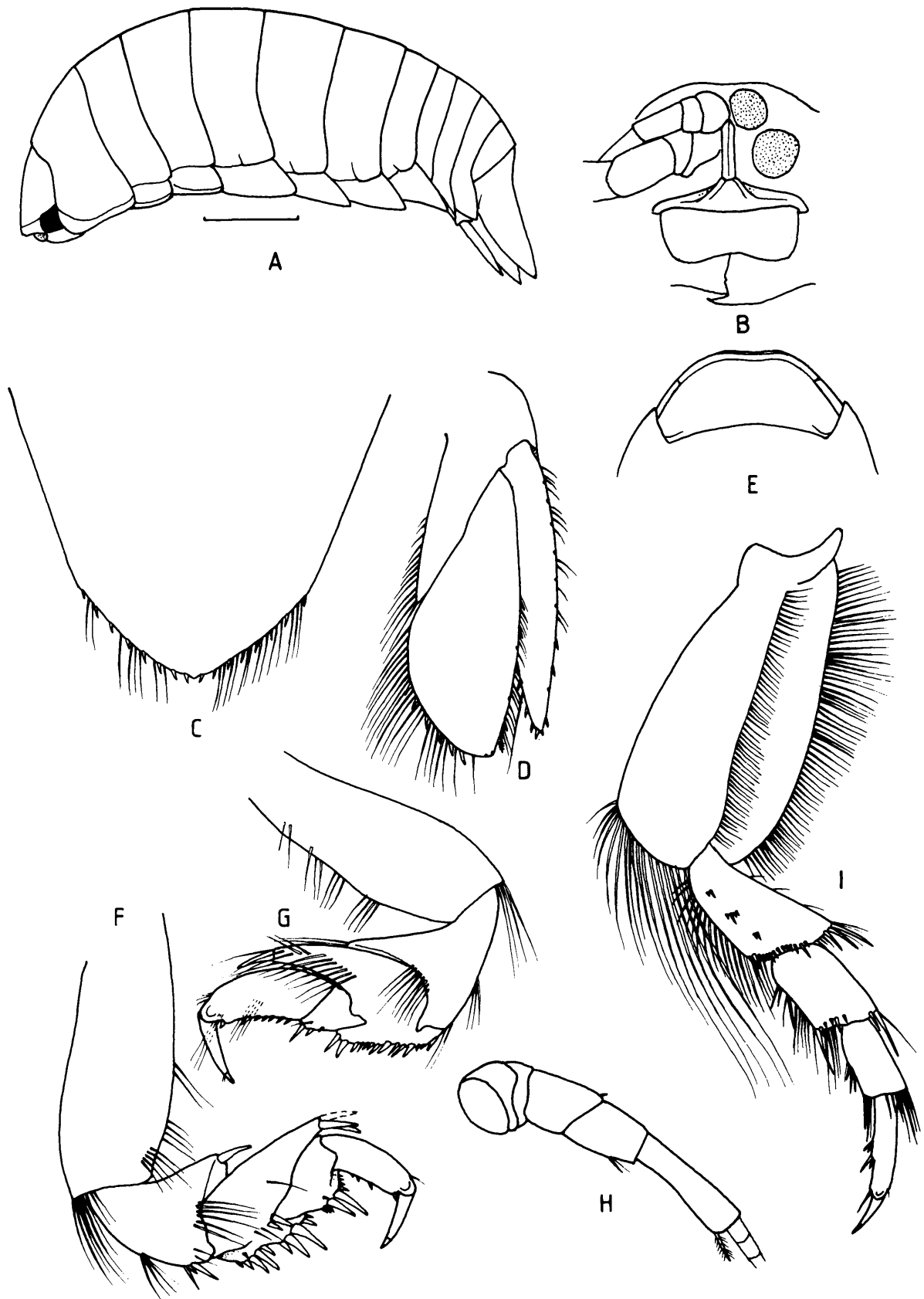


Fig. 60. *Natatolana valida*, holotype. A, lateral view; B, clypeal region; C, pleotelson; D, uropod; E, cephalon, dorsal view; F, pereopod 3; G, pereopod 1; H, antennal peduncle; I, pereopod 7. Scale 5.0 mm.

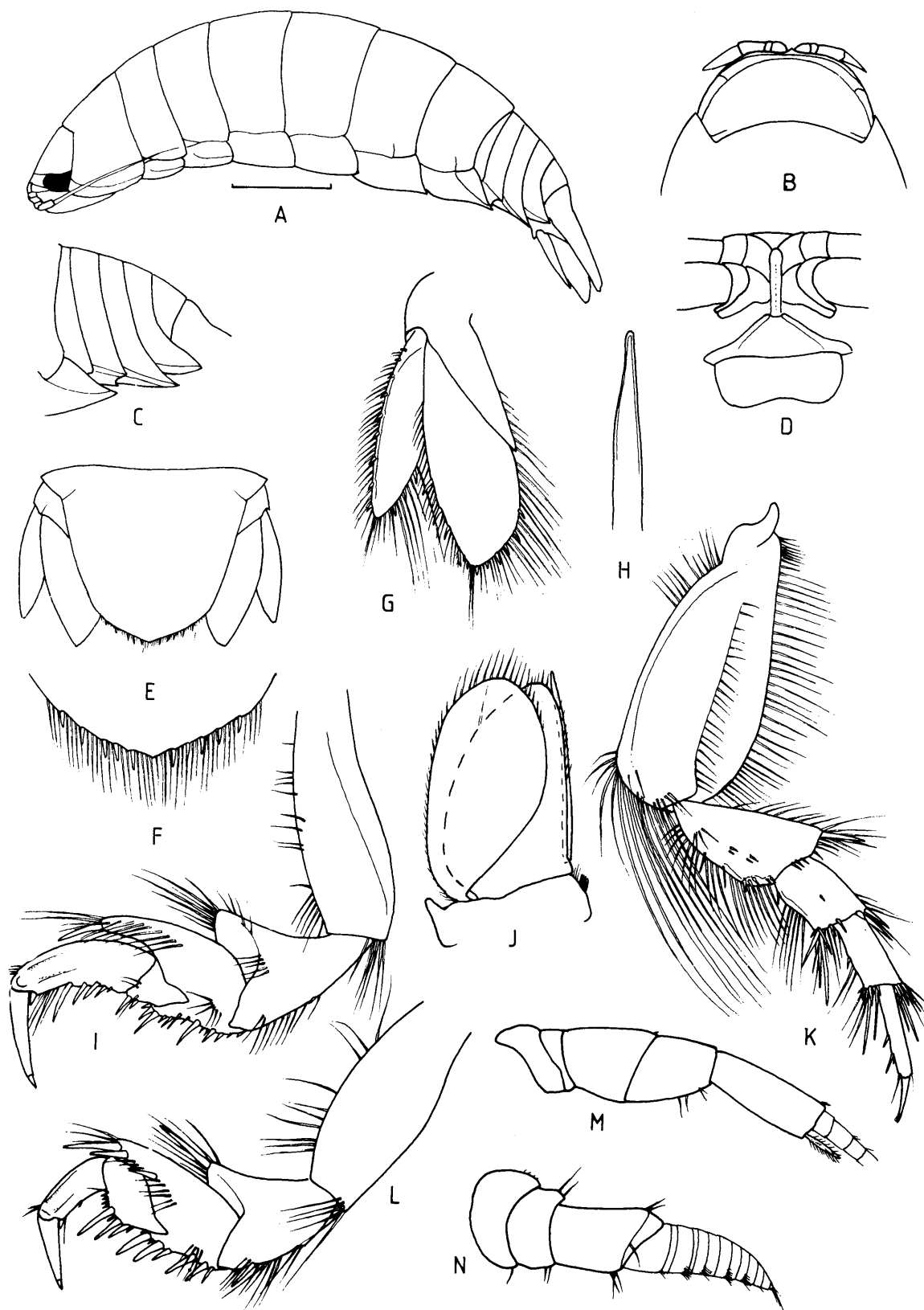


Fig. 61. *Natatolana lurur* n. sp. A-D, holotype; remainder paratype. A, lateral view; B, cephalon, dorsal view; C, pleon, lateral view; D, clypeal region; E, pleotelson and uropods; F, pleotelson, posterior margin; G, uropod; H, appendix masculina, apex; I, pereopod 1; J, pleopod 2; K, pereopod 7; L, pereopod 3; M, antennal peduncle; N, antennule. Scale 3.0 mm.

articles, extending to posterior of pereonite 2.

Frontal lamina straight sided, anterior margin slightly dilated, rounded. Clypeus triangular.

Pereopod 1 with setae along anterior margin of basis; ischium with anterior margin setose, posterior margin with setae along distal half and single small spine set half way along; merus anterior margin with single robust terminal spine and row of setae, posterior margin with 14 spines; carpus with 2 spines on posterior margin; propodus with 5 spines on palm, 5th spine opposing dactylus, anterodistal margin with row of 4 setae. Pereopods 2–3 similar to pereopod 1, but antero- and posterodistal margins each with single stout spine; merus with 3 spines on anterior margin; propodus with single spine on palm in addition to spine opposing dactylus. Pereopod 7 basis with continuous row of setae along anterior margin, posterior margin straight, with long natatory setae on distal margin; ischium, merus and carpus with long setae on posterior margin, with groups of spines at distal angles; propodus with 3 groups of spines on posterior margin.

Uropods extending slightly beyond apex of telson. Exopod distinctly shorter than endopod, lateral margin with 9 spines, medial with 3. Endopod with 5 spines and sensory seta on lateral margin, 6 spines on medial margin. Both rami with marginal setae.

Male. Entirely similar to female except for sexual characters. Lacks penes. Appendix masculina arising basally, extending slightly beyond endopod of pleopod 2, apex slightly narrowed, very slightly curved inwards.

Colour. Cream in alcohol.

Size. Longest specimen, 18.9 mm.

Remarks. This species is similar to *N. thurar* from Bass Strait. There are distinct differences in the relative size of the uropodal rami (the exopod of this species being noticeably short), the shape of the frontal lamina, the shape and spination of the pleotelson, and the much more setose posterior pereopods.

Distribution. Known only from off Geraldton, W.A.

Etymology. *Lurur* is an Aboriginal word meaning broken, and refers to the fact that both specimens are damaged.

Natatolana matong n. sp.

Figs 62, 63

Cirolana rossi.—Hale, 1952, 24. [Mis-identification, not *N. rossi* (Miers, 1876)].

Material examined. 4 males (20.2, 24.0, 21.5, 23.9 mm), 8 females (19.5–27.1 mm), west of King Island, N.W. Tas., 21 Oct. 1950, 180 m. Female (26.5 mm), British, Australian, New Zealand Antarctic Research Expedition Stn 113, off Maria Island, Tas., 42°40'S, 148°27'E, 23 Mar. 1931, 155–178 m. Female (18.9 mm) south of Warrnambool, Vic., 14 May 1969, 220–310 m, coll. V. Johnston. Female (24.0 mm), Apollo Bay, Vic., coll. S. O'Connor.

Types. Holotype, male, TM G2543. Paratypes, TM G1293, NMV J920, J1733; SAM C3277, C3921; USNM 109986; BM(NH); AM P33546.

Type locality. Off King Island, North West Tasmania, ca. 40°S, 144°E.

Description of male. Body little more than 3 times as long as wide. Cephalon with blunt rostral point on anterior margin; furrow runs anteriorly from dorsal surface of each eye, curving slightly inwards before terminating; feeble trace of furrow curves anteriorly from point of termination of distinct furrow. Eyes distinctly narrower anteriorly. Pereonites 1, 5 and 6 subequal in length and longer than pereonites 2–4 and 7; pereonite 1 with submarginal furrow, and second lateral furrow. Coxae of pereonites 2–3 with furrows, coxae on pereonite 4 with partial furrow, coxae of pereonite 7 with feeble trace of furrow. All furrows on coxae feebly developed and difficult to see. Pleonites all visible; posterolateral margins of pleonite 3 acute, produced posteriorly, those of pleonite 4 moderately acute, upper margin convex. Pleotelson slightly shorter than long, posterior margin with marginal plumose setae, 6 spines on either side of mid point; central pair of spines set very close.

Antennule extending to mid point of eye, peduncle article 3 as long as combined lengths of articles 1 and 2; flagellum slightly shorter than peduncle, composed of about 15 articles with numerous aesthetascs. Antenna with group of stiff setae at posterodistal angle of peduncle article 4; flagellum composed of about 35 articles, extending to pereonite 3.

Frontal lamina 2.5 times as long as basal width, constricted medially, apex angled to acute point, ventral surface feebly carinate. Frontal lamina with medial half of anterior margin produced forwards. Maxilliped endite with 2 coupling hooks, 10 plumose and 6 simple setae.

Pereopod 1 with setae along anterior margin of basis, and group of setae at posterodistal angle; ischium with single spine at posterodistal angle and setae along anterior and posterior margins; merus with 9 stout spines on posterior margin, anterior margin with 1 stout spine at apex and numerous setae; carpus with 4 spines on posterior margin; propodus with 4 acute spines on palm and 1 opposing dactylus, further short spine set proximally; lateral surface with group of setae. Pereopods 2–3 similar, more spinose; propodus with 3 acute spines on palm, lateral surface with 2 carinae. Pereopods 5–7 similar, pereopod 6 longer than 5 or 7, basis broadest in pereopod 7. Pereopod 7 basis about twice as long as broad, posterior margin slightly convex, provided with continuous row of marginal setae, anterior margin without setae, except distal extremity which has long plumose setae; ischium with stiff setae along posterior margin, anterior margin with slender setae, distal extremities with spines; merus and carpus with spines at distal angles and in groups along posterior margins; propodus with 3 groups of spines on posterior margin, and further group of spines at base of dactylus.

Vasa deferentia opening flush with surface of sternite 7.

Pleopod 2 appendix masculina arising basally, as long

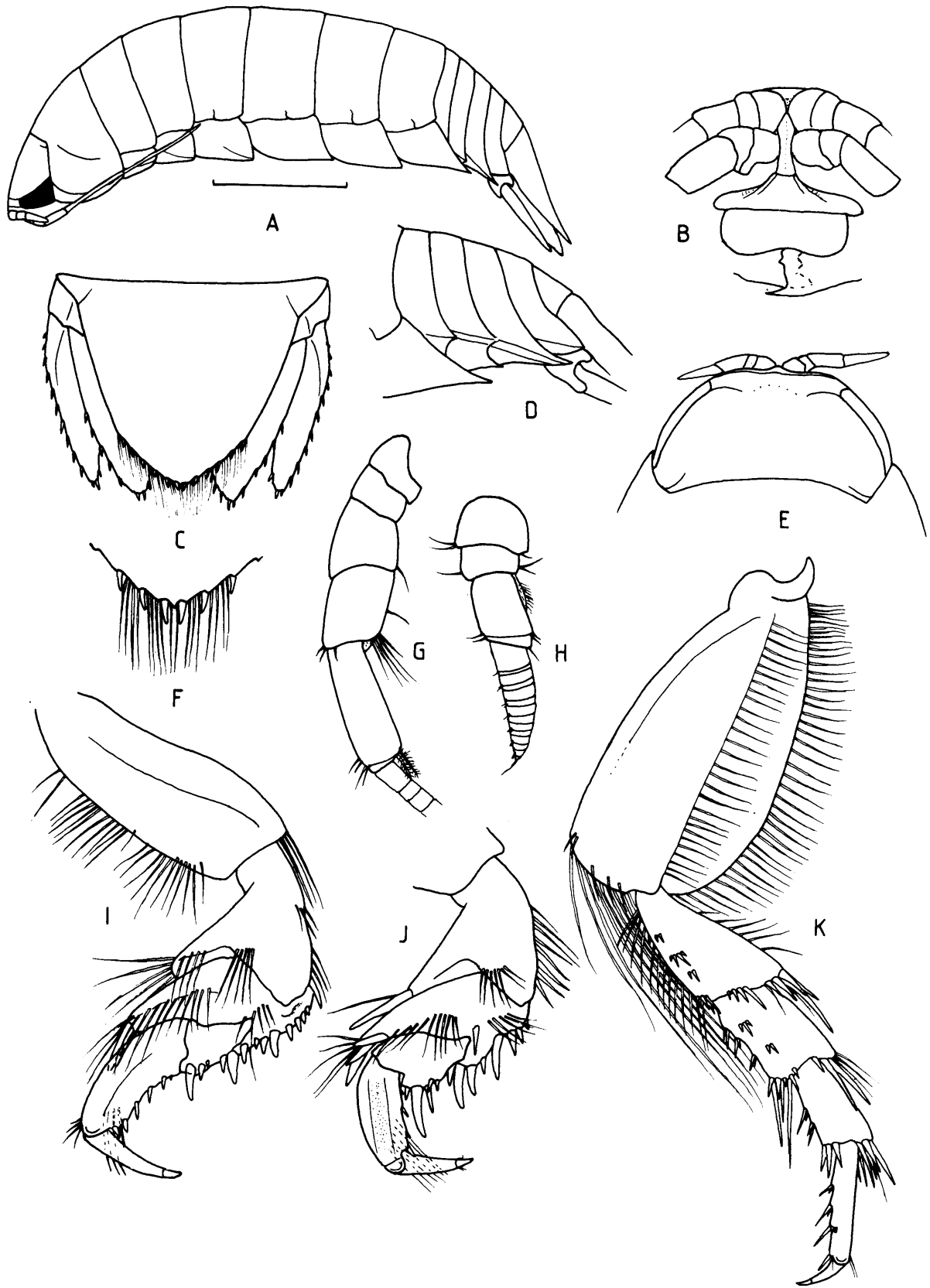


Fig. 62. *Natatolana matong* n. sp. A-C, E, F, holotype; remainder female paratype. A, lateral view; B, clypeal region; C, pleotelson; D, pleon, lateral view; E, cephalon, dorsal view; F, pleotelson, apex; G, antennal peduncle; H, antennule; I, pereopod 1; J, pereopod 3; K, pereopod 7. Scale 5.0 mm.

as inner ramus, straight sided, slender. Uropods extending slightly beyond apex of pleotelson. Exopod slightly shorter than endopod, lateral margin with 11 spines set amongst marginal setae, medial margin with 5 spines and long marginal setae; both margins very slightly convex. Endopod lateral margin very nearly straight, with 7 spines set amongst short setae, medial margin with 7 spines amongst long setae.

Female. Differs from male only in sexual characters.

Variation. All specimens agree closely. The specimen from Apollo Bay does not show the interocular furrows at all clearly.

Colour. Pale tan in alcohol, chromatophores not visible.

Size. Largest female 27.1 mm, largest male, 24.0 mm.

