

RECORDS
OF THE
AUSTRALIAN
MUSEUM

VOLUME 39 No. 2

Australian *Pleopodias* Richardson, 1910, and *Anilocra* Leach, 1818 (Isopoda: Cymothoidae), crustacean parasites of marine fishes NEIL L. BRUCE

Australian *Plepodias* Richardson, 1910, and *Anilocra* Leach, 1818 (Isopoda: Cymothoidae), Crustacean Parasites of Marine Fishes

NIEL L. BRUCE*

Australian Museum,
P.O. Box A285, Sydney South, NSW 2000, Australia

ABSTRACT. The genus *Plepodias* is recorded from Australia for the first time. The genus is rediagnosed, and figures given for *Plepodias* sp. and *P. elongatus* Richardson. Twelve Australian species of *Anilocra* are described and figured: *A. alloceracea* Koelbel, *A. caudata* Bovallius, *A. dimidiata* Bleeker, *A. leptosoma* Bleeker, *A. longicauda* Schiödte & Meinert, *A. ankistra* n. sp., *A. apogonae* n. sp., *A. koolanae* n. sp., *A. morsicata* n. sp., *A. nemipteri* n. sp., *A. pomacentri* n. sp., and *A. soelae* n. sp. Additional figures and descriptive notes are given for *A. cavicauda* Richardson, that species being revalidated. *Anilocra carpentariensis* Avdeev is synonymised with *A. dimidiata*. Keys are provided for the Australian genera of the *Anilocra* group, and the Australian species of *Anilocra*.

BRUCE, N.L., 1987. Australian *Plepodias* Richardson, 1910, and *Anilocra* Leach, 1818 (Isopoda: Cymothoidae), crustacean parasites of marine fishes. Records of the Australian Museum 39(2): 85-130.

Recent studies of the Australian Cymothoidae were limited to the work of Hale (1926, 1940) and Avdeev (1975a,b,c, 1977, 1978, 1979a,b,c), the latter publishing on material collected around, but beyond Australian territorial waters. More recently, Bruce (1986) recorded 9 species of *Mothocya* from Australian waters. Prior to the work of Hale (1926) the only information available on Australian cymothoids was that to be found in the monographs of Schiödte & Meinert (1881, 1883, 1884). Other early works of relevance to the Australian cymothoid fauna are those dealing with the Indo-Pacific (Bleeker, 1857; Bovallius, 1887; Haller, 1880; Koelbel, 1878; Miers, 1880; Nierstrasz, 1915, 1918; Richardson, 1910). Some of these early publications (Haller, 1880; Miers, 1880) are of particular importance as they were not seen by Schiödte & Meinert, and the names proposed may have priority over those proposed by Schiödte & Meinert.

Up to and including Avdeev's publications, 45 species of Cymothoidae in nine genera had been recorded from waters around Australia. Of these, *Nerocila* and *Anilocra* were the only genera of the epidermal attaching lineage of Brusca (1981). Two species of *Anilocra* have

been recorded from Australia: *Anilocra cavicauda*, a misidentification of Hale (1926), and *A. carpentariensis* which is here synonymised with *A. dimidiata*. *Renocila* and *Nerocila* are well represented in Australian waters, and accounts of these two genera will be given in later publications.

Little is known about endemicity or distributional patterns of genera and species of Indo-Pacific Cymothoidae. Avdeev (1985) discussed the distribution of marine cymothoids but, as this present work and other recent publications (Williams & Williams, 1980, 1981; Bruce, 1986) have demonstrated, species richness within the Cymothoidae is far greater than previously suspected.

Methods

When host specimens have been available, identifications have been confirmed by the staff of the Australian Museum Fish Section. Host identifications of specimens not retained, or non-expert identifications are marked by an asterisk. Host identifications without the specimen have been given in the original combination in the 'Material examined' section, and the most recent combination in the 'Hosts' section.

* Present address: Queensland Museum, P.O. Box 300, South Brisbane, Qld 4101, Australia.

All pereopods within a species description are drawn to the same scale, as are all pleopods. All measurements are of length measured from the anterior margin of the cephalon to the apex of the pleotelson, and are in millimetres.

Material placed in the 'Additional material' section is that which has been identified as belonging to the species, but has not been studied in detail.

