

# Cymothoidae (Crustacea, Isopoda) from Indian fishes

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## Abstract

Four cymothoid isopods, parasites of fishes, are reported from India. Two new species, *Nerocila poruvae* and *Joryma hilsae* are described. A full description of *Nerocila longispina* Miers, 1880 is included and two hosts are identified. The distribution and hosts of *Anilocra dimidiata* Bleeker, 1857 are updated. *Nerocila poruvae*, *N. longispina* and *Anilocra dimidiata* were collected from the Southeastern coasts of India and *Joryma hilsae* from the Southwestern coasts.

## Keywords

Cymothoidae, *Nerocila poruvae* sp. nov., *Joryma hilsae* sp. nov., India

## Introduction

Cymothoidae (Crustacea, Isopoda) are ectoparasitic isopods on marine, brackish and freshwater fish (Trilles 1969, 1994). They are found in several of the earliest references on natural history (e.g., Belon 1553, Rondelet 1554). Despite the antiquity of these studies, they are still many parts of the world where they are poorly known or completely unknown (Bowman and Tareen 1983, Trilles 1994, Hadfield *et al.* 2010). The Indian cymothoid fauna is relatively poorly known and until now studies on these parasitic isopods were scanty on marine fishes from the Indian coasts (Pillai 1954, 1964; Bal and Joshi 1959; Veerapan and Ravichandran 2000). Several additional studies were devoted to a single species (Panikkar and Aiyar 1937, Chidambaram and Devidas Menon 1945, Kuriyan 1952, Tiwari 1953, Evangeline 1963, Seshagiri Rao 1981, Parimala 1984, Williams and Bunkley-Williams 1994, Biju Kumar and Bruce 1997, Veerappan and Ramanathan 1997, Raghunathan and Rema Devi 1998). Some articles reported new hosts (Seshagiri Rao 1974; Misra and Nandi 1986; Ravichandran *et al.* 1999, 2009; Ravichandran and Ramesh Kumar 2004; Rajkumar *et al.* 2004, 2005a, b; Ravichandran 2007, 2009; Rameshkumar and Ravichandran 2010) or dealt with a specific area (Chilka Lake, Chilton 1924; Pulicat Lake, Jayadev Babu and Sanjeeva Raj 1984).

In this study, to partly begin to correct this deficiency, we report on a collection of cymothoids from the South coasts of India.

## Materials and methods

Fish were collected directly from the trawlers landed at Vedaranyam (10°45'N, 79°52'E) and Muttam (9°54'N, 76°43'E), respectively Southeastern and Southwestern coasts of India. Isopods were removed alive from the body surface and the branchial cavities of the fish hosts and immediately placed into 70% ethanol. Thirteen specimens were collected (Table I). Additional samples were obtained from the Museum National d'Histoire Naturelle in Paris (MNHN) and from the Rijksmuseum van Natuurlijke Historie te Leiden (RMNH). The total length of the fish hosts and isopods was measured and all measurements are in millimetres. Mouthparts and appendages were carefully dissected using dissecting needles and forceps. Drawings were made with the aid of a camera lucida. Host nomenclature and fish taxonomy are according to FishBase (Froese and Pauly 2010). Holotype specimens are deposited in the collections of the MNHN, paratypes and other specimens in the collection Ravichandran of the Annamalai University.

Abbreviations used: AUCR – Annamalai University, collection Ravichandran, BMNH – British Museum (Natural History) of London, MNHN – Museum National d'Histoire Naturelle, Paris, RMNH – Rijksmuseum van Natuurlijke Historie te Leiden.

**Table I.** Collected cymothoid specimens

Species	No. of specimen	Host	Locality	Means of capture
<i>Nerocila poruvae</i> sp. nov.	4	<i>Thryssa mystax</i> and <i>Trichurus lepturus</i>	Vedaranyam Coasts, Southeastern coast	Trawlers
<i>N. longispina</i>	2	<i>Terapon puta</i> and <i>Otolithes ruber</i>	Vedaranyam Coasts, Southeastern coast of India	Trawlers
<i>Anilocra dimidiata</i>	3	<i>Sardinella longiceps</i> and <i>Leiognathus</i> sp.	Vedaranyam, Southeastern coast of India	Trawlers
<i>Joryma hilsae</i> sp. nov.	4	<i>Sardinella</i> sp., <i>Stolephorus commersonii</i> and <i>Hilsa kelee</i>	Muttam, Southwestern coast of India	Trawlers