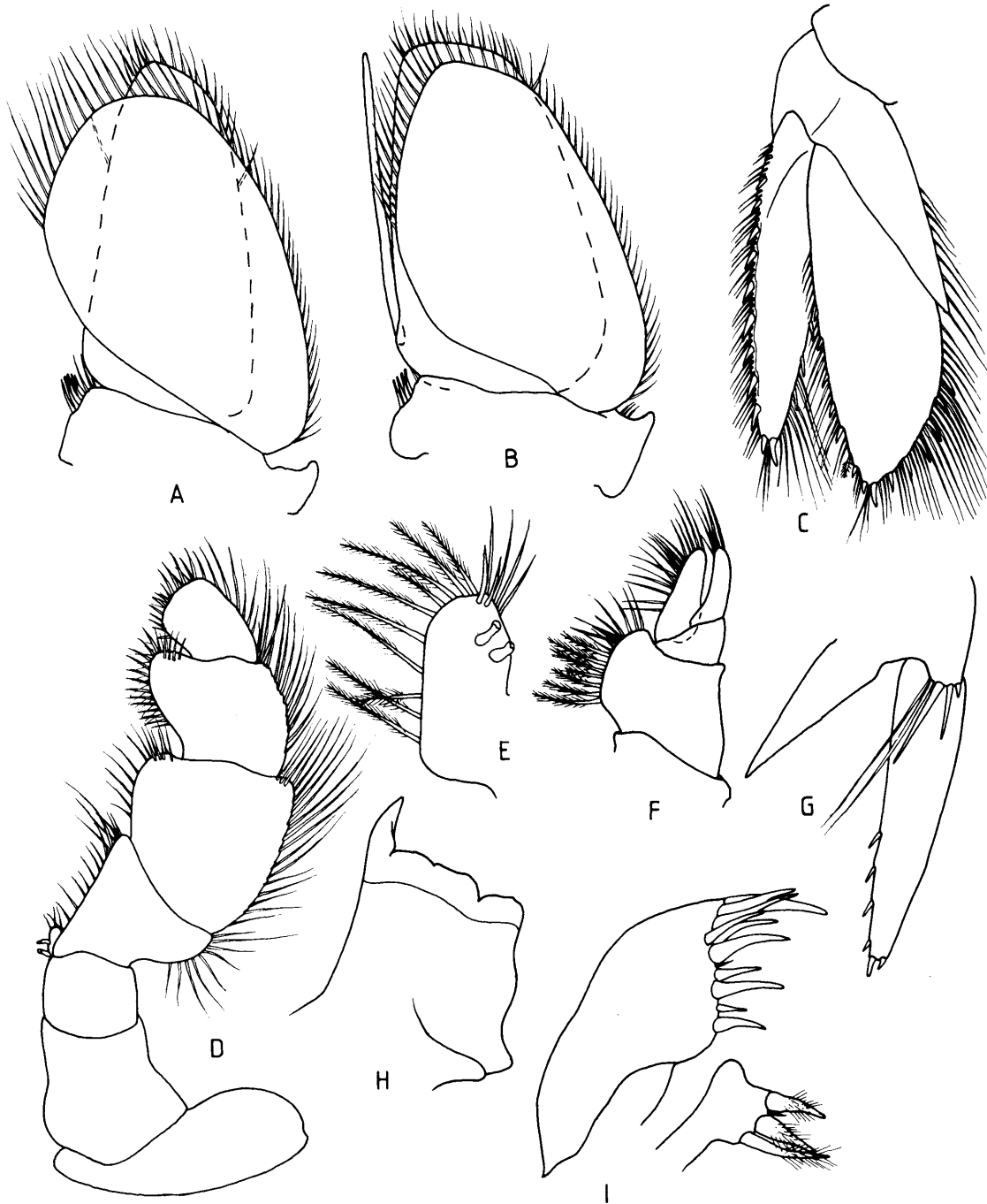


Fig. 63. *Natatolana matong* n. sp. A, B, holotype; remainder female paratype. A, pleopod 1; B, pleopod 2; C, uropod; D, maxilliped; E, maxilliped endite; F, maxilla; G, uropod peduncle, ventral view; H, left mandible incisor, I, maxillule.

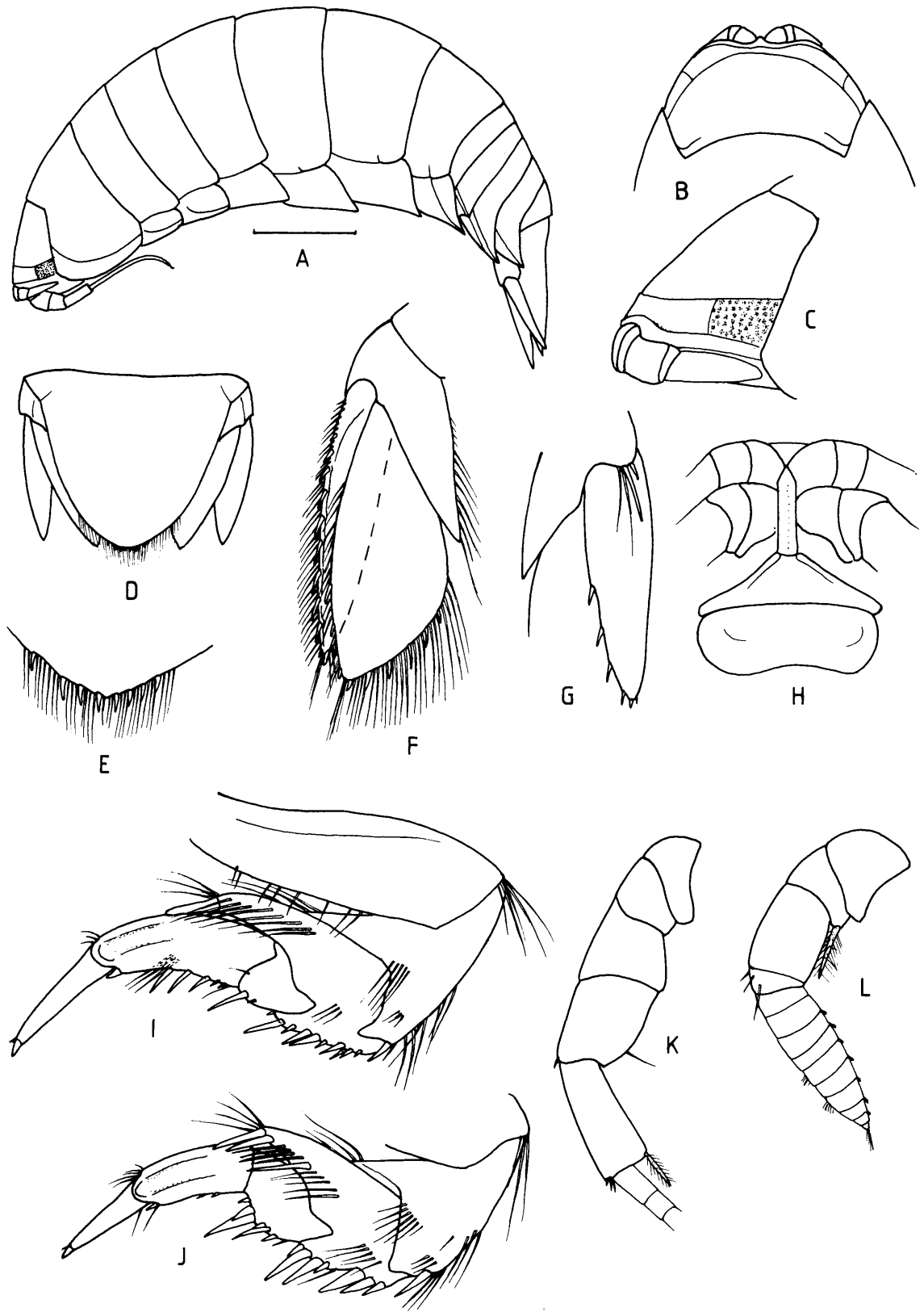


Fig. 64. *Natatolana thurar* n. sp. A-E, H, holotype; remainder paratype. A, lateral view; B, cephalon, dorsal view; C, cephalon, lateral view; D, pleotelson, dorsal view; E, pleotelson, apex; F, uropod; G, uropod peduncle, ventral view; H, clypeal region; I, pereopod 1; J, pereopod 2; K, antennal peduncle; L, antennule. Scale 2.0 mm.

Remarks. This species bears a close similarity to *N. rossi* from New Zealand, but can be readily distinguished as *N. rossi* has a complete interocular furrow, distinct furrows on all coxae, and much broader basis of pereopod 7. At present, *N. rossi* has not been recorded from Australian waters. *Natatolana pastorei* is also similar, but can easily be distinguished from the present species by its more sinuate uropods, and in having the apex of the pleotelson margin strongly produced. *Natatolana hirtipes* from South Africa, another similar species, can be distinguished by having conspicuous coxal furrows, and by differences in shape of the lateral margin of pleonites 3 and 4. *Natatolana valida*, the only other Australian species that approaches *Natatolana matong*, has a narrow straight frontal lamina and lacks a cephalic rostral point.

Distribution. Off Victoria and Tasmania in the Bass Strait area, recorded at depths of 155–310 metres.

Etymology. *Matong* is an Aboriginal word meaning powerful.

Natatolana thurar n. sp.

Figs 64, 65

Material examined. 3 females (15.8, 13.7, 12.6 mm), eastern Bass Strait, 30°35'S, 149°06'E, 20 June 1962, 149 m, coll. CSIRO.

Types. Holotype, female, (15.8 mm) AM P32171. Paratypes, AM P30350.

Type locality. Eastern Bass Strait, 38°35'S, 149°06'E.

Description of female. Body about 3 times as long as wide. Cephalon with 2 complete interocular furrows, and distinct medial rostral point. Eyes rectangular, ocelli feeble, unpigmented. Coxae of pereonites 2, 3 and 7 with furrows, those of pereonites 4–6 without; pereonite 1 with single horizontal furrow. Pleonites all visible, posterolateral margins of pleonites 3–4 acute, those of pleonite 4 with dorsal margin slightly concave. Pleotelson little shorter than greatest width, posterior margin converging smoothly to rounded apex, armed with 8 spines amongst marginal setae.

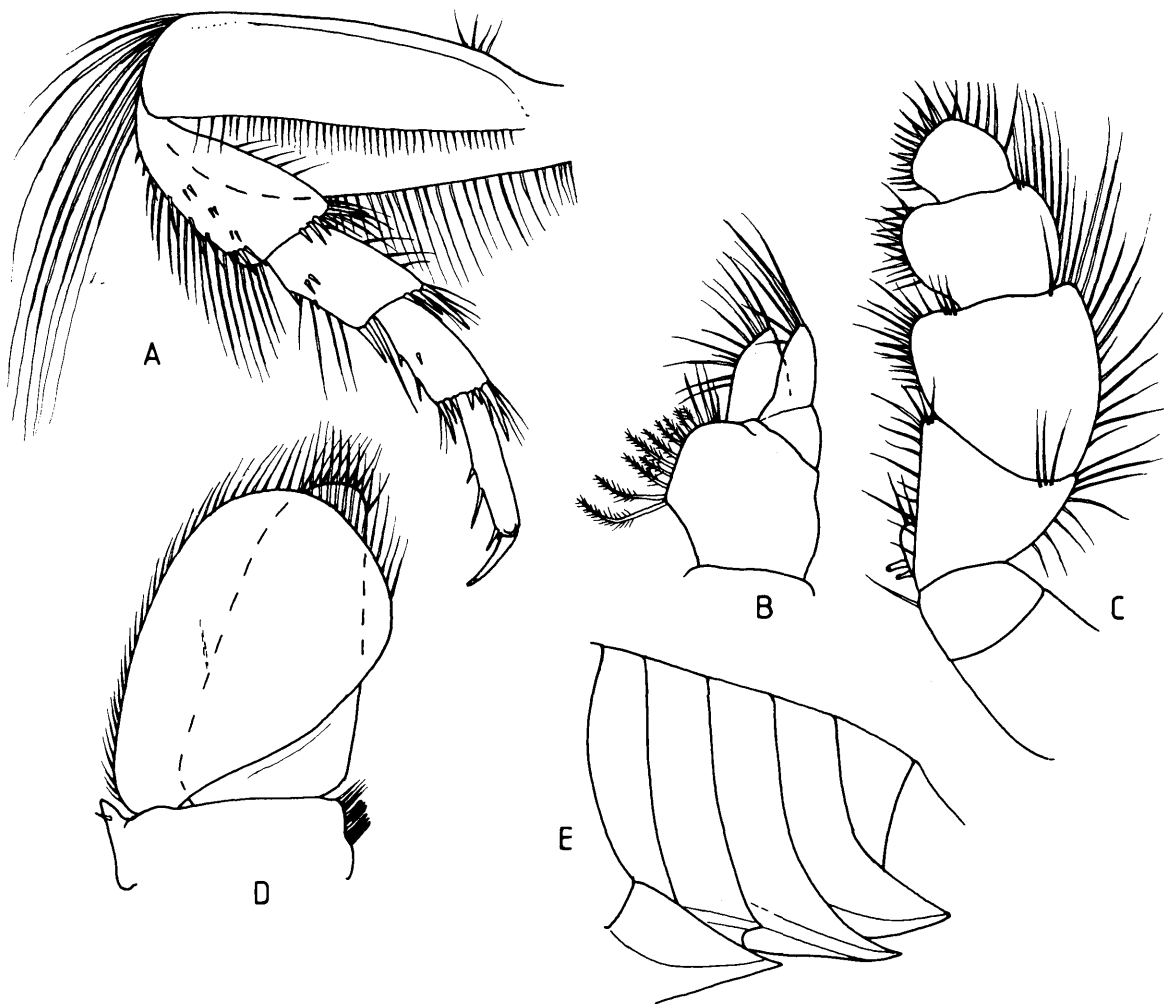


Fig. 65. *Natatolana thurar* n. sp. A–D, paratype. A, pereopod 7; B, maxilla; C, maxilliped; D, pleopod 1; E, holotype, pleon, lateral view.

Antennule short, extending to posterior eye, flagellum subequal to peduncle in length, composed of about 10 articles. Antenna flagellum composed of about 22 articles, extending to pereonite 3.

Frontal lamina straight sided, anterior angled to acute point, clypeus triangular. Maxilla with palp and exopod about twice as long as broad.

Pereopod 1 with few marginal setae along anterior margin of basis; ischium with single spine at posterodistal angle, anterior margin with long setae; merus with 10 spines along posterior margin, anterior margin with single stout spine and setae; carpus with 2 spines; propodus with 5 spines on palm and 6th spine opposing dactylus. Pereopods 2–3 similar to 1, but spines on merus fewer and larger, anterior margin with 2 terminal spines; carpus with 7 spines; propodus with 2 small spines on palm and single spine opposing dactylus. Pereopods 6–7 similar, 6 longer and larger than 7. Pereopod 7 with anterior margin of basis setose, very nearly straight, posterior margin with long setae at distal extremity, ischium with long setae on posterior margin, sparse setae on anterior margin, spine present at distal angles; merus and carpus with spine at distal angles and on posterior margin.

Uropods extending slightly beyond apex of pleotelson. Exopod slightly shorter than endopod, lateral margin with continuous row of setae, armed with 10 spines, medial margin similarly setose, with 5 spines. Endopod with 3 spines on lateral margin, 6 on medial, both margins convex, with marginal setae.

Male. Not known.

Colour. Pale brown in alcohol.

Size. 12.6 mm–15.8 mm.

Remarks. This species is similar to *N. matong* but there are numerous points of difference in the shape and spination of the telson, uropods, the shape of pleonite 4, the frontal lamina, clypeus, and differences in the cephalic furrows. Most noticeably, the eye is much shorter and more rectangular than in *N. matong* and, in all the specimens examined, appears to have feebly developed and unpigmented ocelli. However, the animals are soft, appearing to have been kept in formaldehyde for some time, so the loss of pigment may be associated with a long period of preservation.

Natanolana valida is the most similar species, and is separated from *N. thurar* by differences in the eye, spination of the pleotelson, presence of a rostral point in *N. thurar*, and differences in the shape of pleonite 4.

Distribution. Known only from the eastern Bass Strait.

Etymology. *Thurar* is an Aboriginal word meaning a strait.

Natanolana woodjonesi (Hale)

Figs 66–68

Cirolana woodjonesi Hale, 1924: 71, fig. 2, pl. 2.—1925: 137, fig. 5; 1929b: 248, figs 232, 233, 240; Nierstrasz, 1931: 157; Naylor, 1966: 184; Poore et al. 1975: 33; Holdich, Harrison & Bruce, 1981: 575, fig. 9.

Cirolana woodjonsoni.—Roman, 1970: 167, 192, 195, 197 (*lapsus calami*).

Natanolana woodjonesi.—Bruce, 1981b: 958.

Not *Cirolana woodjonesi*.—Hale, 1940: 288 (Mis-identification).

Material examined. Holotype, male, (13.8 mm), St. Vincent Gulf, SA AM Shelf Benthic Survey series: manca (5.6 mm), off Burwood Beach, NSW, 32°57'S, 151°45'E, 28 Jan. 1976, 26 m; manca (7.1 mm), off Dudley Beach, NSW, 32°59'S, 151°44'E, 30 Nov. 1975, 15 m; female (14.5 mm, ovig.), off Belmont Beach, NSW, 33°02'S, 151°41'E, 18 Mar. 1975, 22 m; 2 mancas (5.6, 6.0 mm), east of Malabar, Sydney, NSW, 33°57'S, 151°19'E, 17 May 1972, 49 m. Female (7.0 mm), off Sydney, NSW, 34°21'S, 151°16'E, 9 July 1962, 82 m, coll. CSIRO. C. 100 males and females (6–18 mm), Mordialloc Pier, Port Phillip Bay, Vic., 12 Apr. 1899, coll. F.N. Baillie. Female (15.1 mm), Hobson Bay, Vic., 10–15 m, Port Phillip Bay, Vic., PPBES Stns: 137, 2 females (11.3, 13.8 mm); 138, 2 males (13.6, 8.8 mm), 2 mancas (5.4, 6.2 mm); 938, immature (6.5 mm), manca (4.5 mm); 986, 2 males (11.5, 12.0 mm), 2 females (12.5 ovig., 14.5 mm); 1231, male (14.2 mm), 3 females (7.5, 8.2, 10.1 mm), 3 mancas (5.6, 7.4, 7.5 mm); 1233, male (11.9 mm); 1236, female (17.0 mm), 3 mancas (5.0, 5.6, 6.3 mm); 1237, 2 females (11.2, 17.5 mm), manca (6.9 mm), Crib Point, Western Port, Vic., CPBS Stns: 24N, female (11.9 mm), 3 mancas (3.8, 6.3, 6.8 mm); 24N/4 male (11.3 mm), 2 females (12.9, 19.9 mm); 24S, female (10.7 mm), manca (4.5 mm). Male (10.5 mm), Bass Strait, 37°55'S, 149°06'E, 20 June 1962, 76 m, coll. CSIRO. 2 males (10.5 mm), 4 females (10.7, 11.0, 11.3 mm), Midway Point, S.E. Tas., 9 Dec. 1973, coll. G. Prestedge and A.J.A. Green. Male (14.5 mm), female (17.6 mm), Koonya, Tasmania Peninsula, Tas., 26 May 1974, in muddy sand, mid littoral, coll. A. Richardson & A.J.A. Green. Material determined by Hale included Elliot Cove, W. Coast, Tas., 10 m, 89 males and females; Bottle and Glass Rocks, Port Jackson, NSW, male (12.6 mm), between tide marks, Oct. 1925; Port Jackson, NSW, 2 females (10.8, 11.5 mm).

Types. Held by the South Australian Museum, Adelaide, C228.

Type locality. Port Willunga, SA.

Descriptive notes. Nearly all characters agree with the description given by Holdich et al. (1981). Differences include: presence of sensory seta on peduncle article 2 of antennule; article 1 of antennule flagellum of Holdich et al. (1981) is in fact the fourth peduncle article, making article 1 of flagellum longest; antenna peduncle articles 1–2 short, 3–4 longer and subequal in length, article 5 is slightly longer than 4, ventrodistal angle with 2 conspicuous sensory setae.

Pereonite 1 with single impressed line. Pleonite 4 with posterolateral margins moderately acute. Pleotelson apex with small protrusion, on each side of which lie 2 spines.

Appendix masculina varies slightly in length from being just shorter than pleopod endopod to just longer; slender, straight sided, and turned outward at tip, width narrows slightly.

Females. Similar to males, but grow to a larger size.

Development. Juveniles and mancas are similar to adults, but may possess fewer spines.

Colour. Tan, kidney red or cream in alcohol.