Abbreviations

AM	Australian Museum, Sydney, NSW, Australia
CSIRO	Commonwealth, Industrial and Scientific Research Organisation, Australia
MNHN	Muséum National d'Histoire Naturelle, Paris, France
NMV	Museum of Victoria, Melbourne, Australia
NRS	Naturhistoriska Riksmuseet, Stockholm, Sweden
NT	Northern Territory, Australia
NTM	Northern Territory Museum, Darwin, Australia
Qld	Queensland, Australia
QFS	Queensland Fisheries Service
QM	Queensland Museum, Brisbane
RMNH	Rijksmuseum van Natuurlijke Historie, Leiden, Netherlands
SAM	South Australian Museum, Adelaide
USNM	Smithsonian Institution, Washington, D.C., U.S.A.
WA	Western Australia
WAM	Western Australian Museum, Perth
ZMC	Zoologisk Museum, Copenhagen.

Taxonomy

Brusca (1981) recognised three lineages within the Cymothoidae. Those genera related to *Anilocra* and *Nerocila* which attach to the hosts' outer body surface form the externally attaching lineage. The other two lineages are the buccal-gill attaching lineage and those

genera that burrow into the hosts flesh. Brusca (1981) considered the latter to be polyphletic. Although the *Anilocra* group of genera can be easily separated on ecological criteria, they can be distinguished from all other cymothoids by morphological characters as well. These characters are: body bilaterally symmetrical; cephalon weakly immersed in pereonite 1; body and appendages usually with abundant chromatophores; brood pouch with oostegites of pereonite 6 dominant (those of pereonites 2, 3, 4 and 6 subequal in other cymothoids) and with posterior pocket arising from sternite 7 (absent in other cymothoids); pereopods without laminar extensions to basis, without bulbous articles; pereopod 7 frequently with spines.

Three inadequately described genera of the epidermal-attaching lineage have been recorded from the Indo-Pacific. Brief remarks for these genera are given here to aid in their identification should they be found in Australia. They are not included in the generic key as none of these genera has been described in detail.

Amblycephalon Pillai, 1954: described in more detail by Pillai (1963). Monotypic; differing from *Anilocra* and *Pleopodias* by lacking reflexed rostrum and having posterior angles of coxae of pereonites 4-7 produced to posterior of their segment; *Nerocila* differs in having ventrolateral extensions on pleonites 1 and 2; *Renocila* differs in having posterolateral margins of pereonites 5-7 produced. Antennule, antenna and mandibles same as those of *Nerocila*. Recorded only from India (Pillai, 1963).

Plotor Schiödte & Meinert, 1881: monotypic; differing from *Nerocila* by lacking ventrolateral extensions on pleonites 1 and 2. Known only from Indian Ocean, 4°30'S, 137°E (Schiödte & Meinert, 1881).

Rosca Schiödte & Meinert, 1881. Two species have been placed in this genus: *R. limbata* Schiödte & Meinert, 1881, from Amboina, and *R. rogans* Stebbing, 1924. The type of the latter is an intermoult juvenile of *Nerocila orbignyi* (see Barnard, 1950). *Rosca limbata* differs from *Nerocila* by the cephalon posterior margin not being trilobed.

Key to Australian Genera of the *Anilocra* Group

1. Cephalon posterior margin trisinate; pleonites 1 and 2 with ventrolateral margins produced; body dorsoventrally flattened; coxae 5-7 as long or longer than respective pereonite. *Nerocila*
- Cephalon posterior margin straight or smoothly curved; pleonites 1 and 2 with ventrolateral margins not produced; body dorsal surface strongly vaulted; coxae 5-7 manifestly shorter than respective pereonite. 2
2. Cephalon without rostrum, or rostrum not projecting between antennule bases; antennule as long as, or longer than antenna; posterolateral margins of pereonites 5-7 produced; coxae 5-7 posteriorly acute. *Renocila*
- Rostrum folded back, lying between antennule bases; antennule shorter than antenna; posterolateral margins of pereonites 5-7 not produced; coxae posteriorly rounded. 3

3. Mandible palp article 3 shorter than article 2; maxilla with 2 short spines each on medial and lateral lobe, medial lobe partially fused to lateral; antennule articles 4–8 short (e.g. Fig. 5d, 10d); posterior of pleon about 0.7 width of pereon. *Anilocra*
- Mandible palp article 3 longer than article 2; maxilla with 2 large nodular spines each on medial and lateral lobe, medial lobe distinct; antennule articles 4–8 elongate (Fig. 1i); posterior of pleon about 0.35 width of pereon. *Pleopodias*

Pleopodias Richardson

Pleopodias Richardson, 1910: 25.—Barnard, 1936: 166.