## Results

### Taxonomy

Suborder Cymothoidea Wägele, 1989  
 Superfamily Cymothoidea Leach, 1814  
 Family Cymothoidae Leach, 1814  
 Genus *Nerocila* Leach, 1818

### *Nerocila poruvae* sp. nov.

Material examined: Holotype female (ovigerous, 26 mm), (MNHN 6288), Vedaranyam Coasts, Southeastern coast of India, 08 September 2009, on *Thryssa mystax* (112 mm).

Paratypes: Female (ovigerous, 20 mm), (AUCR C17), on *Trichiurus lepturus* (272 mm) and 2 females (ovigerous, 23 and 27 mm), (AUCR C18), in the fishing net where they are only *Thryssa mystax*, from Vedaranyam Coasts, Southeastern coast of India, 08 September 2009.

Additional material: Some specimens from the RMNH, already reported by Trilles (1979) i.e. female (ovigerous, 22 mm), West India (RMNH no. 3); female (ovigerous, 29 mm), not labelled, with one ovigerous female of *Nerocila phaiopleura* in the same bottle (RMNH no. 5); female (ovigerous, 30 mm), Java Sea, parasitic on fishes, March 1918, leg. P. Buitendijk (RMNH no. 45).

Description of the female (Figs 1 and 2): Body about 2.5 times as long as wide, widest between pereonites 4–7. Cephalon anterior margin rounded or with indistinct medial point. Eyes with facets almost indistinct. Pereonites 1 and 5–7 longest, 2–4 shortest and subequal. Posterolateral angles of pereonites 1–7 not produced. Coxae 2–4 not extending beyond posterior of pereonites, visible in dorsal view, 2–3 with posterior margins truncate and 4 acute; coxae 5–7 longer than their respective segment and much more wide and long than the anterior, posterior margins acute. All pleonites visible; pleonites 1 and 5 widest, pleonite 5 longest. Ventrolateral margins of pleonites 1–2 posteriorly directed, extending to pleonite 4 or beyond pleonite 5, respectively; pleonites 3–5 rounded, not produced. Pleotelson linguiform, lateral margins curving to medial point, about 1.2 times as long as wide.

Antennula extending to pereonite 1, 8 articulated, articles 1 and 2 longer than article 3, with setae on articles 2–8. Antenna 11 articles, 3–11 with setae.

Mandible palp article 1 largest and article 3 with setae on distolateral margin. Maxillula with 4 terminal spines. Maxilla with 2 spines on medial lobe and 1 spine on lateral lobe. Maxilliped with oostegial lobe, distal palp segment with 3 terminal spines.

Pereopods 1–5 without spines, dactylus about 2 times longer than propodus. Pereopods 6–7 decreasing in length respectively, with dactylus smaller than others; pereopods 6 with 2 spines on posterior margin of carpus and 1 spine on propodus; pereopod 7 with 1 spine on posterior and 1 spine on anterior margin of merus, 2 spines on posterior margin of carpus and a row of 7 spines on propodus.

Pleopods 1–2 with all rami lamellar, 4 coupling hooks and 1 plumose seta or 4 spiny setae on protopod medial margin, endopod proximomedial lobe well-developed but not folded; pleopod 2 appendix masculina about 0.5 length of endopod. Pleopods 3–4 endopod with a single lobe, proximomedial lobe well-developed and folded; pleopod 5 endopod with several large folds and proximomedial lobe well-developed and folded.

Uropod slender, tapering exopod and endopod, exopod about 2 times longer than endopod, both rami extending far beyond posterior margin of pleotelson.