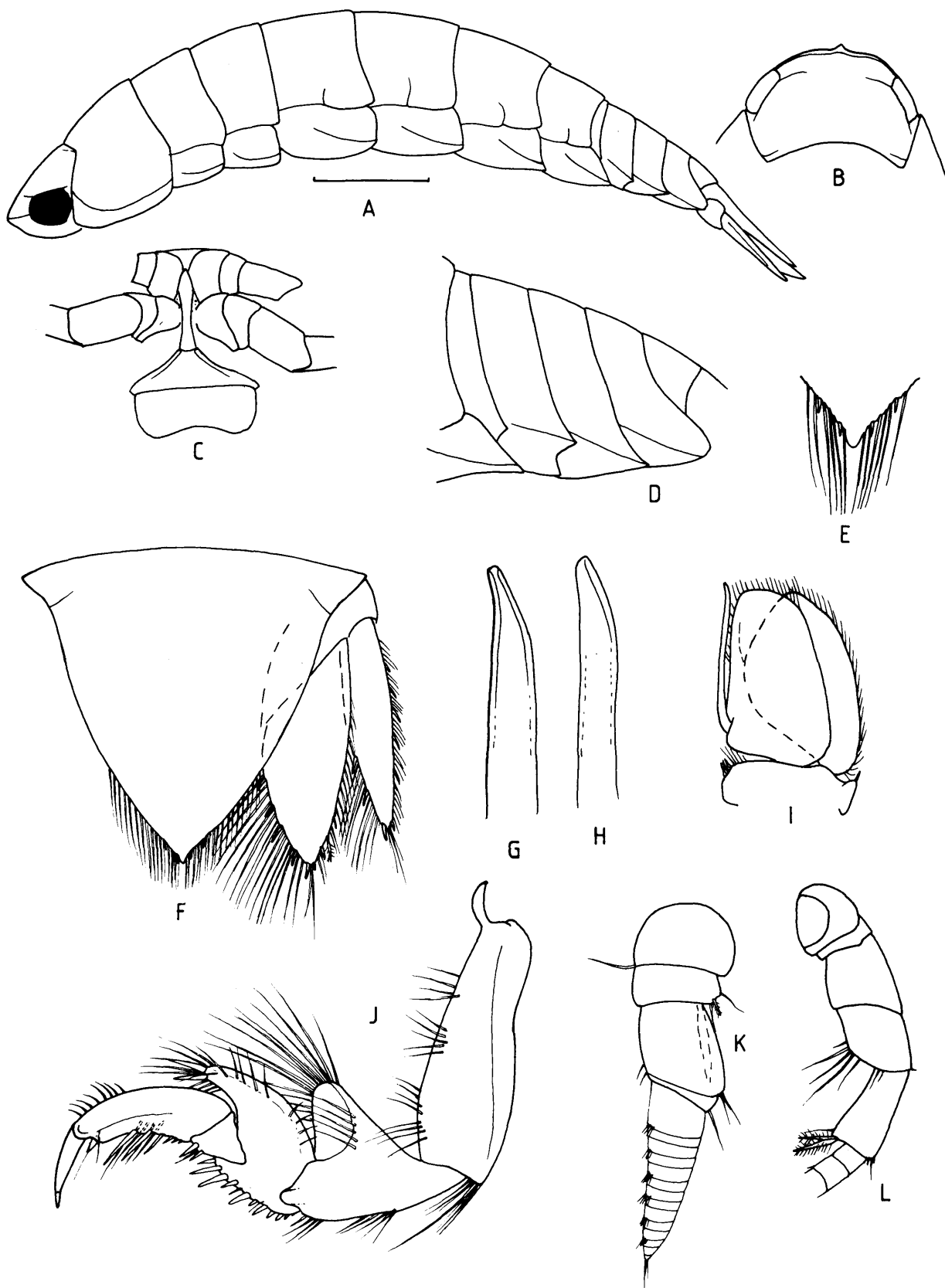


Fig. 66. *Natatolana woodjonesi*. A-D, holotype; E-G, I, male 14.5 mm; J-L, female 13.5 mm, Mordialloc, Vic. A, lateral view; B, cephalon dorsal view; C, clypeal region; D, pleon, lateral view; E, pleotelson, apex; F, pleotelson and uropod; G, appendix masculina, apex; H, appendix masculina, apex, male 14.2 mm, PPB; I, pleopod 2; J, pereopod 1; K, antennule; L, antennal peduncle. Scale 2.0 mm.

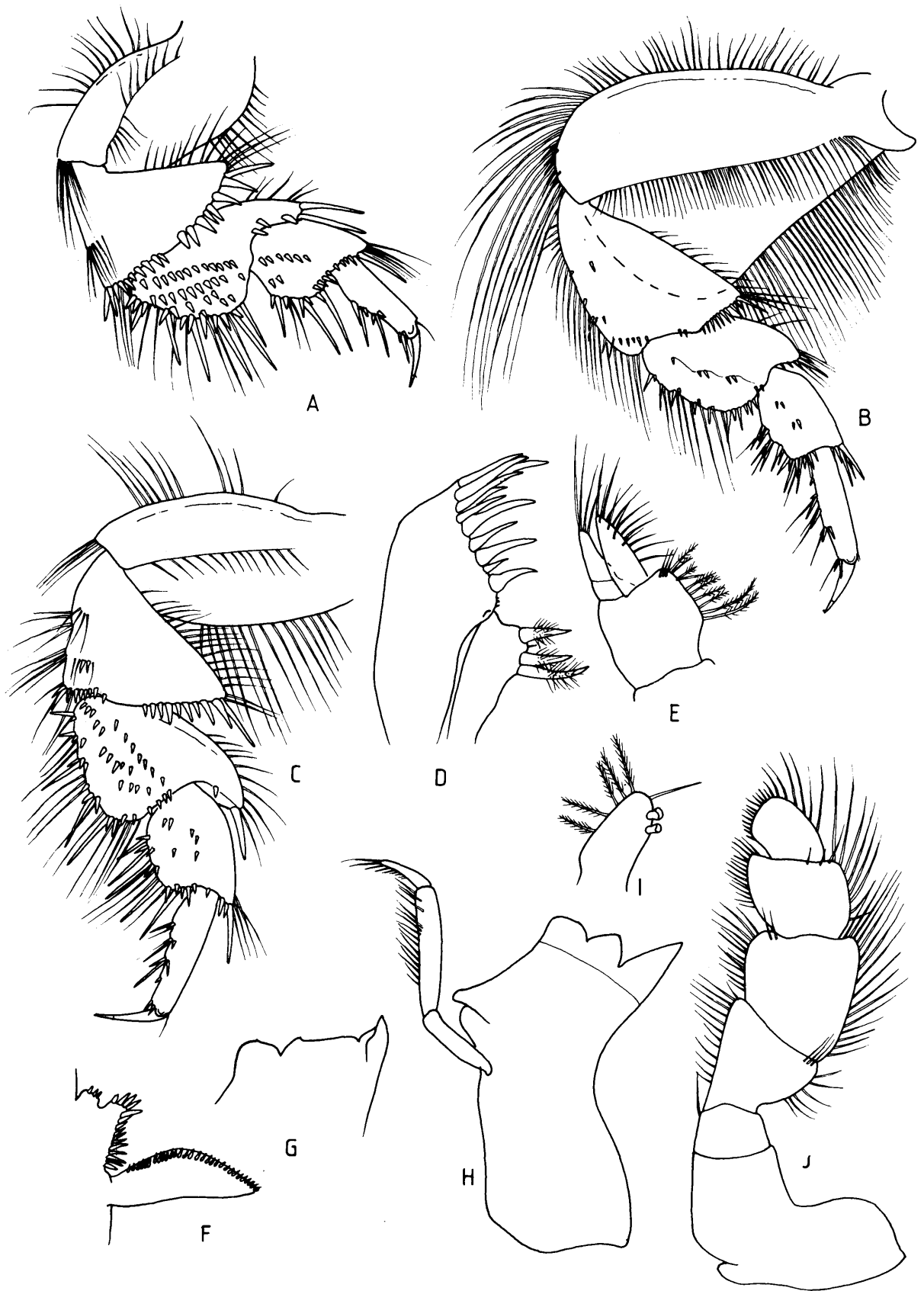


Fig. 67. *Natatolana woodjonesi*, female 13.4 mm, PPB. A, pereopod 4; B, pereopod 7; C, pereopod 5; D, maxillule; E, maxilla; F, lacinia mobilis and molar process; G, left mandible, incisor; H, right mandible; I, maxilliped endite; J, maxilliped.

Size. Largest female 19.9 mm. Hale's (1925) largest size probably referred to *N. wowine* taken from a porpoise.

Remarks. In examining collections from southern Australia, it became apparent that there existed several species that were exceedingly close in appearance to *N. woodjonesi*. All material designated as *N. woodjonesi* was examined, and most specimens proved to belong to this species. The exceptions were those specimens from North West Island, Capricorn Group (Hale, 1940), belonging to the species *N. arcicauda* and *N. bulba*, and amongst the specimens recorded by Hale (1925), those from the porpoise, and those from Portland, Tasmania, are *N. wowine*. The characters that separate *N. woodjonesi* from these other species are the shape of the posterolateral margins of pleonite 4, the arrangement and number of spines on the pleotelson, and also the shape of the pleotelson and uropods. Furthermore, the shapes of the appendix masculina for

N. woodjonesi and *N. wowine* are distinct.

Distribution. A common and widely distributed southern species, extending from off Sydney, N.S.W., in the north, south to Tasmania, and west to Gulf St. Vincent. The greatest depth from which the species has been reliably recorded is 82 metres.

Natatolana luticola (Holdich, Harrison & Bruce)

Fig. 69

Cirolana luticola Holdich, Harrison & Bruce, 1981: 569, fig. 6 (Part).

Natatolana luticola.—Bruce, 1981b: 958.

Material examined. Male (10.4 mm), holotype (QM W6339), Halifax Bay, Townsville, 26 Aug. 1976. Male (13.6 mm), female (6.9 mm), Battery Point, Thursday Island, North Qld, Apr. 1979, beam trawled over turtle grass, coll. P.C. Young. 2 males (9.5, 6.3 mm), 2 manca (6.3, 6.2 mm), Halifax Bay, Townsville, Qld, 25 May 1976–23 Nov. 1976, 10–14 m, coll. JCUNQ, 3 Bays Survey.

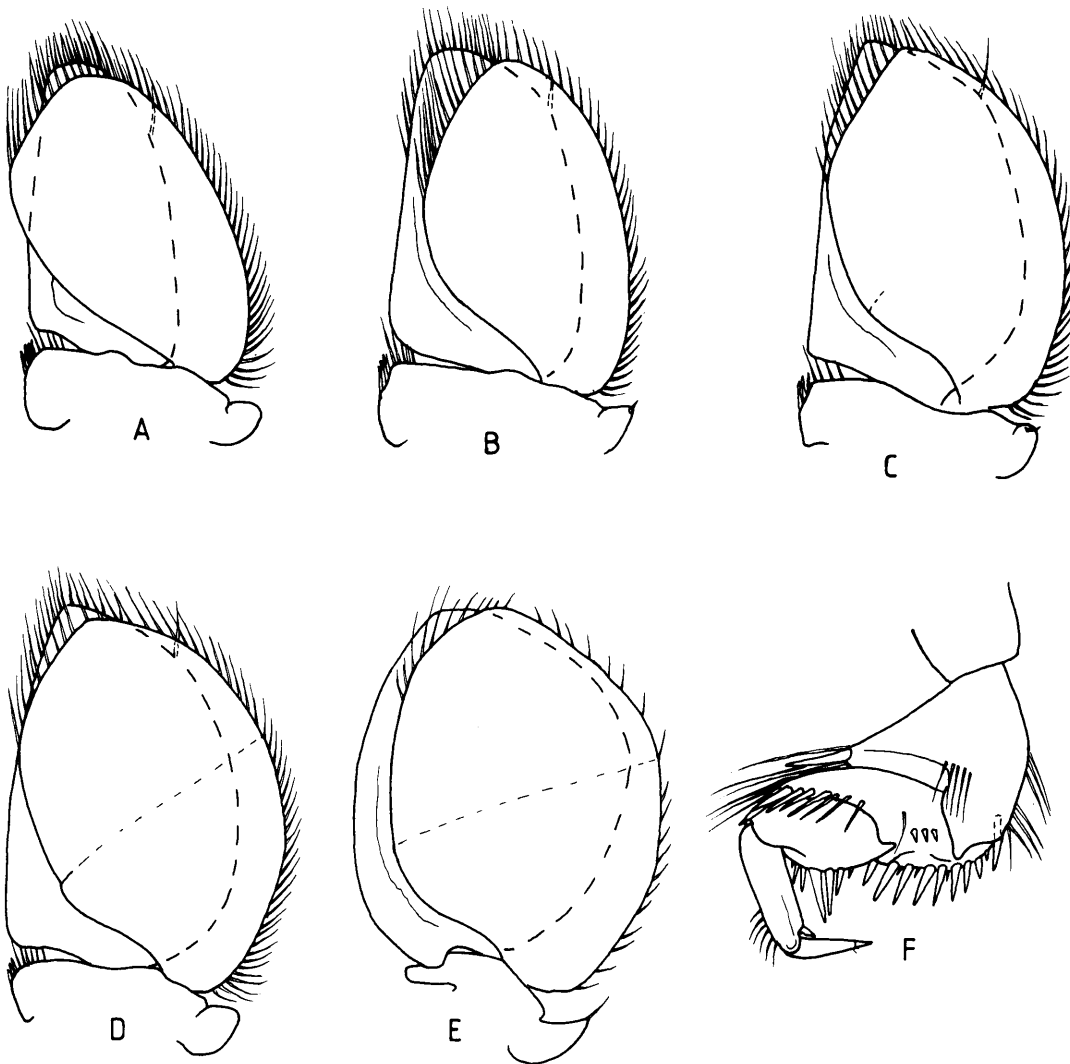


Fig. 68. *Natatolana woodjonesi*, female 13.5 mm, PPB. A-E, pleopods 1-5 respectively; F, pereopod 3.

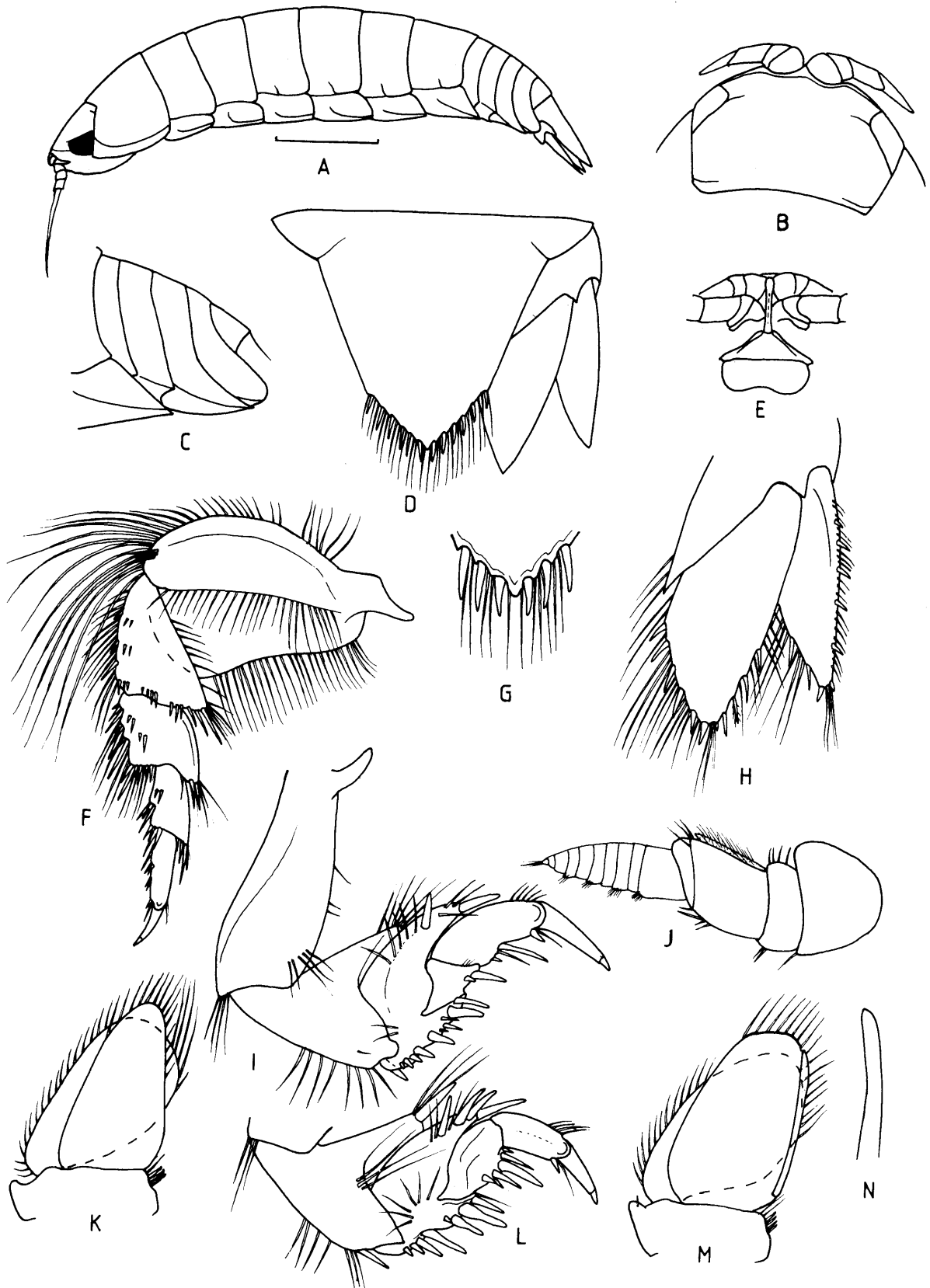


Fig. 69. *Natatolana luticola*. B, C, E, male holotype; remainder male 13.9 mm. A, lateral view; B, cephalon, dorsal view; C, pleon; D, pleotelson; E, clypeal region; F, pereopod 7; G, pleotelson, apex; H, uropod; I, pereopod 1; J, antennule; K, pleopod 1; L, pereopod 3; M, pleopod 2; N, appendix masculina apex. Scale 2.0 mm.

Types. Held by the Queensland Museum, Brisbane.

Type locality. Halifax Bay, Townsville, Qld.

Description of male. Body about 3 times as long as wide, cephalon with small median rostral point. Anterior of cephalon with submarginal furrow; interocular furrow incomplete. Pereonite 1 with horizontal furrow. Coxae each with incomplete furrow. Pleonites all visible, posterolateral margin of pleonite 3 posteriorly produced, acute; posterolateral margins of pleonite 4 rounded. Pleotelson lateral margins straight, narrowing rapidly; posterior margin distinctly angled, provided with 6 long spines on either side of apex; plumose setae present between spines.

Antennule short, peduncle article 3 little shorter than combined lengths of articles 1 and 2; flagellum shorter than peduncle, composed of about 10 articles.

Frontal lamina narrow, feebly carinate, anterior margin very slightly broader. Clypeus triangular.

Pereopod 1 with few setae on basis, ischium with setae along posterior margin and anterodistal angle; merus with 5 large and 6 small spines on posterior margin, anterior margin with 2 spines and row of setae; carpus with 2 spines at posterodistal angle, posterior margin with 2 spines and row of setae; propodus with 1 long and 1 short spine on palm, and stout spine opposing dactylus; propodus relatively short, equal to combined lengths of merus and carpus. Pereopods 2–3 similar to 1 but without spines on palm of propodus, with additional large spines on ischium, merus and carpus. Pereopod 7 basis anterior margin sinuate, posterior margin distinctly convex, all margins with setae; posterior margin of ischium and merus with spines and setae, carpus and propodus with spines only; anterodistal angles of ischium, merus and carpus with spines.

Vasa deferentia opening flush on sternite 7.

Pleopod 2 with simple appendix masculina, not extending beyond ramus. Uropods extending slightly beyond apex of pleotelson, both rami with margins very nearly straight. Exopod shorter than endopod, with 6 spines on lateral margin, 4 on medial. Endopod with 4 spines and sensory seta on lateral margin, 6 spines medial margin.

Female. Similar to male.

Colour. White to tan in alcohol. Eye tan to black.

Size. Largest specimen examined 13.6 mm.

Remarks. Examination of the type material revealed that the variation mentioned in the description (Holdich et al., 1981) was in fact due to there being two species present. None of the figures were of the holotype, and the important features of the dorsal and lateral views, the clypeal region and pereopod 7 were not of the species *N. luticola*. The other species proved to be undescribed, and is here described as *N. angula*. The differences between the species are: *N. luticola* lacks a complete interocular furrow, has a distinctly shorter propodus on pereopods 1–3, has the posterior margin of the basis of pereopod 7 distinctly convex, and has the pleotelson and

uropods far more angular and with far more robust spines.

Distribution. Thursday Island and Townsville, Qld.

Natatolana tenuistylis (Miers)

Figs 70, 71

Cirolana tenuistylis Miers, 1884: 303, pl. 33B.—Hale, 1925: 136, fig. 4; Nierstrasz, 1931: 157; Holdich, Harrison & Bruce, 1981: 572, fig. 7; Ellis, 1981: 123.

Natatolana tenuistylis.—Bruce, 1981b: 958.

Material examined. Male (17.5 mm), north-west of Molle Island, Qld, 19 Nov, 1977, 24 m, coll. F. Rowe & P. Coleman (AM P30377).

Types. Lectotype held at the BM(NH) 1882: 1.

Type locality. Prince of Wales Channel, North Queensland.

Supplementary description of male. As the type has recently been redescribed in detail (Holdich et al., 1981), only a supplementary description is given here. Cephalon with distinct rostral point, interocular furrow running from dorsal margin of each eye. Coxal furrows all incomplete, those on coxae of pereonites 6–7 not extending to posterodistal angle. Pleonite 2 with ventral part of posterolateral margin strongly produced; pleonite 3 with posterolateral margins acute, pleonite 4 with posterolateral margins rounded. Pleotelson with 10 spines on posterior margin set amongst plumose setae.