Diagnosis of female. Cephalon posterior margin not trilobed; rostrum anterior margin folded back, concealing proximal article of antennule. Posterolateral margins of pereonites not produced. Coxae 2 and 3 as long as respective pereonite, coxae 4–7 narrow, always shorter than respective pereonite. Pleon much narrower than pereon, width of pleonites decreasing markedly towards posterior.

Antennule bases close set, both antennule and antenna dorsoventrally flattened, antennule articles 2 and 3 expanded; articles 4–8 elongate. Mandible palp article 3 slender, longer than article 2. Maxilla medial lobe distinct; 2 nodulose spines each on medial and lateral lobe respectively. Pleopods conspicuous in dorsal view, peduncles without accessory lobes; pleopods 1–4 with lamellar rami, endopod of pleopod 5 with 3 simple folds, exopod lamellar.

Additional characters. Eyes present, facets distinct. Pereon dorsum strongly vaulted, widest at pereonites 5 and 6; pereonite 2 shortest, 6 longest. Pleonites 1 and 2 with lateral and ventrolateral margins not produced. Pleotelson narrow, lateral margins bent up.

Maxillule with 3 terminal spines. Pereopods 1–4 short, progressively increasing in length; pereopods 5 and 6 longer than 1–4; pereopod 7 markedly longer than 6, and about 2.3 times longer than pereopod 1. Brood pouch formed by 2 large oostegites arising from pereonite 5, smaller oostegites on pereonites 1, 2, 3 and 4, and posterior pocket. Endopod of pleopods 1 and without, and 3–5 with proximomedial lobe; endopods of pleopods 1–5 progressively decreasing in length. Uropod peduncle and rami elongate.

Type species. *Pleopodias elongatus* Richardson, 1910, by monotypy.

Remarks. The genus *Pleopodias* has received little attention since it was established. Richardson (1911) described a second species from the tropical eastern Atlantic, *P. vigilans*, but gave no figures, nor further discussion on the genus. Barnard (1936) questioned the significance of characters used by Richardson to define the genus, correctly pointing out that several species of *Anilocra* have pleopods prominent in dorsal view and have antennule articles 2 and 3 expanded.

Examination of the type specimen of *P. elongatus* and the specimen from Western Australia revealed several

characters by which the two genera are separated. In *Pleopodias* these are: pleon narrowing strongly towards posterior, and much narrower than pereon (not posteriorly narrower in *Anilocra*); antennule articles 4–8 elongate (short in *Anilocra*); maxilla medial lobe distinct (partially fused in *Anilocra*); prominent and nodulose spines on the maxilla (small, simple spines in *Anilocra*); mandible palp article 3 slender, longer than article 2 (robust, shorter than article 2 in *Anilocra*); and pereopod 7 far more spinose than that of *Anilocra*.

Pleopodias sp.

Figs 1, 2

Pleopodias elongatus.—Barnard, 1936: 167, fig. 7f,g (not *P. elongatus* Richardson, 1910).

Material examined. Female (ovig 14.5, crushed in tube), 232 k north of Port Hedland, WA, 18°10'S, 118°18'E, 10 Oct 1982, depth 298–300 m, coll L. Marsh & S. Slack-Smith on FRV *Soela* (WAM 607-80).

Description. Rostrum strongly produced, lateral margins concave; eyes large, about 0.6 width of cephalon. Pleonite 5 about 0.4 width of pereonite 7. Pleotelson about 2.7 times as long as wide.

Antennule with 8 articles, 2 and 3 wide, 5–8 slender; extends to posterior of pereonite 1. Antenna with 13 articles, articles 1–3 short, 4–7 long, 8–13 becoming progressively shorter.

Mandible palp article 3, 3 times as long as wide. Maxilla medial lobe with 1 smooth spine and 1 nodulose spine, lateral lobe with both spines nodulose. Maxilliped article 3 with 3 spines.

Pereopods 1–3 with dactylus robust, without nodules. Pereopod 6 merus nearly twice as long as carpus; propodus posterior margin with scattered small spines. Pereopod 7 with medial surfaces of carpus and propodus densely covered with small spines.

Pleopod 1 peduncle slightly more than 4 times as long as wide, peduncles of pleopods 2–5 becoming progressively narrower towards posterior. Pleopod 1 rami distal margins rounded, pleopods 2–5 with rami becoming progressively narrower. Pleopod 2 with appendix masculina. Uropod peduncle about 4 times as long as wide; rami subequal in length, extending clearly beyond posterior of pleotelson.