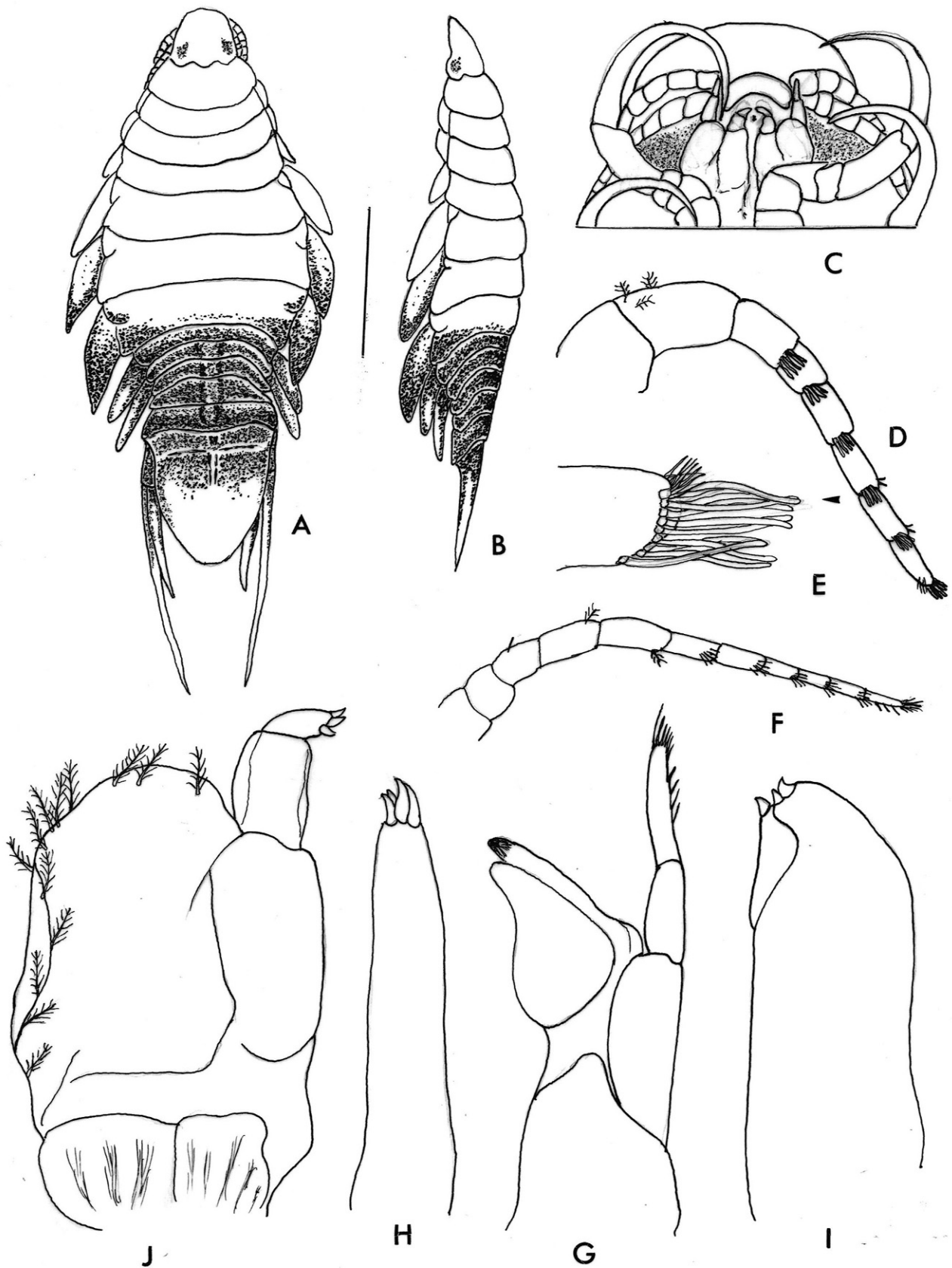
Male: Not known.

Colour: Body pale tan with coxae 6–7, posterior part of pereonite 7, all pleonites, anterior part of pleotelson and uropods dark.

Size: Ovigerous female 20–30 mm.

Remarks: The combination of several characters serves to distinguish *Nerocila poruvae* from the other species of the genus: coxae 5–7 longer than segment, much wider and longer than coxae 2–4, with posterior margin acute; lack of posterolateral pereon processes; ventrolateral margins of pleonites 1–2 strongly produced, posteriorly directed, extending beyond pleonite 5; uropods slender and long, extending largely beyond the distal margin of the pleotelson, exopod much longer than endopod.