Antennule short, extending to eye, flagellum composed of about 10 articles, and shorter in length than peduncle. Antenna peduncle article 5 slightly shorter than the combined lengths of articles 3 and 4, flagellum composed of about 28 articles, extending to pereonite 4.

Frontal lamina medially constricted, anterior margin acute.

Pereopod 1 with single spine on posterior margin of carpus; propodus with 3 spines on distal half of posterior margin, 4th spine opposing dactylus; anterior margin with row of 5 setae at distal extremity; pereopods 2–3 similar but spines conspicuously longer, propodus with single spine opposing dactylus.

Pleopod 2 appendix masculina distinctly shorter than inner ramus; apex with distinct acute projection. Uropod exopod distinctly shorter than endopod, lateral margin with 6 spines, medial with 3; endopod with 4 spines on lateral margin, medial with 4.

Female. Not known.

Colour. Brown, no chromatophores.

Size. 17.5 mm.

Remarks. This species was redescribed by Holdich et al. (1981) and the specimen described here agrees closely with the description given by those authors. Two points not mentioned are the dorsal interocular furrow, and the process formed by the ventral posterolateral margin of pleonite 2. These two characters, and the shape of the appendix masculina distinguish *N. tenuistylis* from all others of the genus. The lectotype (kindly examined

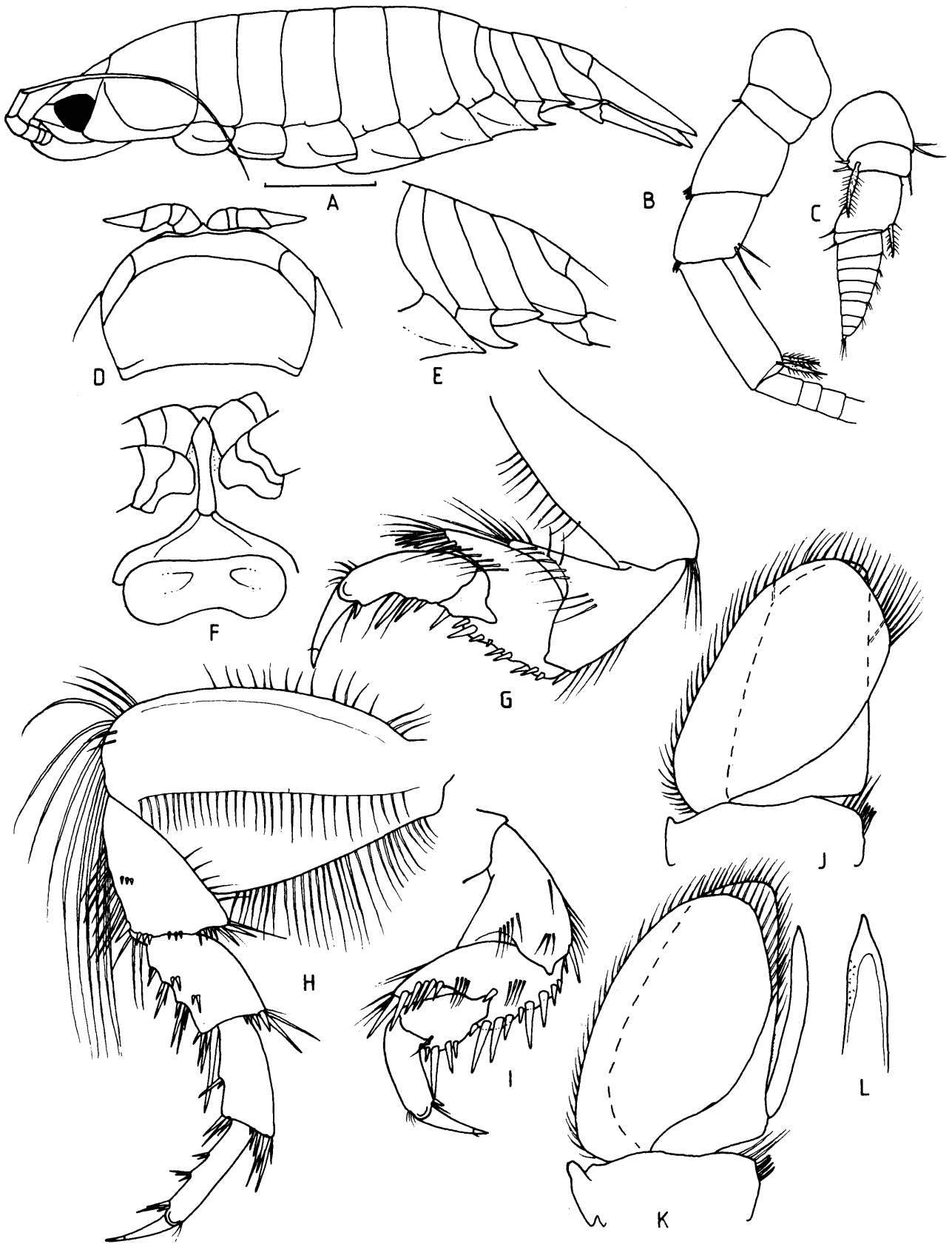


Fig. 70. *Natatolana tenuistylis*, male 17.5 mm, Molle Is. A, lateral view; B, antennal peduncle; C, antennule; D, cephalon, dorsal view; E, pleon, lateral view; F, clypeal region; G, pereopod 1; H, pereopod 7; I, pereopod 3; J, pleopod 1; K, pleopod 2; L, appendix masculina apex. Scale 3.0 mm.

by Dr R.J. Lincoln) was found to show these characters. Other points of distinction include the conspicuously large spines on the anterior pereopods and the coxal furrowing.

The specimen described here is distinctly longer than the syntype (13.9 mm), but agrees in all ways. Two other specimens, from unknown localities, were also designated as types by Miers. One of these, the specimen figured by Hale (1925), is *N. vieta* (Hale, 1925). The second specimen is too badly damaged to be recognizable, but appears likely to be *N. matong*.

Distribution. Prince of Wales Channel, Torres Strait; North Molle Island, Qld.

Natanolana variguberna (Holdich, Harrison & Bruce)

Fig. 72

Cirolana variguberna Holdich, Harrison & Bruce, 1981: 655, fig. 5.

Natanolana variguberna.—Bruce, 1981b: 958.

Material examined. 4 females (7.8–10.8 mm), Knocker Bay, Coburg Peninsula, NT, 11°18'S, 132°7.1'E, 21 June 1981, in trap over sand, 6 m, coll. A.J. Bruce. Female (9.5 mm, ovig.), Battery Point, Thursday Is., Torres Strait, Qld, Apr. 1979,

beam trawl over sea grass, coll. P.C. Young. 2 females (6.5, 7.2 mm), paratypes, Halifax Bay, Townsville, Qld, coll. P. Arnold. Female (10.7 mm), Peel Island, Moreton Bay, Qld, Sept. 1971, coll. Zoology Dept, University of Queensland.

Types. Held at the Queensland Museum.

Type locality. Halifax Bay, Townsville, Queensland.

Descriptive notes. Cephalon anterior margin distinctly recessed on both sides of acute rostral point. In all other points, the material examined agrees with the original description, and presents a constant form throughout its range.

Colour. White to tan in alcohol.

Size. Up to 10.7 mm, larger than previously recorded.

Remarks. This species is immediately recognizable by the unique shape of the uropodal endopod, with the deeply excised endopod lateral margin. Further points of distinction are the shape of the frontal lamina, the posterolateral margins of the pleonites and the shape and furrowing of the cephalon.

Distribution. Coburg Peninsula, NT; Thursday Island, Torres Strait; Townsville and Moreton Bay, Qld. Taken at depths of 2.7–15.5 metres, on various particulate substrata (Holdich et al., 1981).

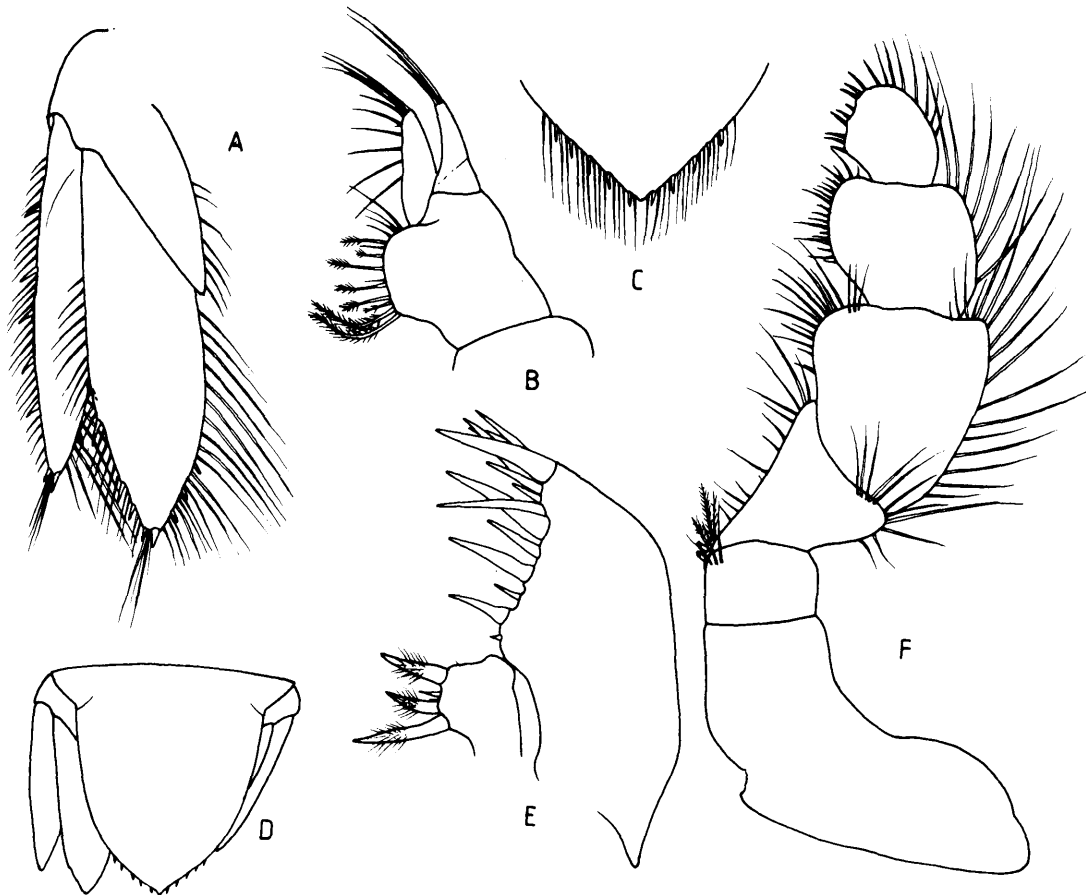


Fig. 71. *Natanolana tenuistylis*, male 17.5 mm, Molle Is. A, uropod; B, maxilla; C, pleotelson apex; D, pleotelson and uropods; E, maxillule; F, maxilliped.

Natatolana angula n. sp.

Fig. 73

Cirolana luticola Holdich, Harrison & Bruce, 1981: 569, fig. 6a-c, h, i, j (Part).

Material examined. 2 females (9.2, 10.7 mm, both ovig.), Dudley Point, Darwin, NT, 13 Nov. 1981, reef flat pools, low water, coll. NTM. Male (10.1 mm), holotype, 24 Feb. 1977, 11 m; female (8.7 mm), 23 Nov. 1976, sand, ca. 4.5 m; female (9.6 mm), manca (5.9 mm), 24 Nov. 1976, muddy sand, 10 m, all from Halifax Bay, Townsville, Qld, coll. JCUNQ. Female (7.9 mm), (allotype of *C. luticola*), Cleveland Bay, Townsville, Qld, 26 Oct. 1974, particulate substrata, 11 m. Male (9.5 mm), 2 females (13.0, 13.5 mm), manca (5.0 mm), Calliope River, Gladstone, Qld, 1975; male (5.3 mm), 2 females (11.3, 6.3 mm), Port Curtis, Gladstone, Qld, 1975, dredged; male (6.8 mm), Port Curtis, Gladstone, Qld, 4 Dec. 1975, dive sample, 7 m, all coll. P. Saenger & J. Moverly.

Types. Holotype, male, QM W9795. Paratypes, QM W9797-W9800; AM P32380; USNM 190721; NTM Cr000237.

Type locality. Halifax Bay, Townsville, Qld, 19°08'S, 146°19'E.

Description of male. Body about 3 times as long as wide. Cephalon with median rostral point, interocular furrow entire, anterior submarginal furrow present. Pereonite 1 with single horizontal furrow. Coxae with furrows on coxae 2, 3 and 7 nearly entire, those of coxae 4-6 incomplete. Pleonite 1 almost entirely concealed by pereonite 7, posterolateral margins of pleonite 4 rounded, slight incision on ventral margin where furrow meets edge of pleonite. Pleotelson with lateral margin convex, converging smoothly to apex; posterior margin with 12 spines, plumose setae set between spines.

Antennule short, peduncle article 3 shorter than combined lengths of articles 1 and 2; flagellum composed of 10 articles, extending to posterior of eye.

Antenna with flagellum extending to pereonite 2.

Frontal lamina narrow, medially constricted, anterior margin forming point, ventral surface feebly carinate. Clypeus triangular. Maxilliped endite with 2 coupling hooks.

Pereopod 1 with scattered setae on posterior margin of basis, anterodistal angle with group of setae; ischium with anterodistal angle setose, posterodistal angle with single spine; merus with 2 spines; carpus short, posterodistal angle with single spine and seta; propodus with proximal half of palm with 3 spines, and stout serrate spine opposing dactylus. Pereopods 2-3 similar to 1, but carpus longer and with several spines, posterior margin of ischium with fewer, but more robust spines; palm of propodus without spines. Pereopod 7 basis anterior margin feebly sinuate, posterior margin straight; anterior margins of ischium, merus and carpus with group of spines and setae at distal angles; posterior margins of ischium, merus and carpus with spines and setae; propodus with 2 groups of spines on posterior margin.

Vasa deferentia opening flush on sternite 7.

Pleopod 2 appendix masculina with basal half broader, distinctly shorter than ramus. Uropods extending slightly beyond apex of pleotelson, margins slightly convex except lateral margin of endopod which is very nearly straight. Endopod with 6 spines on medial margin, 6 on lateral. All margins fringed with setae.

Female. Similar to male.

Colour. Tan in alcohol. Eyes dark brown or black.

Size. Largest specimen 13.5 mm.

Remarks. Examination of the types of *N. luticola* revealed that the designated holotype and allotype could not be considered one species, there being numerous

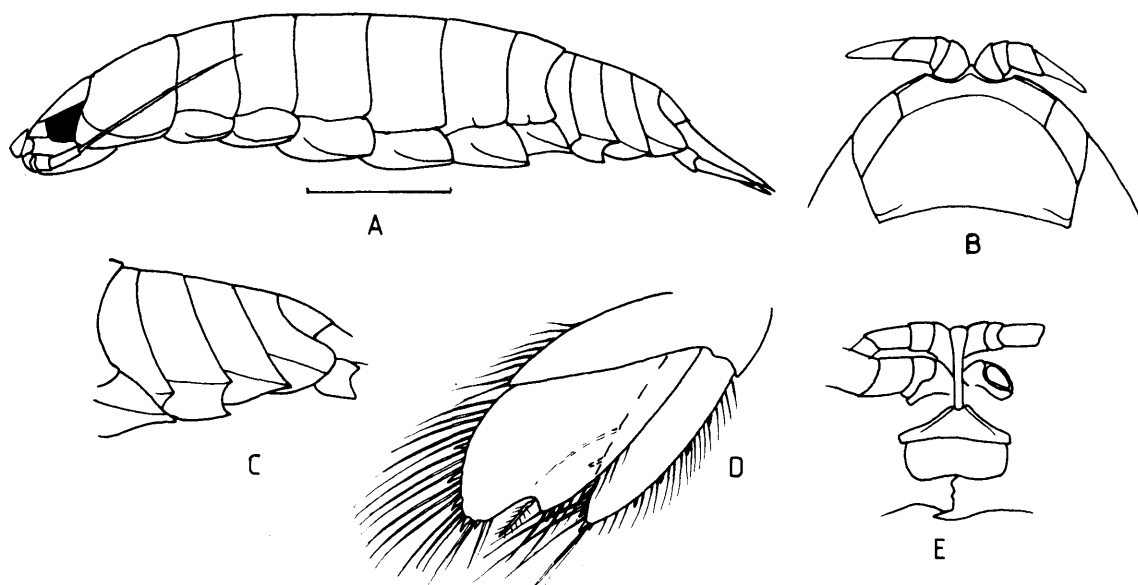


Fig. 72. *Natatolana variguberna*, female, Moreton Bay. A, lateral view; B, cephalon, dorsal view; C, pleon, lateral view; D, uropod; E, clypeal region. Scale 2.0 mm.

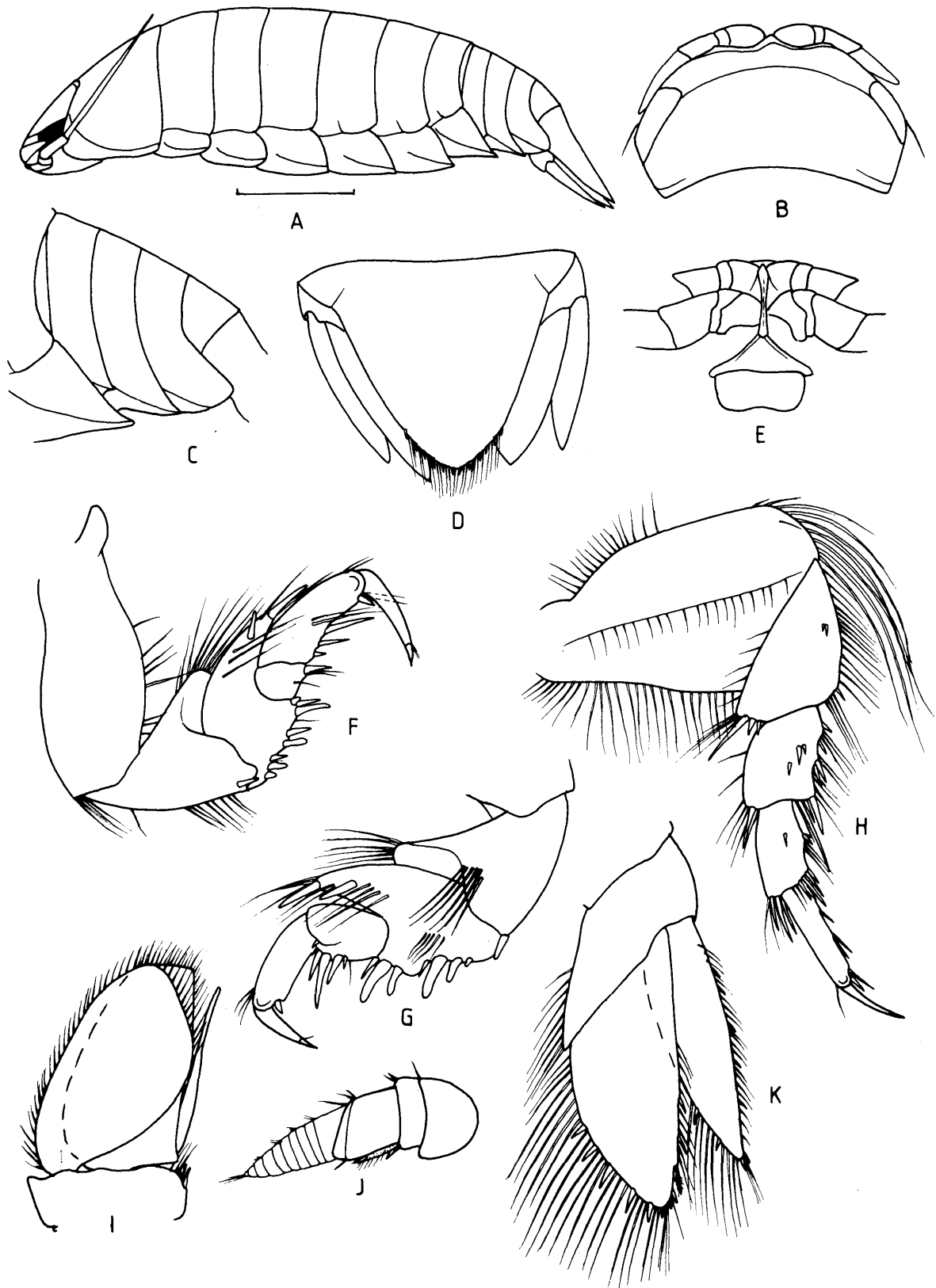


Fig. 73. *Natatolana angula* n. sp. A-E, H, I, holotype; F, G, J, K, male paratype. A, lateral view; B, cephalon, dorsal view; C, pleon, lateral view; D, pleotelson and uropods; E, clypeal region; F, pereopod 1; G, pereopod 2; H, pereopod 7; I, pleopod 2; J, antennule; K, uropod. Scale 3.0 mm.

points of distinction. These differences are the furrowing of the cephalon, shape of the frontal lamina, form of the pleotelson and uropods, shape of the basis of pereopod 7, and differences in the anterior 3 pereopods. In *N. luticola* the propodus is noticeably shorter than the present species. *Natatolana wullunya* from off Sydney is similar, and is best distinguished by having only 6 spines on the pleotelson and an incomplete interocular furrow.