Colour. Dark reddish brown in alcohol.

Size. 14.5–15.5 mm (Barnard, 1936).

Remarks. The specimen described here, while

undoubtedly distinct from *P. elongatus* cannot be described as a new species owing to its crushed condition. The Australian specimen differs from *P. elongatus* in being smaller in size, having a far narrower pleotelson, shorter rostrum, larger eyes, narrower pleopod peduncles, and retaining the appendix masculina. Barnard's (1936) figures agree well with

Western Australian material, and that record is here considered conspecific with the Australian specimen.

Hosts. Not known.

Distribution. Andaman Islands, north-eastern Indian Ocean (Barnard, 1936) and north-western Australia; to depths of 300 metres.

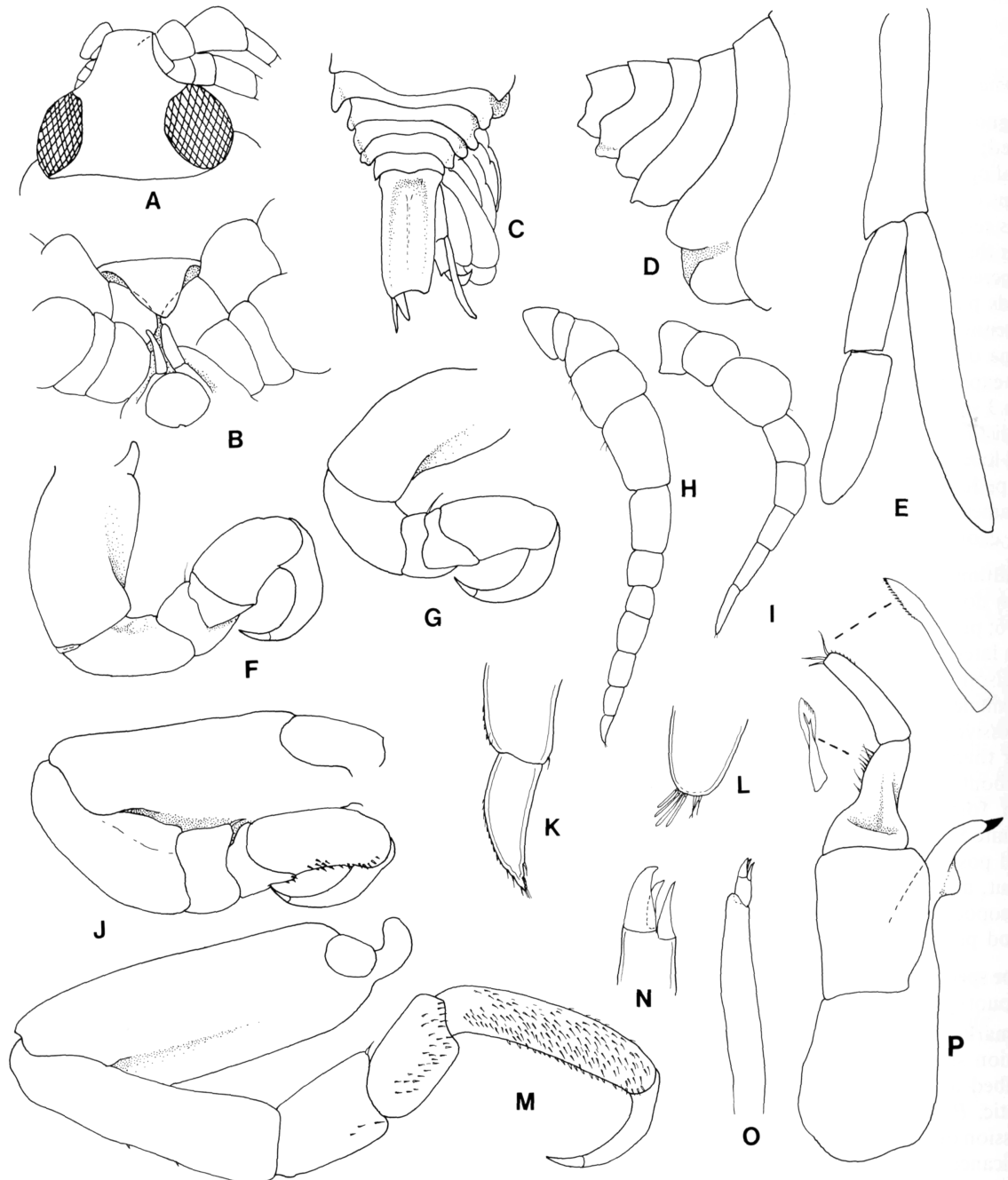


Fig. 1. *Pleopodias* sp. (WAM 607-80). A, cephalon; B, frons; C, pleon and pleotelson, dorsal view; D, pleon, lateral view; E, uropod; F, pereopod 1; G, pereopod 2; H, antenna; I, antennule; J, pereopod 6; K, antenna, terminal article; L, antennule, apex of terminal article; M, pereopod 7; N, maxillule apex; O, maxillule (apex creased); P, mandible.