Some additional features may be also useful i.e., pleotelson heart-shaped, longer than wide; pleonites 4–5 subequal



**Fig. 1.** *Nerocila poruvae* sp. nov., ovigerous female: **A** – dorsal view; **B** – lateral view; **C** – cephalon, ventral view; **D** – antennula; **E** – antennula apex; **F** – antenna; **G** – mandible; **H** – maxillula; **I** – maxilla; **J** – maxilliped. Scale bar = 0.5 mm

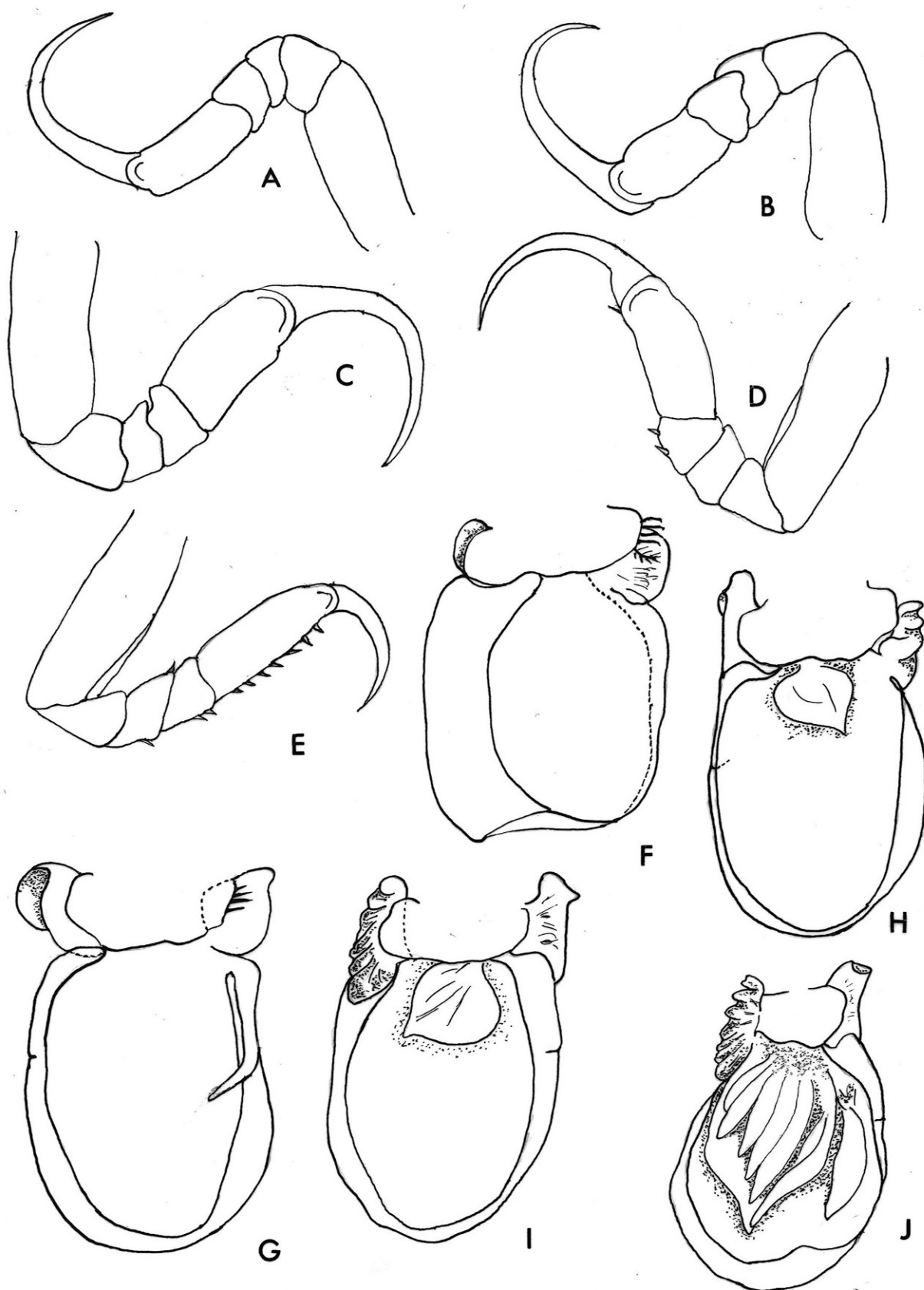
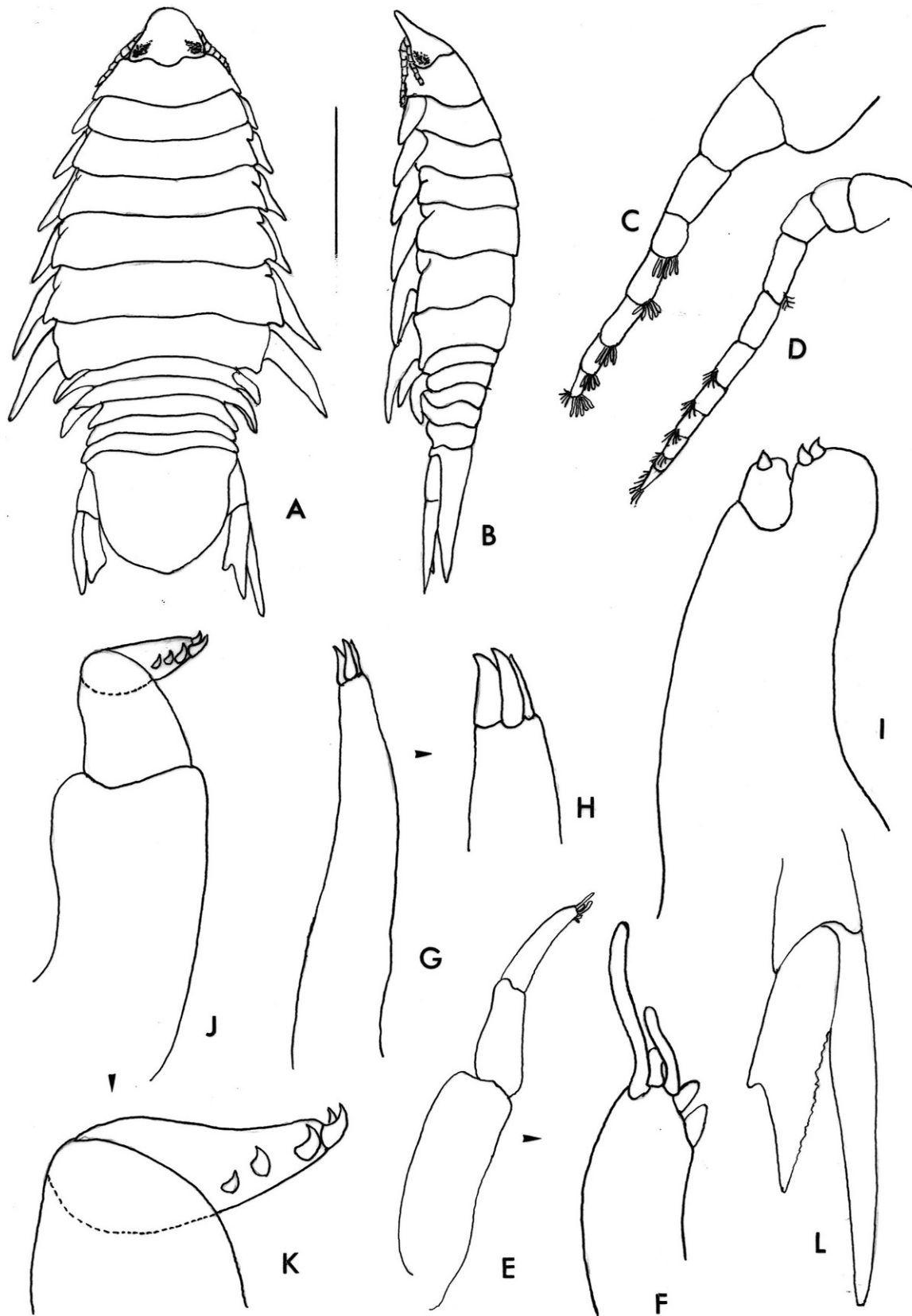