Distribution. Halifax Bay, Townsville, and mouth of the Calliope River at Gladstone, Qld, at depths to 11 metres. Darwin, NT.

Etymology. The specific name is derived from the Latin word *angulus* which means bay or gulf, and refers to the place of capture of the specimens.

Natatolana arrama n. sp.

Fig. 74

Material examined. Female (11.1 mm), South of Portland, Vic., 38°52'S, 141°50'E, 26 June 1962, 77 m, coll. CSIRO. Female (12.6 mm, damaged), south-east of Eucla, SA, Australian Bight, 32°42'S, 131°27'E, 4 July 1962, 77 m, coll. CSIRO.

Types. Holotype, female, (11.1 mm) AM P30363. Paratype, AM P30362.

Type locality. South of Portland, Vic., 38°52'S, 141°50'E.

Description of female. Body about 3 times as long as wide. Cephalon anterior margin with small rostral point and submarginal interocular furrow; each eye with short furrow extending medially. Eyes rectangular, not narrower in front. Pereonite 2 with single longitudinal furrow; coxae of pereonites 2-7 each with incomplete furrow; those of pereonite 7 very nearly entire. Pleonites all visible, posterolateral margins of pleonite 3 acute, 4 rounded. Pleotelson as long as broad, converging smoothly to small point on either side of which lie 2 spines and marginal setae.

Antennule short, not extending beyond eye; peduncle article 3 longer than combined lengths of articles 1 and 2, little shorter than flagellum, which has about 11 articles. Antenna with 2 stiff setae on posterior margin of peduncle article 4, peduncle article 5 with 2 simple and 2 sensory setae; flagellum composed of about 14 articles.

Frontal lamina narrow, not dilated anteriorly, clypeus with central half strongly produced. Maxilliped endite with 2 coupling hooks.

Pereopod 1 with anterior margins of ischium provided with setae, merus with terminal spine and row of stiff setae; posterior margin of ischium with 2 short spines, and conspicuous spine at posterodistal angle; posterior margin of merus with 11 marginal and 5 submarginal spines; carpus with 2 setae and single spine; propodus with row of 8 setae on anterodistal margin, palm with 3 acute spines and serrate robust spine opposing dactylus. Pereopods 2-3 similar to 1 but anterior margin of merus with 5 stout spines; posterior margin of carpus with 5 long and 4 short spines; propodus with only single serrate spine opposing dactylus. Pereopod 7 basis with

continuous fringe of setae on both anterior and posterior margins, both of which are strongly convex; setae on posterodistal margin not as long nor as abundant as in most species of genus; ischium and merus broad; posterior margins of ischium, merus, carpus and propodus with abundant marginal and submarginal spines; anterior margins with spines and setae at distal angles only. Pereopod 6 very similar to 7.

Uropods extending slightly beyond telson, both rami lanceolate. Endopod slightly shorter than exopod, lateral margin without spines except for small terminal spine, medial margin with 3 spines; both margins with setae. Endopod with 2 spines, sensory seta and marginal setae on lateral margin, medial margin with 5 spines set amongst marginal setae.

Male. Not known.

Colour. Brown in alcohol.

Size. Up to 12.6 mm.

Remarks. This species belongs to the *N. woodjonesi* complex of species and can easily be separated from others of the assemblage by having the posterior margin of the basis of pereopods 6 and 7 strongly convex, by having shorter and fewer natatory setae on these pereopods, and by the lateral margin of the uropodal exopod being without spines. The spination of the anterior pereopods, the shape of the clypeus and frontal lamina, and the length of the peduncular articles of the antennule also serve to distinguish this species.

Distribution. Bass Strait, and off Portland and Eucla, SA.

Etymology. The epithet is the Aboriginal word *arrama*, and means louse.

Natatolana bulba n. sp.

Fig. 75

Part *Cirolana woodjonesi*.—Hale, 1940: 288 [mis-identification, not *N. woodjonesi* (Hale, 1924)].

Material examined. Male (9.5 mm), 8 females (6.9-12.9 mm), off North West Island, Capricorn Group, Qld, 9 Dec. 1919, brought up on bait while line fishing, 40 m.

Types. Holotype, male, AM P32174. Paratypes AM E4843.

Type locality. North West Island, Capricorn Group, Southern Great Barrier Reef, Qld, 23°17.5'S, 151°42.0'E.

Description of male. Body about 3 times as long as wide. Cephalon with rostral point, 2 furrows running from dorsal anterior margin of each eye, another furrow runs posterior to anterior margin. Pereonite 1 with single horizontal furrow. Coxae of pereonites 2-7 with partial furrows. Pleonites all visible; posterolateral margins of pleonites 2-4 with horizontal furrows; posterolateral margins of pleonite 3 not strongly produced, those of pleonite 4 acute. Pleotelson about as long as greatest width, shield shaped, lateral margins converging smoothly to small produced tip, on either side of which lie 2 spines set amongst marginal setae.

Antennule short, peduncle article 3 shorter than combined lengths of articles 1 and 2; flagellum shorter

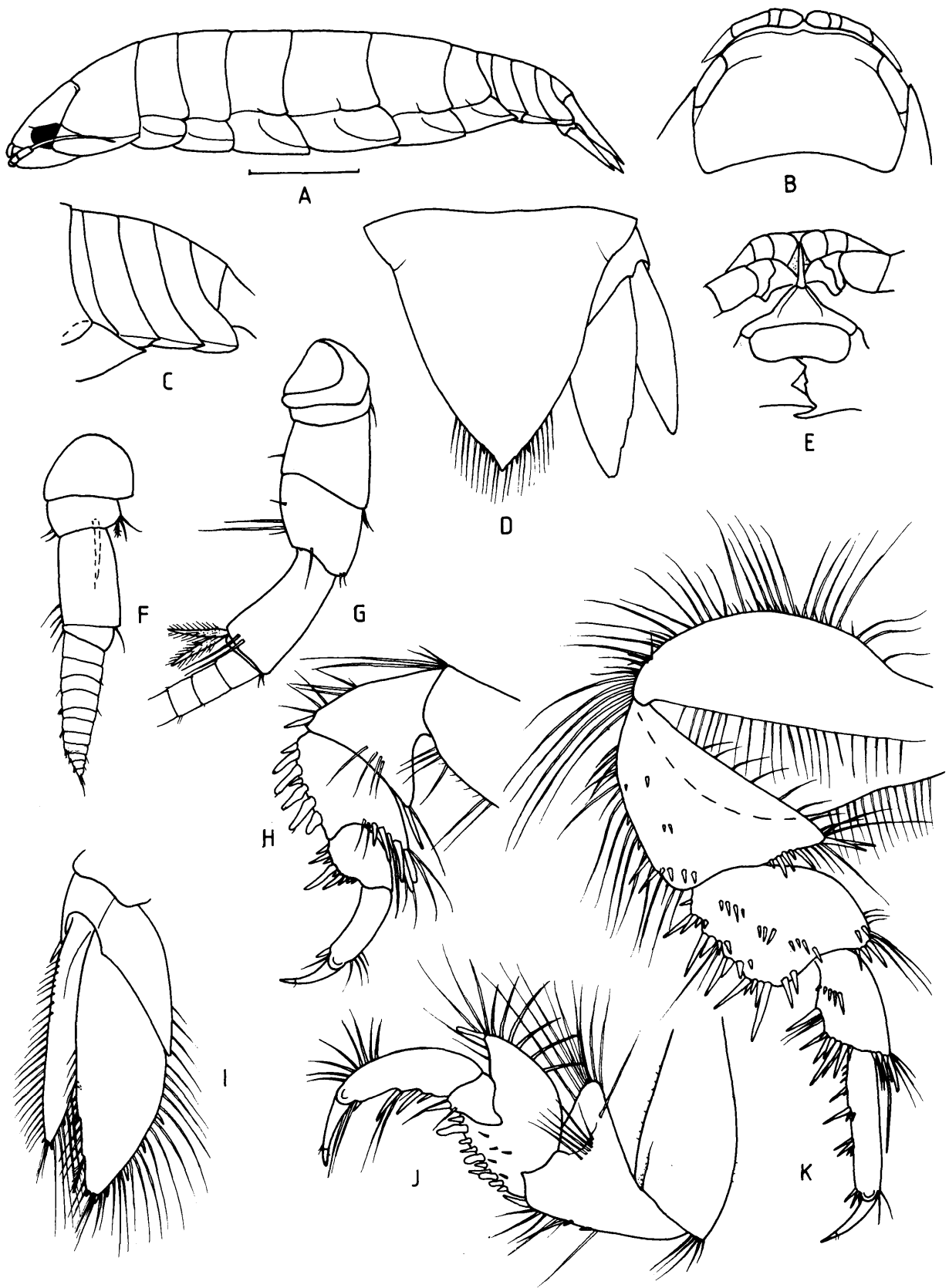


Fig. 74. *Natatolana arrama* n. sp. A-E, holotype; remainder paratype. A, lateral view; B, cephalon, dorsal view; C, pleon, lateral view; D, pleotelson and uropod; E, clypeal region; F, antennule; G, antennal peduncle; H, pereopod 3; I, uropod; J, pereopod 1; K, pereopod 7. Scale 2.0 mm.

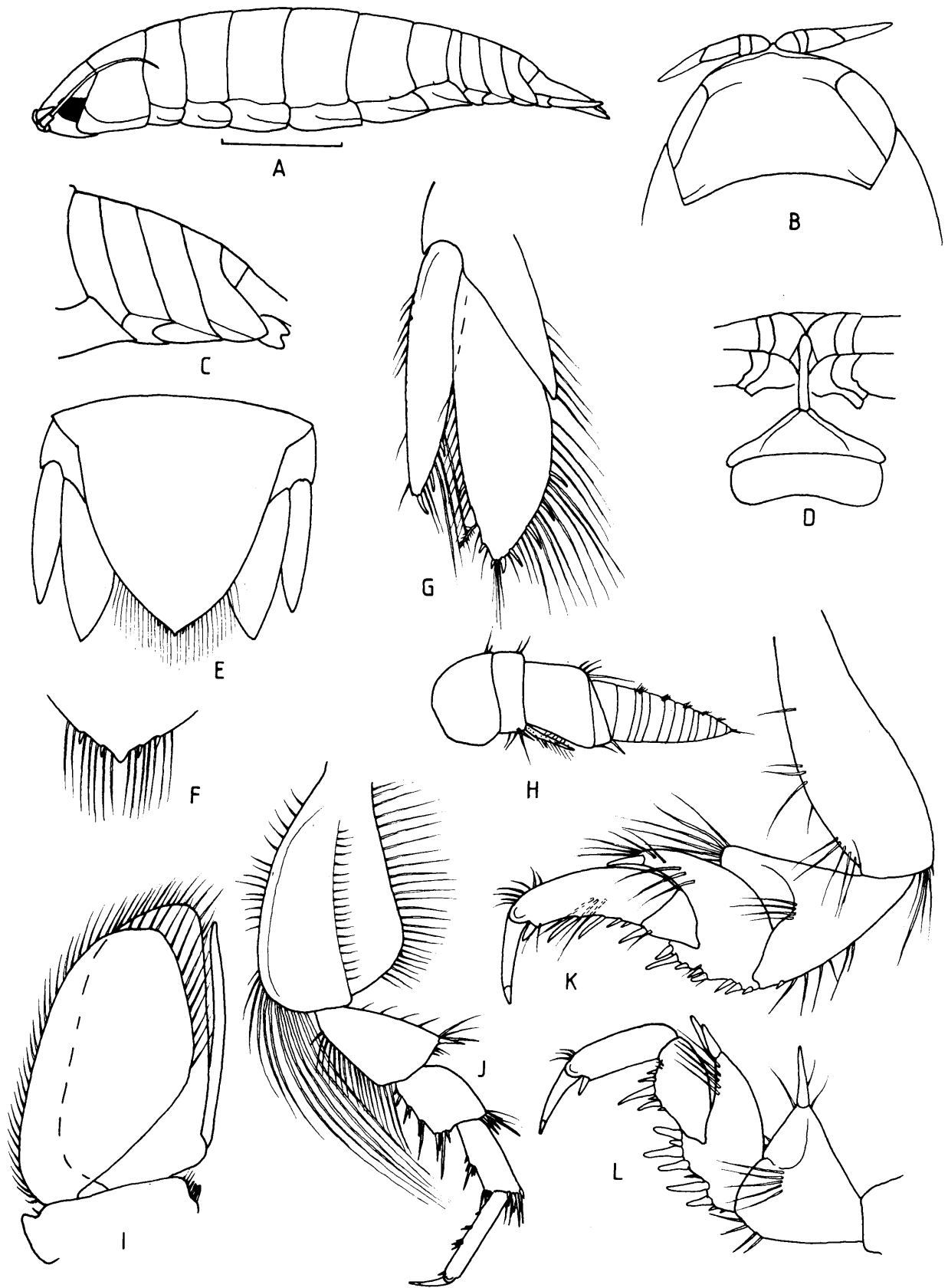


Fig. 75. *Natatolana bulba* n. sp. A-D, I, holotype; E-H, J-L, female paratype 12.9 mm. A, lateral view; B, cephalon, dorsal view; C, pleon, lateral view; D, clypeal region; E, pleotelson and uropods; F, pleotelson, apex; G, uropod; H, antennule; I, pleopod 2; J, pereopod 7; K, pereopod 1; L, pereopod 3. Scale 2.0 mm.

than peduncle, composed of about 14 articles, not reaching pereonite 1. Antenna flagellum extending to pereonite 3.

Frontal lamina narrow, anterior slightly swollen, anterior margin rounded; clypeus triangular.

Pereopod 1 with few setae on anterior margin and at posterodistal angle of basis; ischium with marginal setae and single spine on posterior margin, anterior margin produced, with long setae; merus with posterior margin sinuate, armed with 8 spines, anterior margin with single spine at distal angle, setae on lateral margin; carpus with single seta and spine at posterodistal angle; propodus with 4 spines on palm, distal pair longest, and 5th spine opposing dactylus, anterodistal margin with row of about 7 setae. Pereopods 2–3 similar to pereopod 1, but spines on posterior margin of merus much larger, and additional spine present on anterior margin; merus with 6 spines on posterior margin, 2 of which are large; posterior margin of propodus only with spine opposing dactylus. Pereopods 5–7 similar, 6 longer than 7. Pereopod 7 basis with marginal setae along anterior and posterior margins; anterior margin of ischium with few setae, posterior margin of merus, carpus and propodus without setae, with spines at anterodistal angles of ischium; posterior margins without seta except for ischium, group of spines present, and at distal angles.

Vasa deferentia opening flush with surface of sternite 7.

Pleopod 2 appendix masculina arising sub-basally, apex slightly turned out, not extending beyond inner ramus. Uropods extending slightly beyond apex of pleotelson, rami lanceolate in shape. Exopod shorter than endopod, lateral margin entirely without spines, except for small apical spine, medial margin with 3 spines; both margins setose. Endopod with 3 spines on lateral margin, 5 on medial, both sides with marginal setae.

Female. Similar to male, reaching slightly larger size.

Colour. Brown in alcohol.

Size. Females up to 12.9 mm, male specimen 9.5 mm.

Remarks. This species was identified as *Cirolana woodjonesi* by Hale (1940). In fact, amongst Hale's specimens from North West Island are two species, neither of which are *N. woodjonesi*. *Natolana bulba* can be separated from all but one of the *N. woodjonesi* group by its lack of spines on the outer margin of the exopod. Although the specimens are in a rather poor state, examination showed this to be true for all of them. The other species that has this character, *N. arrama*, can be distinguished by having a narrow frontal lamina and far more convex margins to the basis of pereopod 7 than *N. bulba*.

Distribution. North West Island, Capricorn Group, southern Great Barrier Reef.

Etymology. *Bulba* is an Aboriginal word meaning island.

Natolana kahiba n. sp.

Fig. 76

Material examined. 2 females (8.8, 8.2 mm), off Cape Byron, NSW, 29°57'S, 153°24'E, 11 Nov. 1951, *Galathea* Stn 545, muddy sand, 75 m.

Types. Holotype, female (8.2 mm) ZMUC. Paratype, AM P32175.

Type locality. Off Cape Byron, NSW, 29°57'S, 153°24'E.

Description of female. Body about 2.5 times as long as wide. Cephalon with minute rostral point, with furrows extending from anterodorsal angle of each eye, another running just posterior to anterior margin. Pereonite 1 with single horizontal furrow. Coxae of pereonites 2–7 with incomplete oblique furrows; posterior margins of coxae 2–5 distinctly rounded. Pleonites all visible, posterolateral margins of pleonite 3 only slightly produced, those of pleonite 4 rounded. Pleotelson slightly shorter than long, shield shaped; posterior margin setose, with small medial point on either side of which lie 2 spines.

Antennule and antenna not differing significantly from *N. woodjonesi*.

Frontal lamina medially constricted, anterior margin acute. Clypeus triangular, posterior margin very slightly raised.

Pereopod 1 with few setae on basis; ischium with setae along distal half of posterior margin and along anterodistal margin; merus with single spine on anterodistal extremity, posterior margin with 12 spines; carpus with single spine and seta on posterior margin; propodus with 4 acute spines (2 long, 2 short) on palm, serrate spine opposing dactylus, anterior margin with row of 8 setae on distal extremity. Pereopods 2–3 similar to 1, but carpus longer; merus and carpus far more spinose, spines larger; propodus of pereopod 2 with 2 spines on palm, pereopod 3 with 1. Pereopod 7 with basis similar to *N. woodjonesi*, but anterior margin less sinuate; anterior margins of ischium, merus, carpus and propodus without setae, except at distal angles; posterior margin of ischium and merus with setae and spines, merus and carpus with clusters of spines, but few setae.

Uropods extending slightly beyond apex of telson, rami with slightly convex margins. Exopod distinctly shorter than endopod, both margins with continuous row of setae and 3 spines. Endopod with 3 spines and sensory setae on lateral margin, medial margin with 5 spines.

Male. Not known.

Colour. Cream in alcohol.

Size. 8.8 mm.