Pleopodias elongatus Richardson

Fig. 3

Pleopodias elongatus Richardson, 1910: 26, fig. 25.—
Nierstrasz, 1931: 133.

Material examined. HOLOTYPE: female (ovig 20.0), off Motocot Point, Philippine Islands, 8 June 1908, 170 fathoms (= 306 m), coll U.S. Bureau of Fisheries *Albatross* Philippine Expedition 1907-08 (USNM 40917).

Descriptive notes. Body about 2.5 times as long as wide; lateral margins sub-parallel in dorsal view. Eyes about 0.5 width of cephalon; rostrum strongly produced, lateral margins weakly concave. Pleotelson about 1.6 times as long as wide, lateral margins weakly convex, posterior margin rounded.

Antennule bases not contiguous. Mandible palp article 2 with numerous setae along lateral margin. Maxilla medial lobe with 1 large conical spine and 1 small spine. Pereopods similar to those of *Pleopodias* sp. Pleopod 2 without appendix masculina.

Remarks. As discussed under the remarks for *Pleopodias* sp., *P. elongatus* is clearly distinct from the Indian Ocean species. Additional figures are given here to facilitate identification of the species.

Hosts. Not known.

Distribution. Philippine Islands.

Anilocra Leach

Anilocra Leach, 1818: 348, 350.—Desmarest, 1825: 306; Edwards, 1840: 255; Dana, 1853: 747; Schiödte & Meinert, 1881: 100; Gerstaecker, 1882: 231; Richardson, 1905: 25; Hale, 1926: 210; Schultz, 1969: 153; Kensley, 1978: 78; Kussakin, 1979: 281; Brusca, 1981: 140; Brusca & Iverson, 1985: 45.

Canolira Leach, 1818: 350.

Epichthyes Herklots, 1870: 122.

Diagnosis of female. Cephalon posterior margin weakly or not trilobed; rostrum anterior portion folded down and back, not concealing antennule basal articles. Coxae 2 and 3 as long as respective pereonite; coxae 4-7 narrow, much shorter than respective pereonite. Posterolateral margins of pereonites not produced. Pleonites all visible, pleon lateral margins sub-parallel or narrowing slightly towards posterior.

Mandible palp articles robust, article 3 setose, shorter than article 2. Pereopods 1-4 short, 5-6 longer; pereopod 7 markedly longer than 6, 1.7-2.9 times longer