Fig. 2. *Nerocila poruvae* sp. nov., ovigerous female: A – pereopod 1; B – pereopod 2; C – pereopod 4; D – pereopod 6; E – pereopod 7; F-J – pleopods 1 to 5



**Fig. 3.** *Nerocila longispina* Miers, 1880, non ovigerous female: **A** – dorsal view; **B** – lateral view; **C** – antennula; **D** – antenna; **E** – mandible palp; **F** – mandible palp article 3; **G** – maxillula; **H** – maxillula apex; **I** – maxilla; **J** – maxilliped; **K** – maxilliped article 3; **L** – uropod. Scale bar = 0.5 mm

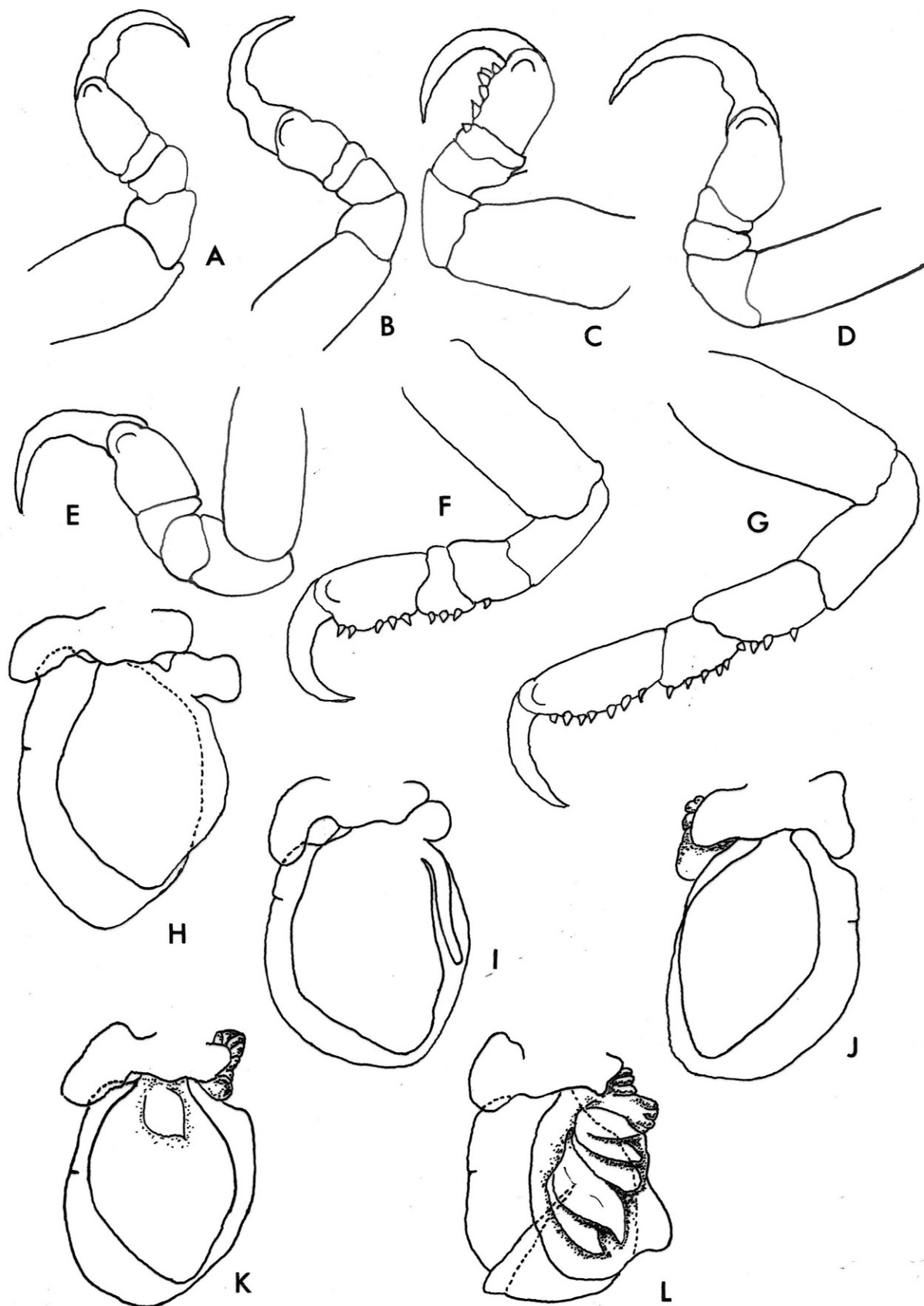


Fig. 4. *Nerocila longispina* Miers, 1880, non ovigerous female: A-G – pereopods 1 to 7; H-L – pleopods 1 to 5

and longer than 1–3; slender and long pereopods 1–5 with dactyli well-developed; darkness of posterolateral part of pereon, all pleon and anterior part of pleotelson and uropods.