Remarks. The characters that separate *N. kahiba* from *N. woodjonesi* are the less acutely narrowed pleotelson, the rounder coxal plates, and the frontal lamina having a more acute anterior margin. The appendages differ in that the anterodistal extremity of the merus of pereopod 1 bears 1 spine (2 in *N. woodjonesi*), the palms of pereopods 2–3 have 2 spines

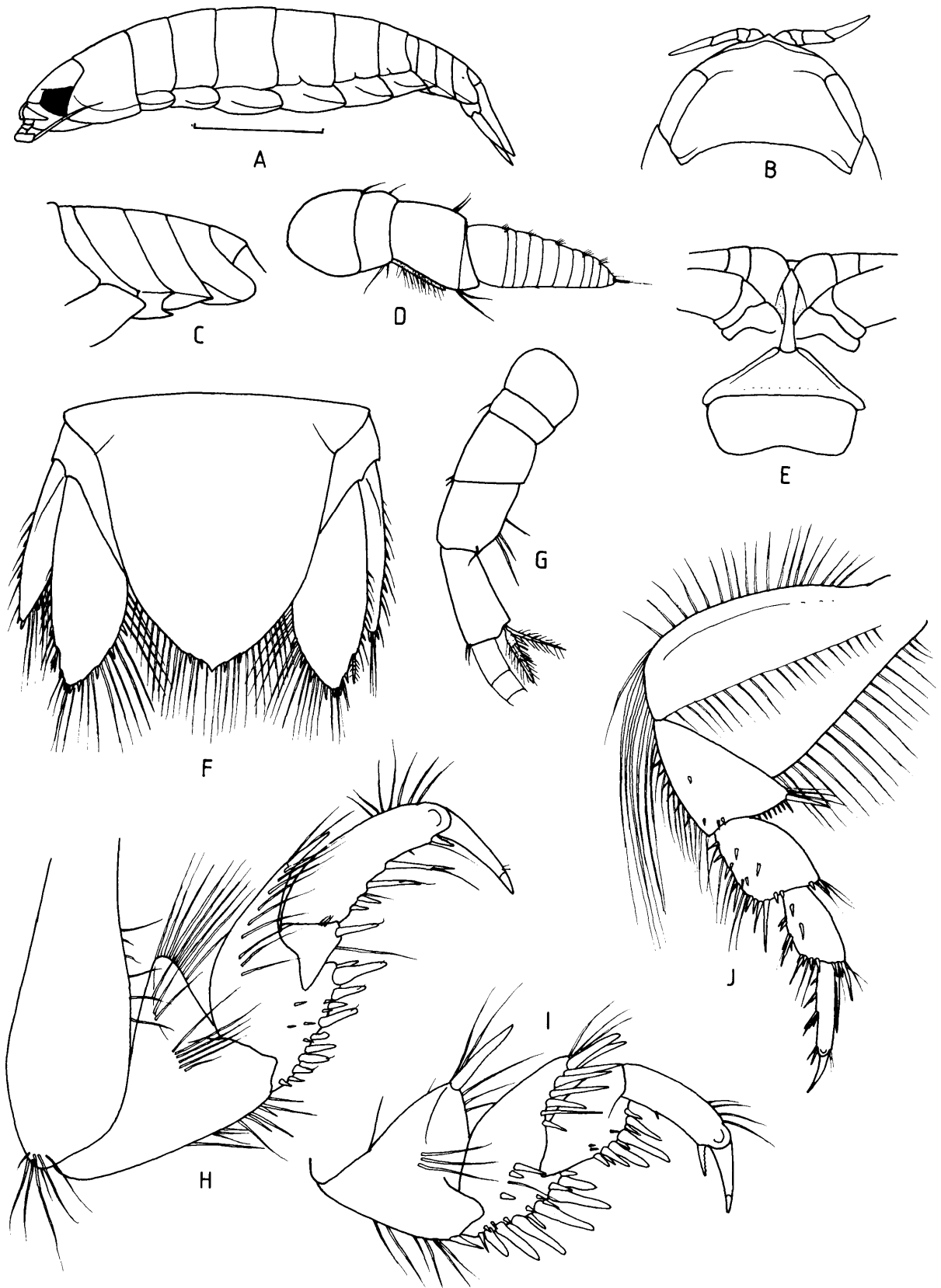


Fig. 76. *Natatolana kahiba* n. sp. A-C, E, F, holotype; remainder paratype. A, lateral view; B, cephalon, dorsal view; C, pleon, lateral view; D, antennule; E, clypeal region; F, pleotelson and uropods; G, antennal peduncle; H, pereopod 1; I, pereopod 3; J, pereopod 7. Scale 2.0 mm.

and 1 spine each (without spines in *N. woodjonesi*) and the spines are more robust. Pereopod 7 differs in having the anterior margin less sinuate than in *N. woodjonesi*. The uropods differ in having a shorter exopod, and in having fewer spines.

Distribution. Known only from the type locality.

Etymology. *Kahiba* is an Aboriginal word meaning eager.

Natatolana nammuldi n. sp.

Figs 77, 78

Material examined. Crib Point, Western Port, Vic., CPBS Stns: 21N, 4 manca (5.0, 6.0, 6.5, 6.9 mm); 22N, 2 females (20.2 ovig., 21.8 mm); 300/865, female (15.5 mm); 300/1270, female (12.6 mm); 31N/1, female (13.6 mm); 31N/770, female (17.9 mm); 31N/867, female (24.5 mm); 31S, 2 female (19.9, 18.5 mm); 32N, 4 manca (5.0, 6.9, 6.9, 7.0 mm).

Types. Holotype, female (20.2 mm) NMV J1718. Paratypes NMV J1719-J1722, J1753; AM P32363-P32365; USNM 190722.

Type locality. Western Port, Vic., 38°27'S, 145°14'E.

Description of female. Body about 3 times as long as wide, sides subparallel. Cephalon with small median rostral point; impressed line behind anterior margin, 2 further lines run from dorsal surface of each eye. Pereonites 1, 5 and 6 subequal in length and longer than pereonites 2-4 and 7; pereonite 1 with lateral impressed lines, the lower of which runs entire length of segment; pereonites 2-7 with short impressed line running from centre of each segment. Coxae each with impressed line, running 0.75 length of coxae; coxae extending beyond posterior border of pereonite except for pereonites 6-7. Pleonites all visible; posterolateral margins of pleonites 2-4 with impressed line; lateral margins of pleonite 4 produced posteriorly, dorsal side of projection gently rounded, ventral side nearly straight. Pleotelson narrows smoothly to point, on either side of which lie 4 spines, set amongst fringing setae.

Antennule short, extending posteriorly to middle of eye, peduncle article 2 shortest, article 3 as long as combined lengths of articles 1 and 2; article 2 with large sensory seta; flagellum of about 12 articles, provided with numerous aesthetascs. Antenna peduncle article 5 little longer than article 3-4, posterior margin of article 4 with 3 setae; posterodistal margin of article 5 with 2 large sensory setae; flagellum extends to posterior of pereonite 2 composed of about 23 articles.

Frontal lamina medially constricted, widening anteriorly, forming gently rounded point. Maxilliped endite with 2-3 coupling hooks.

Pereopod 1 basis with group of setae on posterodistal angle, setae along anterior margin; ischium anterodistal margin without spines; merus with 6 blunt and 3 small acute spines on posterior margin and single robust spine at anterodistal angle; carpus with 2 spines on posterior margin; propodus with setae on anterodistal margin, palm with 4 long acute spines and distal serrate spine opposing dactylus, further groups of stiff setae lie

submarginally on lateral surface. Pereopods 2-3 similar to 1, but increasingly spinose; carpus becomes progressively longer, palm of propodus without spines. Pereopod 4 with ischium, merus and carpus armed with numerous stout spines, propodus with spines on posterior margin. Pereopod 6 longer than 5 and 7. Pereopod 7 basis greatly expanded; anterior margin with proximal two thirds slightly concave, entire length of margin with plumose setae; lateral surface with medial row of setae; posterior margin with short setae, except distal angle which has long plumose setae; posterior margins of ischium and merus with spines and setae, anterior margins with setae only; distal angles of ischium, merus and carpus with groups of spines, propodus with 2 groups of spines on posterior margin, and third group opposing dactylus.

Uropods extend very slightly beyond telson apex. Exopod narrow, slightly shorter than endopod, lateral margin very slightly concave, provided with 5 spines set amongst continuous fringe of setae, medial margin with 3 spines and continuous fringe of setae. Endopod lateral margin with setae extending distal two thirds of its length, armed with 4 spines and sensory seta, medial margin slightly convex, with 6 spines set amongst marginal setae. Ventrolateral angle of peduncle with 2 stout spines.

Male. Not known.

Colour. Preserved specimens are deep salmon or pale tan.

Size. Largest specimen 24.5 mm, largest manca 7.0 mm.

Remarks. *Natatolana nammuldi* is distinguished from *N. woodjonesi* by having more acute uropodal rami, a longer uropodal exopod, less acute posterolateral margins of pleonite 4, and by having 8 marginal spines on the pleotelson (not 4 as in *N. woodjonesi*). *Natatolana wowine* is also very similar, but the present species can be separated by the far more acute telson and uropods and by the difference in shape of the lateral margins of pleonite 4, which in *N. wowine* are broadly rounded.

Distribution. Known only from Western Port, Vic.

Etymology. *Nammuldi* is an Aboriginal word meaning hidden, and alludes to the fact that this species was "hidden" within *N. woodjonesi*.

Natatolana thalme n. sp.

Figs 79, 80

Material examined. Series of specimens, all labelled 'Middle Banks, Moreton Bay, South East Queensland, coll. S. Cook & S. Newlands', collected between Mar. 1972 and Jan. 1976, comprising 10 males (5.0-6.9 mm), 20 females (5.5-9.5 mm) and 21 manca (2.0-6.0 mm). No other data.

Types. Holotype, male QM W6292. Paratypes, QM W6288, W6291-W6293, W9848-W9852; AM P32382.

Type locality. Middle Banks, Moreton Bay, Qld, 27°06'S, 153°16'E.

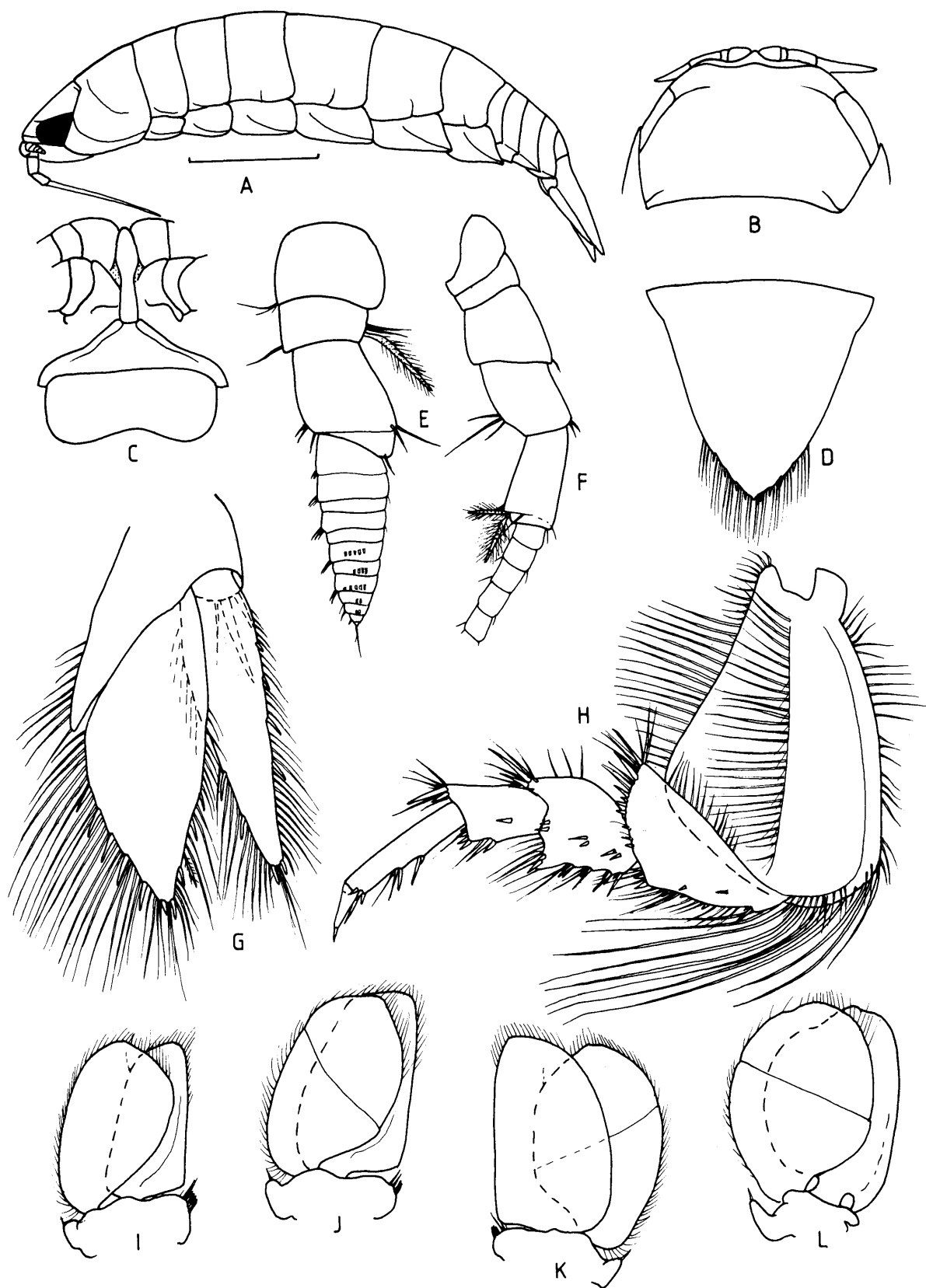


Fig. 77. *Natatolana nammuldi* n. sp. A-D, female holotype 20.2 mm; E-L, female paratype 19.9 mm. A, lateral view; B, cephalon, dorsal view; C, clypeal region; D, pleotelson; E, antennule; F, antennal peduncle; G, uropod; H, pereopod 7; I, pleopod 1; J, pleopod 3; K, pleopod 4; L, pleopod 5. Scale 4.0 mm.

Description of male. Body about 3 times as long as wide. Cephalon with small rostral point, anterior margin with interocular furrow, additional furrow extends from top of each eye. Eye large, narrower anteriorly. Pereonite 1 with 2 longitudinal furrows. Coxae of pereonites 2-7 each with partial diagonal furrow. Pleonite 3 with posterolateral margins acute, those of pleonite 4 rounded. Pleotelson slightly longer than greatest width, apex produced to small point on either side of which lie 2 spines, and marginal plumose setae.

Antennule short, extending to mid point of eye, flagellum slightly shorter than peduncle; peduncle article

2 with large sensory plumose seta set at distoventral angle. Antenna extending to posterior of pereonite 2, flagellum composed of about 20 articles; peduncle article 5 with 2 large sensory setae set at distoventral angle.

Frontal lamina narrow, about 4.5 times as long as greatest width, constricted about two thirds of way along its length, anterior margin bluntly rounded; clypeus triangular.

Pereopod 1 with group of setae at posterodistal angle of basis, scattered setae along anterior margin; ischium with stiff setae on distal half of posterior margin,

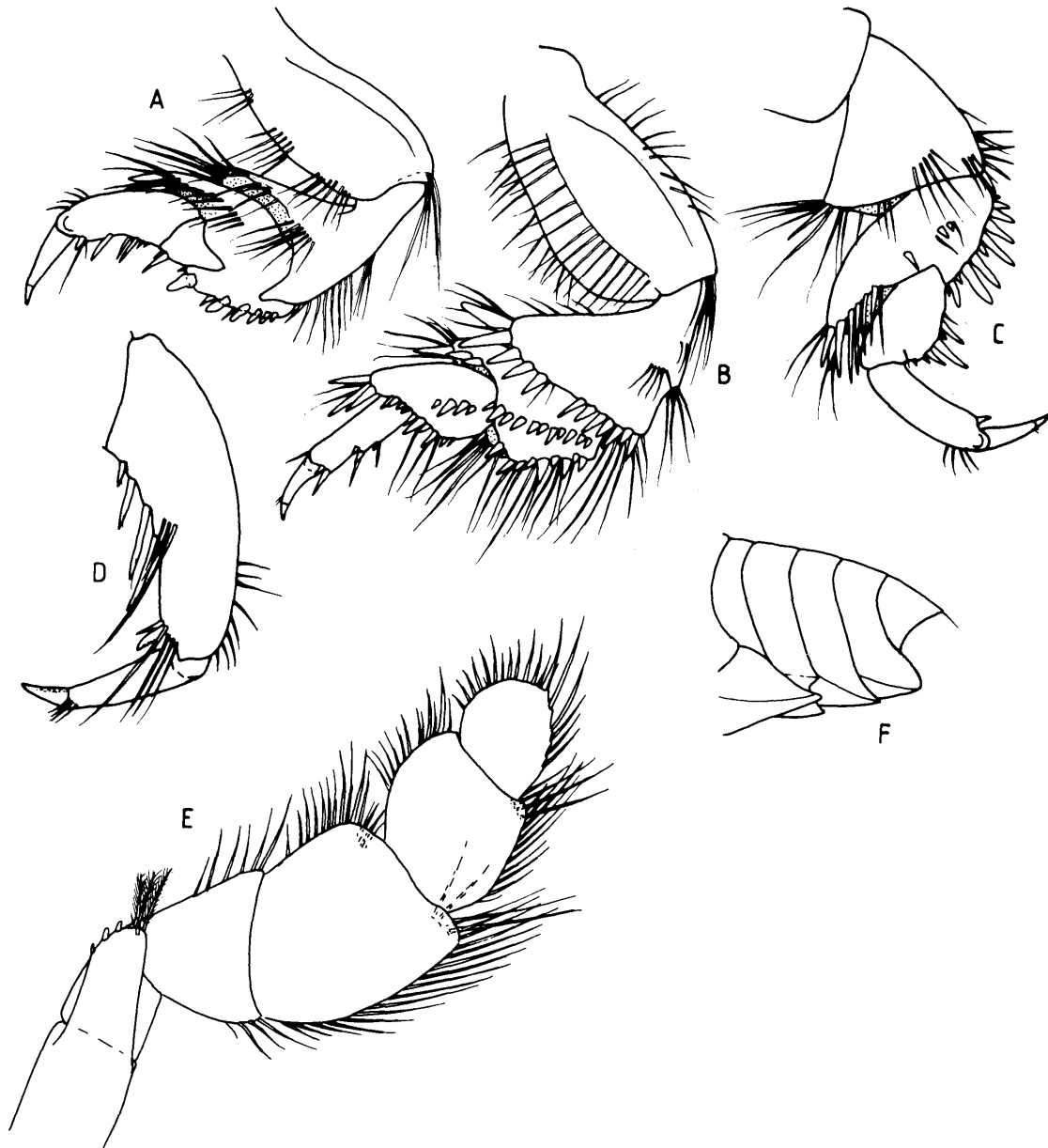


Fig. 78. *Natatolana nammuldi* n. sp., female 19.9 mm. A, pereopod 1; B, pereopod 4; C, pereopod 3; D, pereopod 1, propodus; E, maxilliped; F, pleon, lateral view.