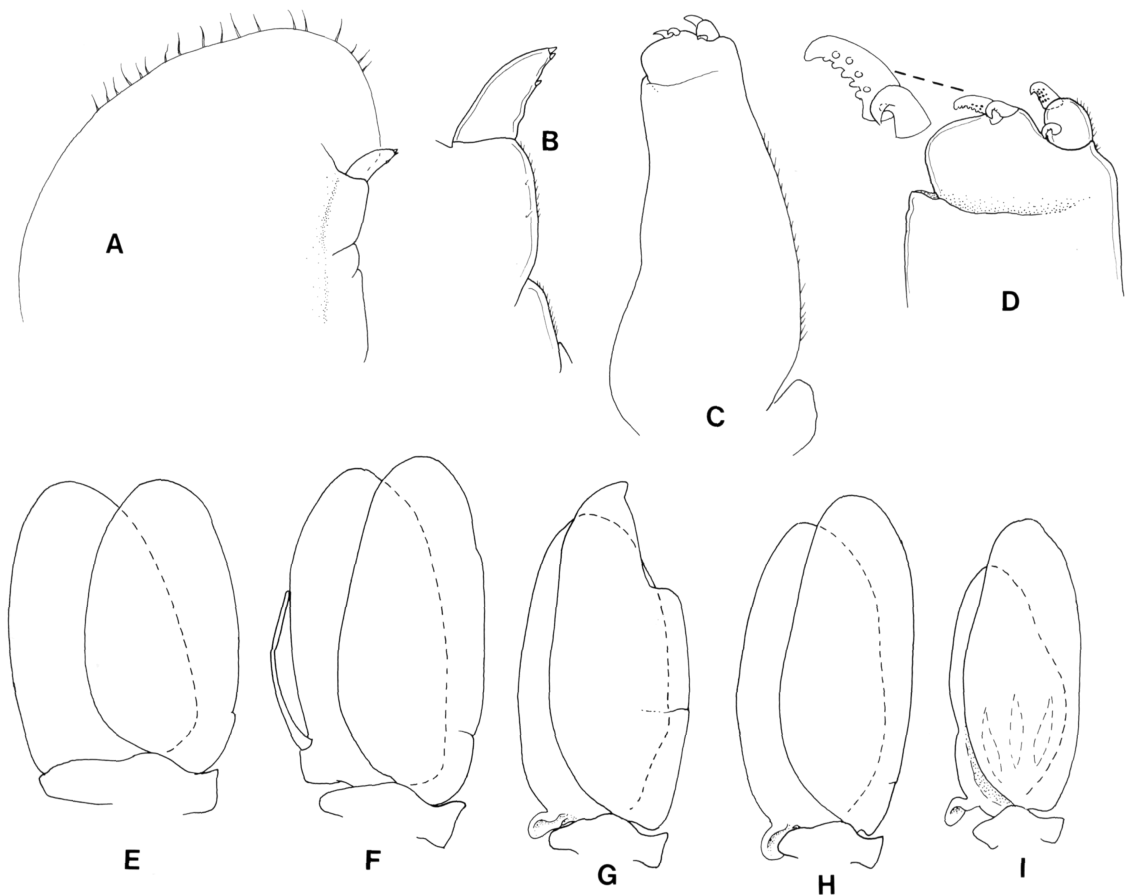


Fig. 2. *Pleopodias* sp. (WAM 607-80). **A**, maxilliped; **B**, maxilliped detail; **C**, maxilla; **D**, maxilla apex; **E-I**, pleopods 1-5 respectively.

than pereopod 1. Pleopods visible in dorsal view; peduncles without accessory lobes. Endopods of pleopods 1 without, and 3–5 with proximomedial lobe.

Additional characters. Pereon dorsum strongly vaulted, widest at pereonites 5 and 6; pereonite 2 shortest, 6 longest, pereonite 7 usually about 0.6 as long (0.45–0.81) as pereonite 6. Pleotelson longer than wide. Pleonite lateral and ventrolateral margins not produced.

Antennule usually with 8 articles, bases not contiguous; articles 1–3 more robust than remainder; articles 4–8 short. Antenna longer than antennule. Maxillule with 3 or 4 terminal spines. Maxilla medial lobe partially fused to lateral lobe, each lobe with 2 small

stout spines. Maxilliped article 3 with 3 or 4 short curved spines. Brood pouch formed by 2 large oostegites arising from pereonite 5, smaller oostegites from pereonites 1, 2, 3 and 4, and posterior pocket. Pleopods 1 and 2 each with lamellar rami, pleopods 3 and 4 usually with small folded lobes on posterior surface of endopod; pleopod 5 endopod with prominent folded lobes; endopod of pleopod 5 subtruncate. Endopods decreasing in length from pleopod 1 to pleopod 5. Uropod peduncle and rami elongate.

Male. Smaller, narrower than female; eyes proportionally larger. Pleon and pleotelson characters may not be developed. Appendages generally similar to

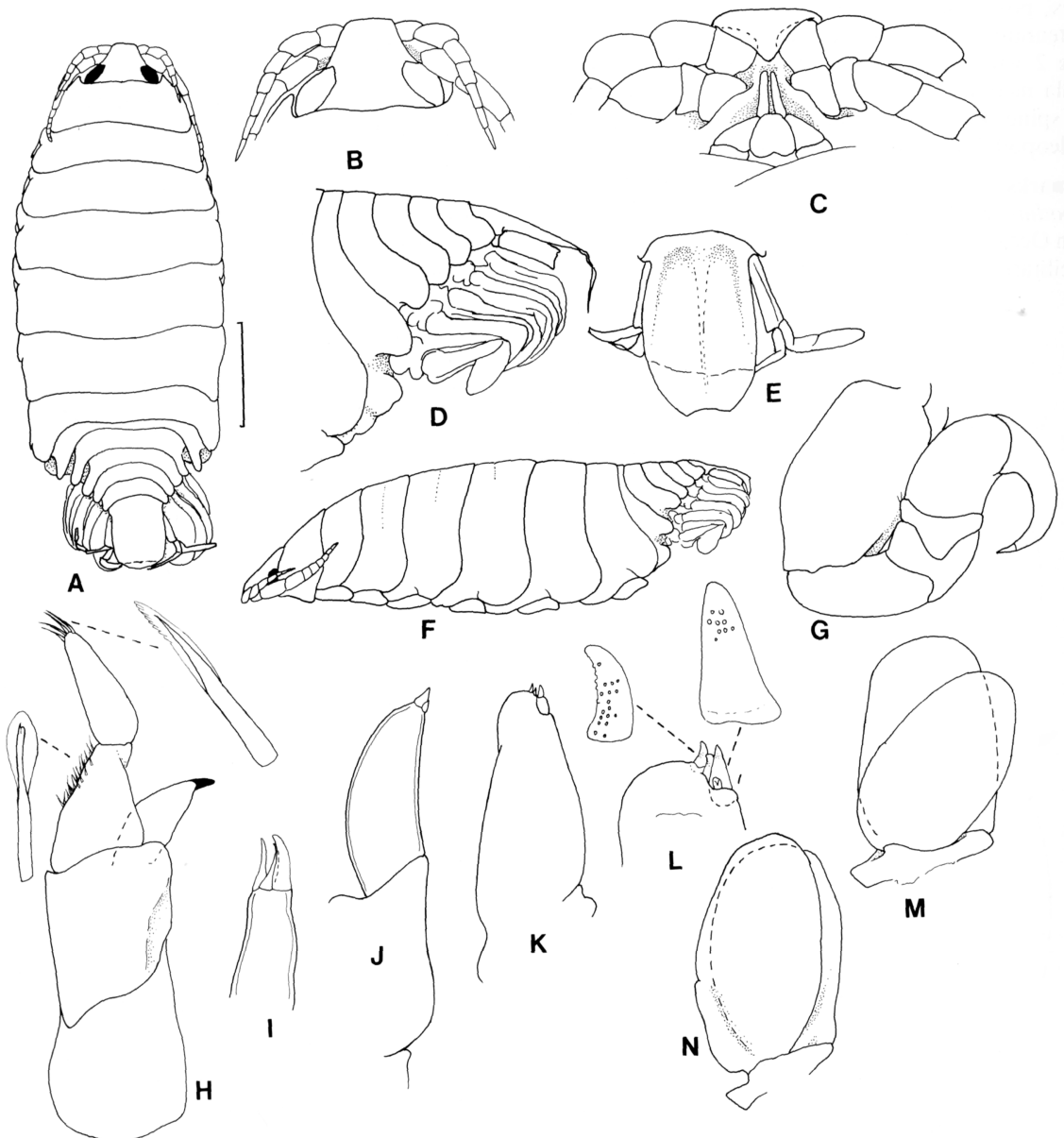


Fig. 3. *Pleopodia elongatus*, holotype (USNM 40917). A, dorsal view; B, cephalon, dorsal view; C, frons; D, pleon, lateral view; E, pleotelson (straightened); F, lateral view; G, pereopod 1, in situ; H, mandible; I, maxillule apex; J, maxilliped articles 2, 3; K, maxilla; L, maxilla, apex and detail of spines; M, pleopod 1; N, pleopod 2. Scale line represents 4.0 mm.

female except maxilliped article 3 with larger terminal spines, pereopod with dactylus nodules not fully developed. Pleopod 2 with appendix masculina, folding on endopods of pleopods 3–5 less well developed. Penial process not present (in species examined here).

Type species. Leach (1818), in establishing the genus, recorded three species. Kussakin (1979) designated *Anilocra cuvieri*, the first described in Leach's text, as the type species. *Anilocra cuvieri* is a synonym of *Anilocra physodes* (Linnaeus, 1758) (see Trilles, 1975, for synonymy), and the type specimen of *A. physodes* is held at the British Museum (Natural History) (1758: 636).

Remarks. The genus *Anilocra*, currently with about 37 species, is primarily tropical in distribution. Only three eastern Atlantic species extend beyond the tropics (Trilles, 1975). *Anilocra frontalis* occurs off the Dutch coast at latitude 53°33'N (Holthuis, 1978). In Australia, the most southerly records of *Anilocra* are of *A. leptosoma* and *A. apogonae*, both of which occur in Moreton Bay, southern Queensland (ca. 27°S). The distribution of Australian *Pleopodias* and *Anilocra* is given in Figure 33.