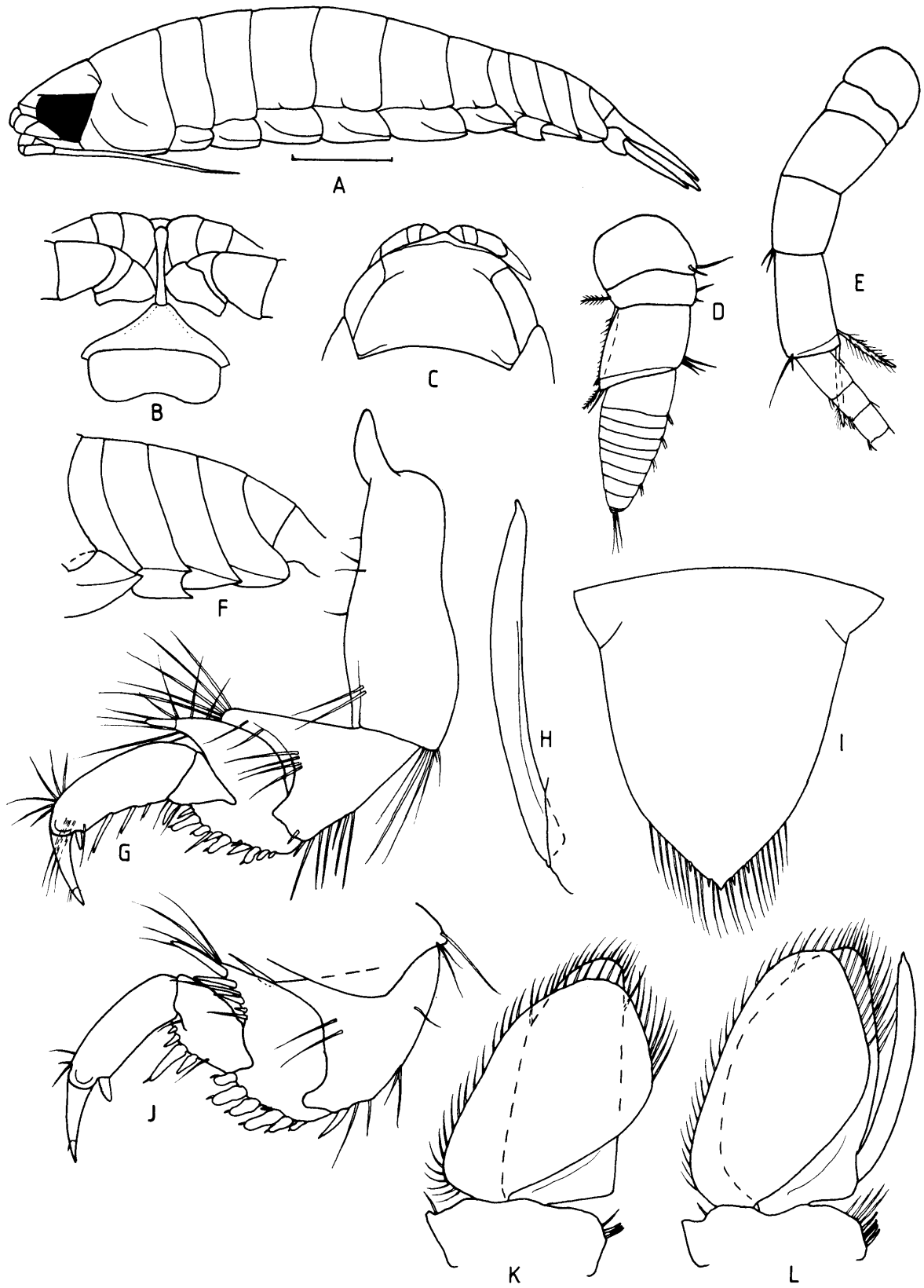


Fig. 79. *Natatolana thalme* n. sp. A-C, H, J-L, holotype; D, E, G, I, male paratype; F, female paratype. A, lateral view; B, clypeal region; C, cephalon, dorsal view; D, antennule; E, antennal peduncle; F, pleon, lateral view; G, pereopod 1; H, appendix masculina; I, pleotelson; J, pereopod 2; K, pleopod 1; L, pleopod 2. Scale 1.0 mm.

anterior margin setose; merus with single stout spine at anterodistal extremity as well as setae, posterior margin with 6 blunt and 4 acute spines; carpus with single spine and 2 setae on posterior margin; propodus palm with 3 slender spines and robust serrate spine opposing dactylus, distal margin with row of 6 setae. Pereopods 2-3 similar to pereopod 1, but palm of propodus without spines, carpus proportionally longer and with larger and more numerous spines; merus with fewer spines, but these are conspicuously more robust; basis shorter and more robust than pereopod 1. Pereopod 7 with basis little shorter than twice its greatest width, anterior margin with continuous row of setae, posterior margin sparsely setose, except distal extremity which bears long plumose setae; anterior margins of ischium, merus, carpus and propodus with spines, and setae at

distal angles, posterior margins with groups of spines; ischium with continuous row of setae along posterior margin. Pereopods 5-6 similar to 7, but pereopod 6 longer than 7.

Vasa deferentia opening flush on surface of sternite 7.

Pleopod 2 appendix masculina arising sub-basally, gently recurved, with small projection at apex; not extending beyond inner ramus. Uropods extending slightly beyond apex of pleotelson, rami moderately slender. Exopod with 4 spines on lateral margin and continuous row of setae, medial margin with 3 spines. Endopod with 3 spines and sensory seta on lateral margin, which is slightly indented towards the apex; medial margin with 4 spines set amongst long marginal setae.

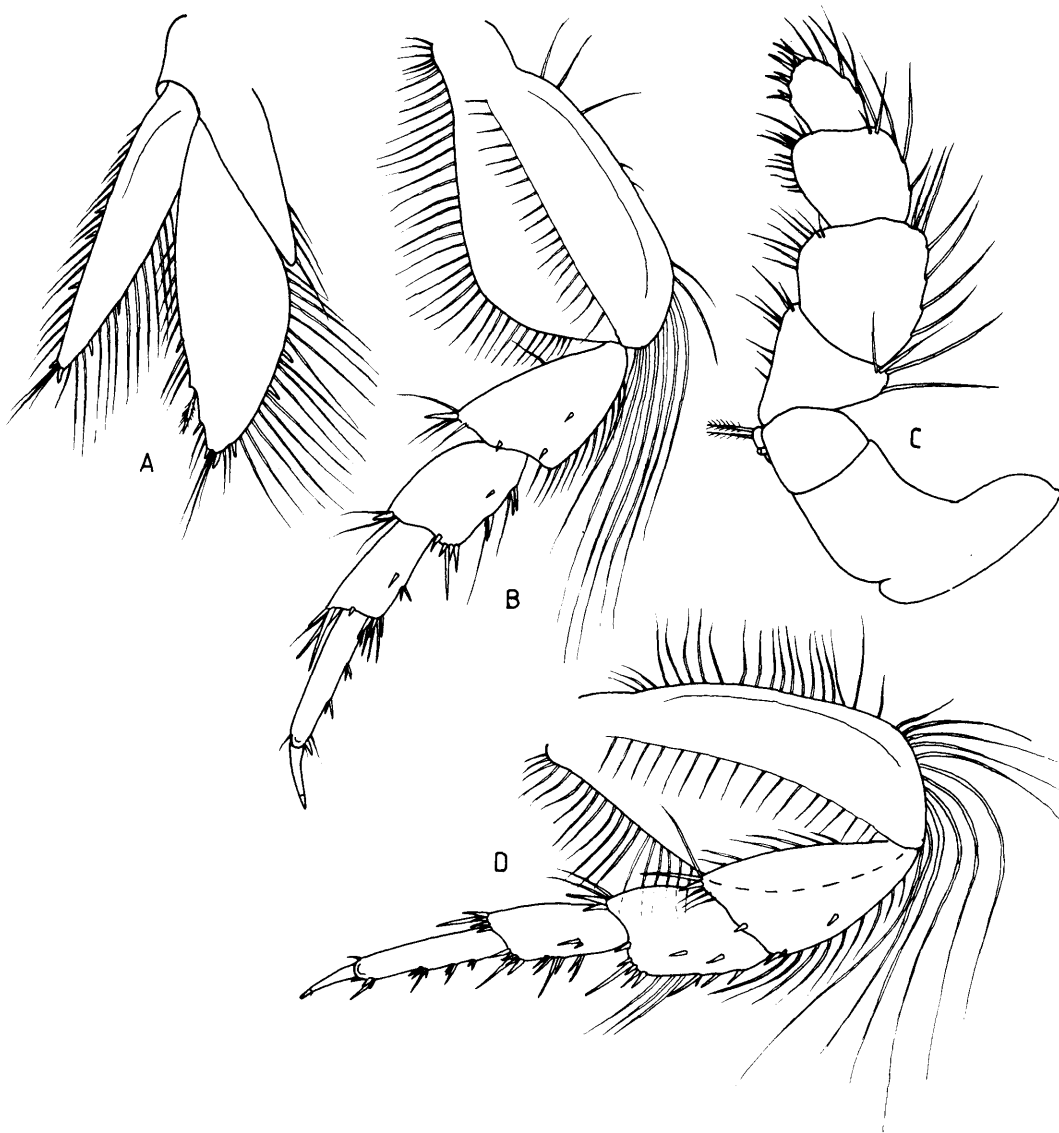


Fig. 80. *Natatolana thalme* n. sp. A, C, female paratype; B, D, male paratype. A, uropod; B, pereopod 7; C, maxilliped; D, pereopod 7.

Female. Agrees closely to description of male, but with more setae and spines on pereopods.

Variation. Larger specimens have more spinose pereopods. The differences in pereopod spination and setation between sexes may be a reflection of size difference.

Colour. All brown in alcohol. Eye dark brown to red.

Size. Largest male, 6.9 mm, largest female 9.5 mm, manca up to 6.0 mm.

Remarks. This species is very similar to *N. woodjonesi*, but has an obviously distinct appendix masculina, as well as larger eyes. Other differences are a narrower basis to pereopod 7, more robust spines on pereopods 2–3, and a narrow frontal lamina which has the anterior margin more blunt than in *N. woodjonesi*. *Natatolana tenuistylis* is also similar and can be separated by having a shorter appendix masculina, and more numerous spines on the posterior margin of the pleotelson. This last factor also serves to distinguish *N. thalme* from *N. nammuldi* and *N. wowine*.

Distribution. Known only from the type locality.

Etymology. Specific epithet is the Aboriginal word *thalme*, meaning bay, and refers to the type locality, known locally as 'The Bay'.

Natatolana wowine n. sp.

Figs 81, 82

Part *Cirolana woodjonesi*.—Hale, 1925: 137 [misidentification, not *N. woodjonesi* (Hale, 1924)].

Material examined. Crib Point, Western Port, Vic., CPBS Stns: 21S, 21 males (7.8–11.5 mm), 19 females (7.5–14.8 mm), 58 mancas (5.0–8.0 mm); 31N, 2 females (14.3, 17.6 mm); 31S/466, male (10.7 mm), 3 females (12.6, 14.7, 16.0 mm); 31S/866, 2 females (14.3, 17.6 mm), manca (5.6 mm); 32N/367, female (19.5 ovig.); 32N/1767, male (11.3 mm); 51N, female (11.5 mm). Port Phillip Bay, Vic., PPBES Stns: 906, 2 males (10.7, 12.6 mm), 6 females (12.5, 12.9, 13.0, 14.5, 14.7, 17.6 mm ovig.), manca (6.9 mm); 921, 3 females (7.2, 7.5, 15.8 mm ovig.); 942, 3 females (11.3, 14.2, 14.8 mm); 1252, female (15.1 mm), manca (5.6 mm); 1730, female (11.5 mm), Stn. 8, off Burnie, W. Tas., 10 Feb. 1970, 40 m, coll. males and females off Cape Portland, N.E. Tas., 10–20 m, over sand, covering fish baits on lines at night; from porpoise, 18 males and females, these from Hale, (1924). Female (18.2 mm), Stn. 8, off Burnie, W. Tas., 10 Feb. 1970, 40 m, coll. N.W. Acid Plant Survey. 5 males (14.5–18.0 mm), 3 females (12.6, 12.0, 11.9 mm), Mondarin Is., Recherche Archipelago, WA, 6 Feb. 1960, in craypot, 20–40 m, coll. R.W. George.

Types. Holotype, male NMV J1723. Paratypes, NMV J1724–J1731; AM P9592, P9594, P32366–P32370; WAM 18–80.

Type locality. Crib Point, Western Port, Vic., 38°23'S, 145°14'E.

Description of male. Body smooth, 3 times as long as wide, sub-parallel in shape. Cephalon with small rostral point, furrow runs just behind anterior margin; second furrow extends along medial margin of each eye, extending anteriorly. Pereonite 1 longest, pereonite 7 shortest; pereonites 2–5 becoming progressively longer,

6–7 progressively shorter. Lateral margins of pereonite 1 with submarginal furrow extending length of segment, shorter furrow more dorsally placed. Coxae of pereonites 2–7 each with oblique furrow, extending from posterior angle to 0.75 of distance to dorsal edge. Pleonite 1 almost entirely concealed by pereonite 7, posterolateral margins of pleonite 3 produced, those of pleonite 4 rounded, both with 1 longitudinal furrow. Pleotelson slightly domed, about as long as broad, lateral margins converging smoothly to apex; 8 spines set amongst setae of posterior margin.

Antennule short, peduncle article 2 half as long as 1, article 3 slightly longer than combined lengths of articles 1 and 2; article 2 with long sensory setae at distoventral margin; flagellum of 10 articles, extending to middle of eye. Antenna peduncle article 3 shorter than article by 0.25 of its length, article 5 longest; flagellum extends to pereonite 2.

Frontal lamina 3 times longer than greatest width, dilated anteriorly; clypeus with 2 marginal ridges.

Pereopod 1 with anterodistal angles of ischium and merus armed with setae; merus with single conspicuous spine; posterior margins of ischium with setae and single distal spine, merus with 9 spines and carpus with 1; propodus with 3 spines on palm and single spine opposing dactylus. Pereopod 2 with anterodistal angle of ischium with large spine, 2 spines on posterodistal angle, and 2 submarginal spines; merus with 2 truncate spines on anterodistal angle, posterior margin with 5 large truncate spines and 4 acute spines, further group of 4 spines on lateral surface; carpus longer than in pereopod 1, with 6 spines on posterior margin; propodus without spines on palm except for spine opposing dactylus. Pereopod 7 with greatest width of basis more than half its length; posterior margin with plumose setae, distal group extending as far as merus; anterior margin with continuous fringe of setae, and further median line of setae on lateral surface; ischium with 2 spines at anterodistal angle, posterior margin with continuous row of setae; distal angles of merus and carpus provided with spines and setae; propodus with 3 groups of spines on posterior margin.

Vasa deferentia opening flush with ventral surface of pereonite 7.

Pleopod 2 appendix masculina extending little beyond inner ramus, apex falcate. Uropods extending slightly beyond pleotelson. Endopod with lateral and medial margins gently rounded, about 2–4 times longer than broad; medial margin with 6 spines, lateral with 3. Exopod slightly shorter than endopod, lateral margin with continuous fringe of setae amongst which are set 6 spines; medial margin with 3 spines. Posterolateral margin of peduncle with 2 spines.

Female. Not differing significantly from male. Tends to be larger in size, and ovigerous females may be slightly broader.

Variation. There is variation in the degree of roundness of the pleotelson, which sometimes approaches the shape of that of *N. woodjonesi*. Variation also exists in the number of spines on the

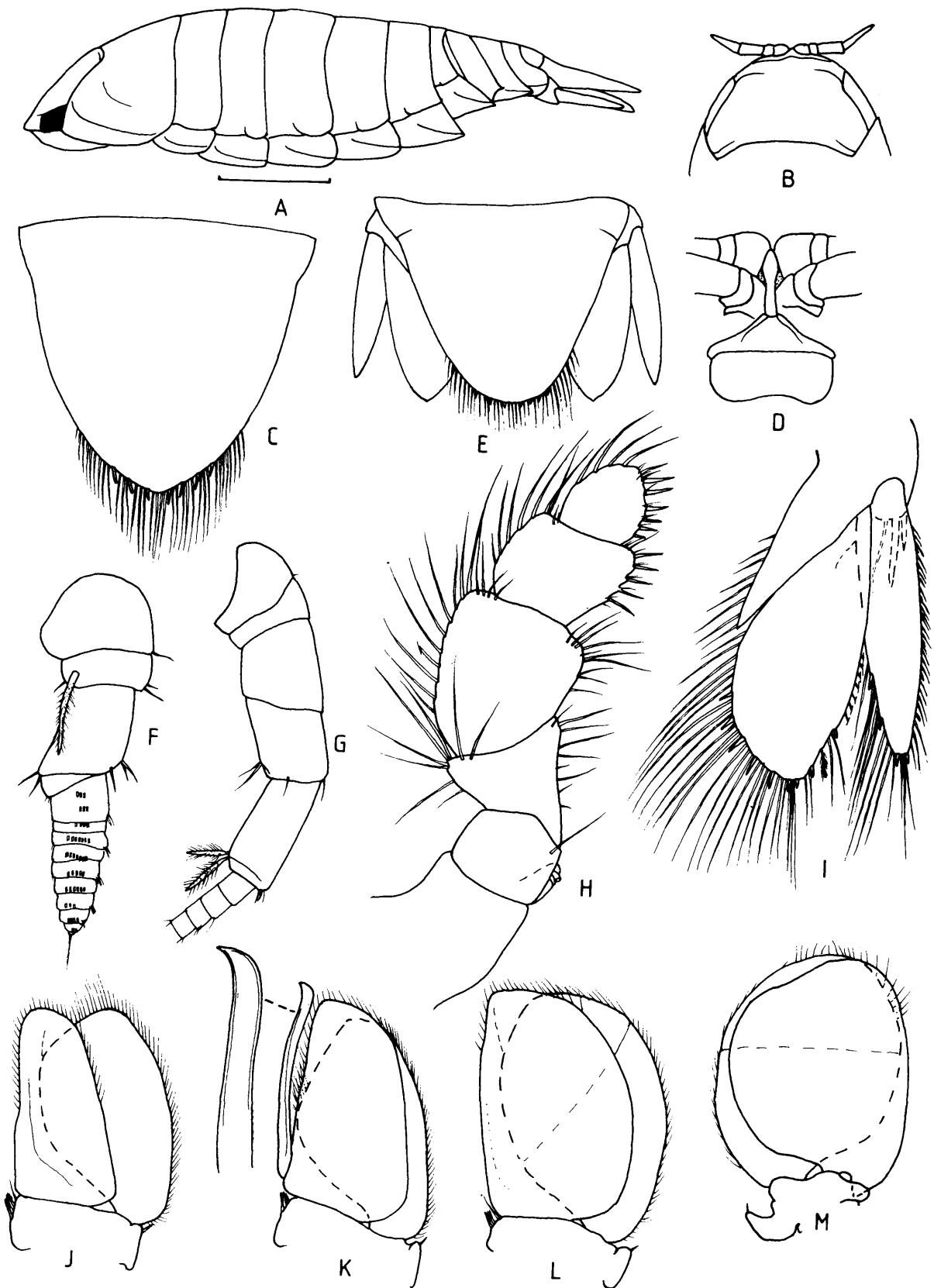


Fig. 81. *Natatolana wowine* n. sp. A-D, male holotype; F-M male paratype, 11.2 mm. A, lateral view; B, cephalon, dorsal view; C, pleotelson, dorsal view; D, clypeal region; E, pleotelson and uropods, male 14.2 mm; F, antennule; G, antennal peduncle; H, maxilliped; I, uropod; J, pleopod 1; K, pleopod 2; L, pleopod 4; M, pleopod 5. Scale 4.0 mm.

posterior margin of the pleotelson. All the Port Phillip Bay and Western Port material had 7 or 8 spines, most specimens from other areas had 6, or occasionally 8.

Colour. In preserved specimen, varies from cream to dark tan.

Size. Largest male 19.0 mm, largest female 17.6 mm, largest manca, 8.0 mm.

Remarks. This species differs from *N. woodjonesi* principally in the shape of the pleotelson and pleonite 4. However, there are other differences which include the spination of pereopod 2, which in this species possesses truncate spines, the shape of the uropods which are more rounded, and the difference in appendix masculina shape which, in *N. wowine*, is broader than in *N. woodjonesi*, and has a smoothly falcate apex. Lastly, *N. woodjonesi* has only 4 pleotelson spines.

Distribution. A southern coast distribution, from north-eastern Tasmania, Western Port and Port Phillip Bay, Vic., and the Recherche Archipelago, WA. The distribution overlaps with that of *N. woodjonesi*, and specimens from Portland and from porpoises identified by Hale (1925) as *N. woodjonesi* are this species.

Etymology. *Wowine* is an Aboriginal word meaning alike, and refers to this species' similarity to *C. woodjonesi*.

Natatolana wullunya n. sp.

Fig. 83

Material examined. Female (11.3 mm), off Sydney, NSW, 33°58'S, 151°29'E, 18 Nov. 1962, 150 m, coll. CSIRO.

Types. Holotype, AM P30364.

Type locality. Off Sydney, NSW, 33°58'S, 151°29'E.

Description of female. Body about 2.5 times as long as wide. Cephalon with rostral point; furrows extending from dorsal anterior angle of each eye, one running behind anterior margin. Pereonite 1 with single horizontal furrow; coxae of pereonites 2-7 each with partial furrow. Pleonites all visible, pleonite 3 with posterolateral margins moderately produced, pleonite 4 with posterolateral margins rounded, each with single longitudinal furrow. Pleotelson slightly shorter than wide, shield shaped, posterior margin with setae, 3 spines on either side of small apical projection.

Antennule peduncle article 3 slightly shorter than combined lengths of articles 1 and 2; flagellum shorter than peduncle, composed of about 12 articles, extending to posterior of cephalon. Antenna flagellum extending to pereonite 2.

Frontal lamina very narrow, anterior very slightly expanded; posteroventral surface raised to form ridge; clypeus triangular, posterior slightly raised.