There are two areas of high diversity, the West Indies with nine species, and the Australian-Malaysian region with 18 species. The eastern Atlantic has three species, while the Indian and Pacific Oceans (excluding Australia) have 14 species, seven of which are from the Malaysian-Indonesian area.

Characters which separate *Anilocra* from related genera are to be found in the key. *Anilocra* is distinguished from *Pleopodias* by the obviously wider pleon and pleotelson, shorter antennule articles, shorter mandible palp article 3, and the character differences listed under the remarks for *Pleopodias*.

Types of four Indo-Pacific species were either not located (*A. australis* Schiöde & Meinert, 1881, and *A. alloceraea* Koelbel, 1878), or not made available for study (*A. acuminata* Haller, 1880, and *A. tropica* Avdeev, 1977). The status of these species, with the exception of *A. alloceraea*, is uncertain, and they cannot be separated from others of the genus with any confidence. *Anilocra australis* is characterised by a very short uropod endopod. *Anilocra tropica* is apparently characterised by a very wide pleon, short subequal uropod rami, and pereopod 7 with very large spines which occur on the merus, propodus, and uniquely, on the dactylus (Avdeev, 1977, fig 2). Little can be said of *Anilocra acuminata*, but that it could be one of many Indo-Pacific species.

Characters of Taxonomic Utility

Cephalon: rostrum: width, length; eye size. Pereon: relative width. Pleon: relative length of pleonite 1; relative width; details of posterolateral angles of pleonites 4 and 5; detail of lateral margins of pleonites 1–4. Pleotelson: shape; lateral margins flat or upturned.

Antennule and antenna: relative lengths of both,

number of articles present in antenna; antennule article 3 produced or not. Mouthparts: mandible palp; details of maxilla and maxilliped may often be supportive characters. Pereopods: shape of, and presence and distribution of nodules on dactylus of pereopods 1–4; density of spines on pereopod 7; relative length of pereopod 7 compared to pereopod 1. Pleopods: shape and width; degree of folding on pleopods 3–5; presence or absence of appendix masculina. Uropods: shape; relative lengths of rami; extension beyond pleotelson or not.

Host Preferences

Recent work by Williams & Williams (1981) demonstrated that *Anilocra* species have a higher degree of host specificity than previously suspected. Prior to their revision of the Caribbean *Anilocra*, most specimens were attributed to *Anilocra laticauda* which had been recorded from hosts of 11 fish families (Trilles & Vala, 1975). Williams & Williams (1981) found *A. laticauda* to be a *nomen dubium*, and recorded nine species of *Anilocra* from the West Indies. Of these, five were recorded from a single host species, three were from two to four species within a genus, and one from nine host species from three genera of Serranidae. This suggests a strong correlation between isopod and host family, but varying degrees of specificity at low levels of host classification.

Half of the Australian species recorded here lack host data. The remainder suggest a pattern similar to that of West Indian *Anilocra*: close affinity to a host family, lower specificity to genus and species. *Anilocra apogonae* is recorded from five host species in two genera of Apogonidae. *Anilocra nemipteri* from seven species in three genera of Nemipteridae, and also one species of Pomacentridae. *Anilocra pomacentri* is recorded from ten species in three genera of Pomacentridae.

Host preference on the Great Barrier Reef appears to be strongly localised. At Lizard Island, *Anilocra pomacentri* utilises *Pomacentrus melanochir* and *P. pavo*, while on Heron Island and adjacent Wistari Reef it has been recorded only from *Chromis nitidus*. In the Palm Group, these three hosts are present, but *A. pomacentri* occurs commonly on *Pomacentrus melanopterus*, *Pomacentrus lepidogenys* and *Pomacentrus moluccensis*. *Anilocra nemipteri* occurs commonly on *Scolopsis bilineatus* at Lizard Island. It is not found on that host in the Palm Group but on *Scolopsis monogramma* and *Pentapodus setosus*. Table 1 summarises host data for Australian species of *Anilocra*.

In areas of high host species diversity (West Indies, central Indo-Pacific) *Anilocra* species are found on a limited number of host species, usually within one or two genera. In areas of lower diversity, the isopod can utilise a greater number of hosts, perhaps through reduced competitive pressure. An example is the north-eastern Atlantic and Mediterranean species *Anilocra physodes* which has been recorded from 25 genera in