Pereopod 1 with few setae on anterior margin and posterodistal angle of basis; ischium with anterior

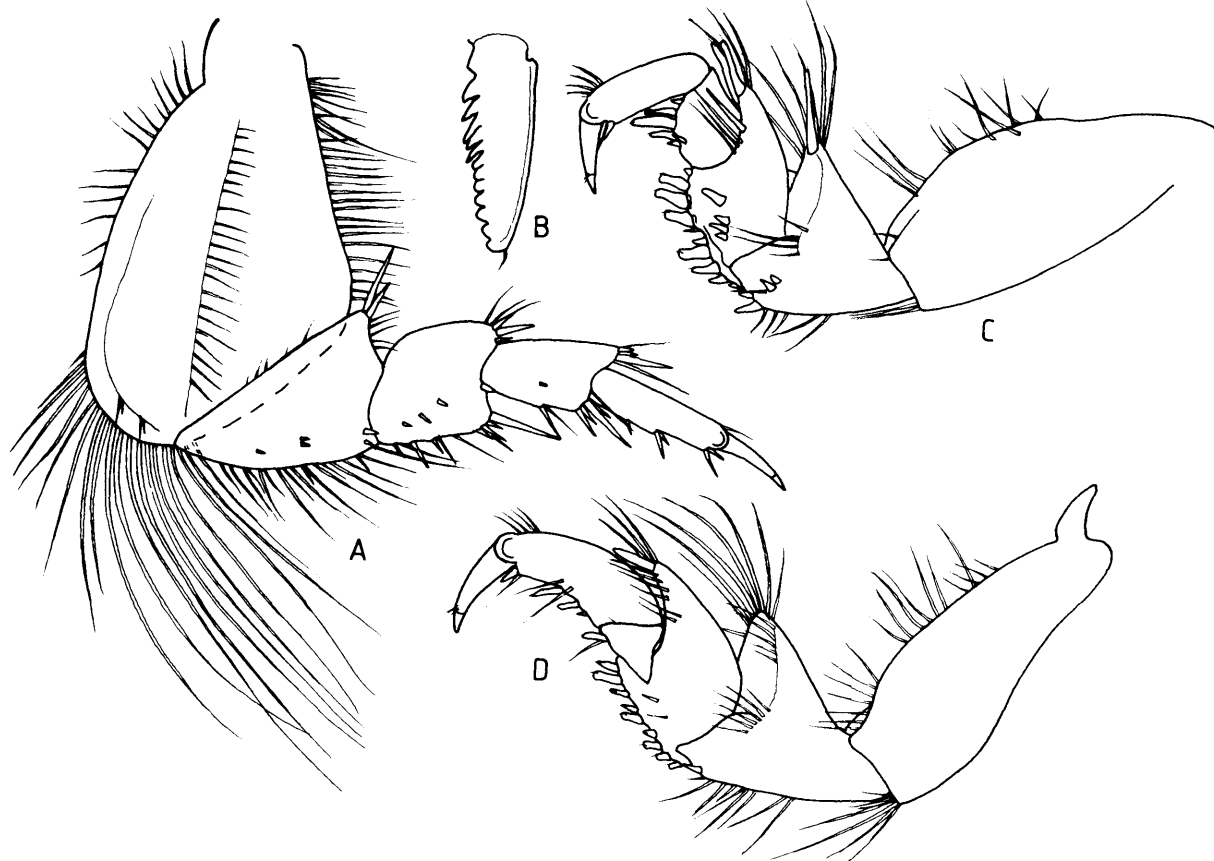


Fig. 82. *Natatolana wowine* n. sp., male paratype 11.2 mm. A, pereopod 7; B, pereopod 2, distal propodial spine; C, pereopod 2; D, pereopod 1.

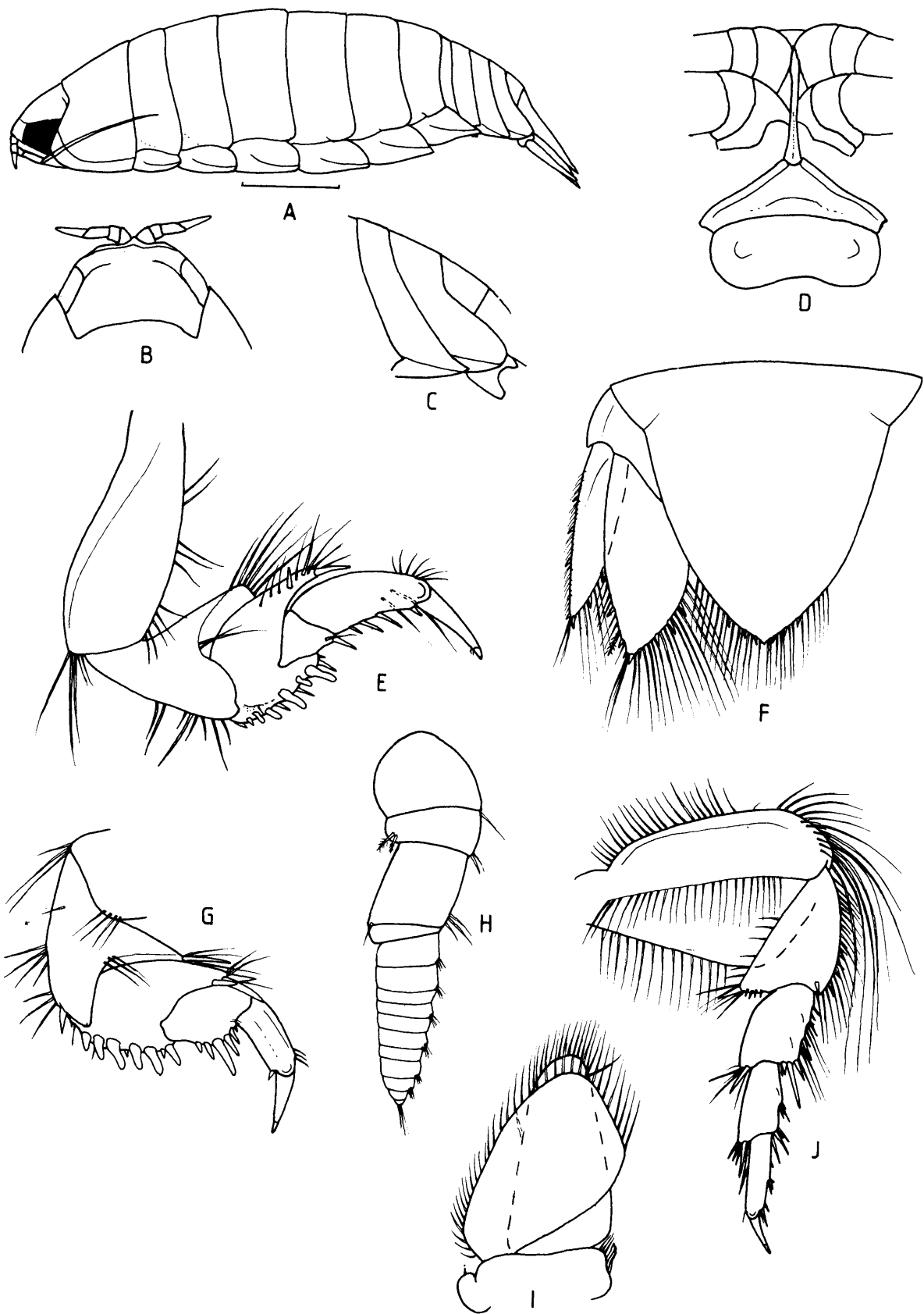


Fig. 83. *Natatolana wullunya* n. sp., holotype. A, lateral view; B, cephalon, dorsal view; C, pleonites 3 to 5, lateral view; D, clypeal region; E, pereopod 1; F, pleotelson and uropod; G, pereopod 3; H, antennule; I, pleopod 1; J, pereopod 7. Scale 2.0 mm.

margin setose, posterior margin with stiff setae on distal half; merus with 2 spines on anterior margin as well as setae, posterior margin with 5 blunt and 6 acute spines; carpus with single spine and seta at posterodistal angle; propodus with 3 acute spines on palm and spine opposing dactylus, row of 7 setae on anterodistal margin. Pereopods 2–3 similar to 1, but possess additional spines on anterior margins of ischium and merus; posterior margin of merus with 6 large blunt spines; posterior margin of carpus with 5 spines; propodus with spine opposing dactylus. Pereopods 5–7 similar, 6 longer than 7. Pereopod 7 with setae along both margins of basis; anterior margin straight to point of inflection, posterodistal margin with long natatory setae; ischium posterior margin setose, anterior margin with 6 short setae; anterior margins of merus, carpus and propodus without setae; merus and carpus each with cluster of spines at distal angles; posterior margins of merus, carpus and propodus with groups of spines; merus with few setae between spine groups.

Uropods extending slightly beyond apex of pleotelson. Exopod shorter than endopod, lateral margin with 4 spines, medial with 3, both margins with setae. Endopod with setae on distal half of lateral margin, and with 3 spines; medial margin with 5 spines, setose along entire length.

Male. Not known.

Colour. Brown in alcohol. Chromatophores not visible.

Size. 11.3 mm.

Remarks. This species is at once separated from all others of the group but one by its narrow frontal lamina. *Natatolana arrama* has a similar frontal lamina but differs in the shape of clypeus, pereopod 7, and lack of spines on the outer margin of the uropodal exopod. *Natatolana woodjonesi* also appears similar, but again the frontal lamina of the two species differ, as do the number of spines on the posterior margin of the pleotelson and on the outer margin of the uropodal exopod. The shape of the basis of pereopod 7 of both species is distinct, the anterior margin of which is somewhat sinuate in *N. woodjonesi*.

Distribution. Known only from the type locality.

Etymology. *Wullunya* is an Aboriginal word meaning to swim.

Dolicholana n. gen.

Type species. *Cirolana elongata* Milne-Edwards, 1840, original designation. Types held by the Muséum Nationale d'Histoire Naturelle, Paris.

Diagnosis. Antennule peduncle articles 1–3 subequal in length. Antenna peduncle articles 4–5 subequal in length, article 5 longest. Frontal lamina ventral surface excavate, posterior part produced to form downwardly projecting lobe. Maxilliped endite elongate with 2 coupling hooks. Pereopods 1–3 with anterodistal margins of ischium and merus strongly produced.

Pereopods 5–7 with article, flattened, long natatory setae on basis, ischium and merus. Pleopod 1 endopod greater than half width of exopod; pleopods 3–5 endopods without setae; appendix masculina inserted sub-basally.

Additional characters. Body about 3 times as long as wide; cephalon with anterior margin recessed, without rostral point; eyes lateral. Pereonite 1 slightly longer than pereonite 2. Pleonites 1–2 with lateral margins not produced, those of 3–4 broad; lateral margins of pleonite 5 encompassed by pleonite 4.

Antennule flagellum articles short; antenna peduncle articles 1–2 short, 3–4 longer, subequal in length, article 5 equal to combined lengths of articles 3–4. Clypeus and labrum flat. Mouthparts similar to *Natatolana*; maxilliped endite extending to palp article 3. Pereopod dactyls all unungiculate. Pleopods 3–5 exopods with complete suture. Uropod peduncle only moderately produced.

Remarks. There are several features shown by *Dolicholana elongata* that prevent its inclusion in other genera. The form of the antennule flagellum, antenna, mouthparts and particularly the pereopods suggest a close affinity with *Natatolana*. Differences in the morphology of the antennule peduncle, frontal lamina, and in the pleopod setation prevent its inclusion in *Natatolana*. As other genera are even less similar, a new genus is established.

Barnard (1936) described the species *Cirolana porcellana* which, from his figures and description, appears to belong to this genus. Examination of the type specimens would be necessary for confirmation.

Etymology. The genus name is obtained by coupling the Greek word *dolichos* (= long) and the ending *-lana* to indicate family affinity. Gender is feminine.

Dolicholana elongata (Milne-Edwards)

Figs 84, 85

Cirolana elongata Milne-Edwards, 1840: 236.—Hansen, 1890: 345, pl. III figs 4, 4a–e; Thielemann, 1910: 14; Nierstrasz, 1931: 151; Monod, 1934: 8, pl. VA, VI, VII; Iwasa, 1965: 13; Bruce, 1981b: 961.

Cirolana pumicea Hale, 1925: 130, fig. 1.—Nierstrasz, 1931: 157.

?*Cirolana elongata*.—Hesse, 1866: 262 (identity uncertain).

Material examined. Female (13.2 mm), Capricorn Channel, Qld, 14 Dec. 1977, *Kimbla* Stn 22, 310 m, coll. P. Terrill. Manca (7.5 mm), east of North West Island, Capricorn Group, Qld, 23°15.2'S, 152°24.1'E, 14 Dec. 1977, 284 m, coll. P. Terrill. Also material described by Hale (1925).

Description of female. Body about 4 times as long as wide. Cephalon dorsal surface irregular, anterior margin with median depression and submarginal furrow; ventromedial margin of eye with long setae; pereonite 1 slightly longer than others; pereonites 2–7 with distinct carinae on coxae. Pleon broad, with horizontal impressed line on posterolateral margins of pleonites 3–4. Pleotelson with fused 6th pleon segment

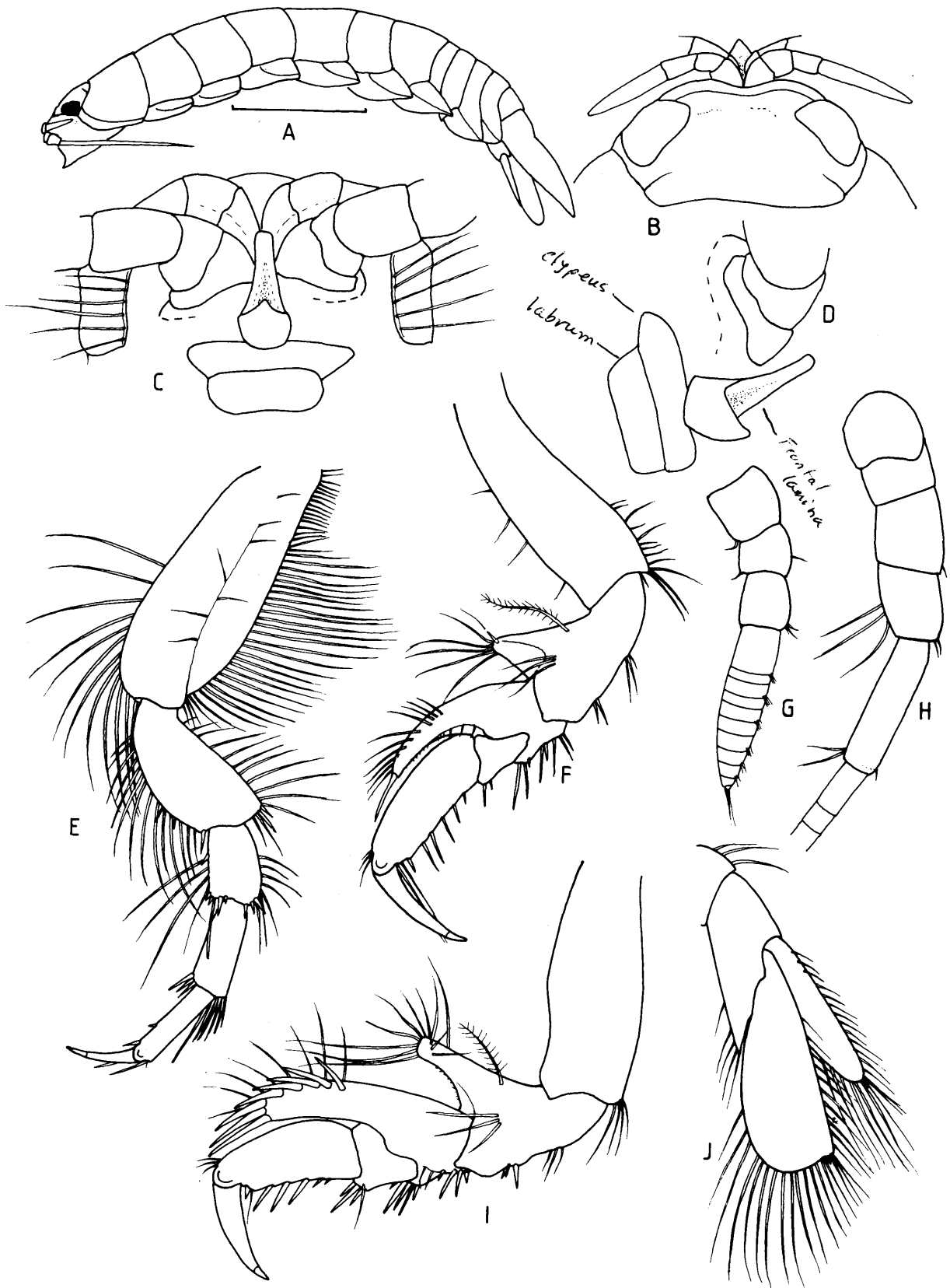


Fig. 84. *Dolicholana elongata*, female 13.2 mm. A, lateral view; B, cephalon, dorsal view; C, clypeal region; D, clypeal region, perspective; E, pereopod 7; F, pereopod 1; G, antennule; H, antennal peduncle; I, pereopod 2; J, uropod. Scale 3.0 mm.

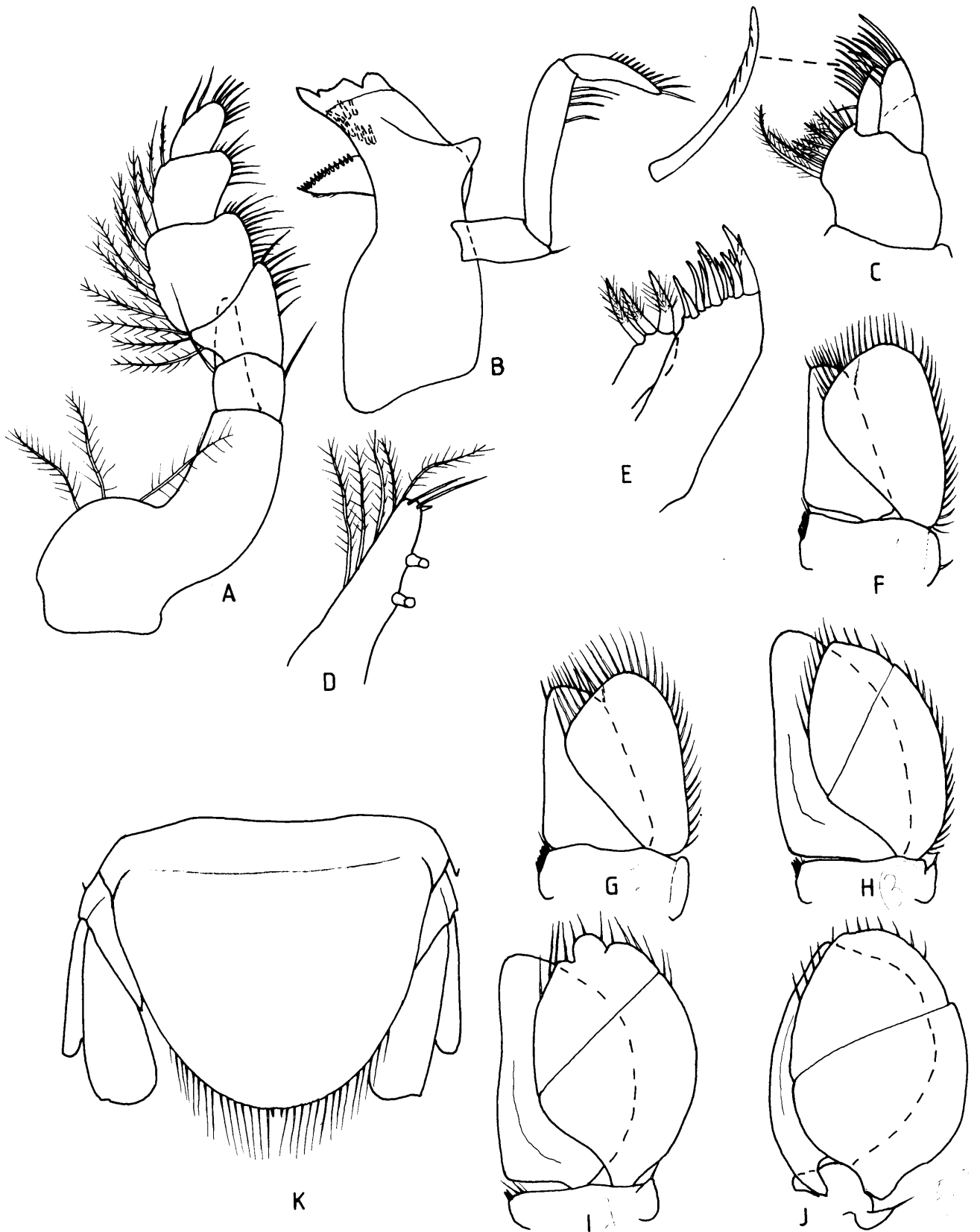


Fig. 85. *Dolicholana elongata*, female 13.2 mm. A, maxilliped; B, mandible; C, maxilla; D, maxilliped endite; E, maxillule; F-J, pleopods 1-5 respectively; K, pleotelson and uropods.