Hosts: Known only from the type locality, *Thryssa mystax* (Engraulidae) and *Trichiurus lepturus* (Trichiuridae). *Thryssa mystax* is distributed into the Indo-West Pacific: Western coast of India to Myanmar and South to Java, Indonesia; *Trichiurus lepturus* is widely distributed throughout tropical and temperate waters of the world.

Distribution: Southeastern coasts of India and Java Sea.

A specimen held in the RMNH, labelled from West Indian, host unknown, was already mentioned by Trilles (1979). If this data is correct, we can deduce that this species is maybe more widely distributed. However this record should be regarded as doubtful but given the wide distribution of *Trichiurus lepturus*, this possibility is maybe not out of the question.

Etymology: The epithet is derived from poruva, the common name of *Thryssa mystax* in Tamil Nadu, India.

### *Nerocila longispina* Miers, 1880

Synonymy: *Nerocila longispina* Miers, 1880: 468. Nierstrasz, 1915: 78. Nierstrasz, 1931: 125. Ellis, 1981: 124. Bruce, 1987: 355, 412, fig. 35A-D. Trilles, 1994: 92.

Material examined: Female (non ovigerous, 20 mm) (AUCR C21), on *Therapon puta* (132 mm), female (ovigerous, 24 mm) (AUCR C22), on *Otholites ruber* (127 mm), from Vedaranyam, Southeastern coasts of India, 08 September 2009.

Additional material: From the MNHN, several female specimens of *Nerocila sunndaica* Bleeker, 1857, no. 147 (ovigerous, 31.5 mm) from the Cape of Good Hope, South Africa; no. 148 (13 ovigerous, 27–36 mm and 2 non-ovigerous, 25 and 33 mm) locality unknown. These specimens were already photographed and reported by Trilles (1975).

Description of the female (Figs 3 and 4): Body about 2 times as long as wide, widest between pereonites 6–7. Cephalon anterior margin narrowly rounded or with slender medial point. Eyes large, occupying 0.6 width of cephalon. Pereonites 1, 5 and 6 longest and subequal, 2–4 and 7 shortest and subequal. Posterolateral angles of pereonites 1 produced backward into a pointed process, those of pereonites 3–7 weakly produced. Coxae 2–7 produced into successively longer pointed processes, always exceeding posteroventral corners of pereonites and more strongly angled away from the body. All pleonites visible; pleonites 1 and 5 longest; ventrolateral margins of pleonites 1–2 produced as far as pleonite 3, curving posteriorly obliquely to the longitudinal body axis; pleonites 3–5 lateral margins weakly acute. Pleotelson about 1.2 times wider than long, smoothly rounded.

Antennula 8 articulated, 1 larger than 2–3, articles 4–7 each with dense posterodistal cluster of esthetes and article 8 with esthetes and spiny setae. Antenna with 11 articles, 4 and 6–11 with plumose or spiny setae. Mandibular palp with 5 unequal setae at apex of 3rd article.

Maxillula with 3 terminal spines. Maxilla with 2 spines on medial lobe and 1 spine on lateral lobe. Maxilliped distal article with 5 hooked spines.

Dactylus of pereopods 1, 2, 4 with swellings; pereopods 1, 2, 4–5 without marginal hooked spines; pereopod 3 with 1 spine on carpus and 5 unequal spines on propodus; pereopod 6 with 1 spine on merus, 3 spines on carpus and 6 spines on propodus; pereopod 7 with 3 marginal spines on merus, 7 on carpus and 8 on propodus.

Protopod of pleopods without retinaculæ; endopod 1–5 with proximomedial lobe well-developed; pleopod 2 with appendix masculina about 0.6 length of endopod; pleopod 4 with single small fold on endopod; pleopod 5 with large folds.

Uropod rami extending beyond posterior margin of pleotelson; exopod slightly longer than endopod; endopod with a notch on medial margin and very coarsely serrate lateral margin.

Male: Not known.

Colour: Pale tan with sparsely scattered chromatophores.

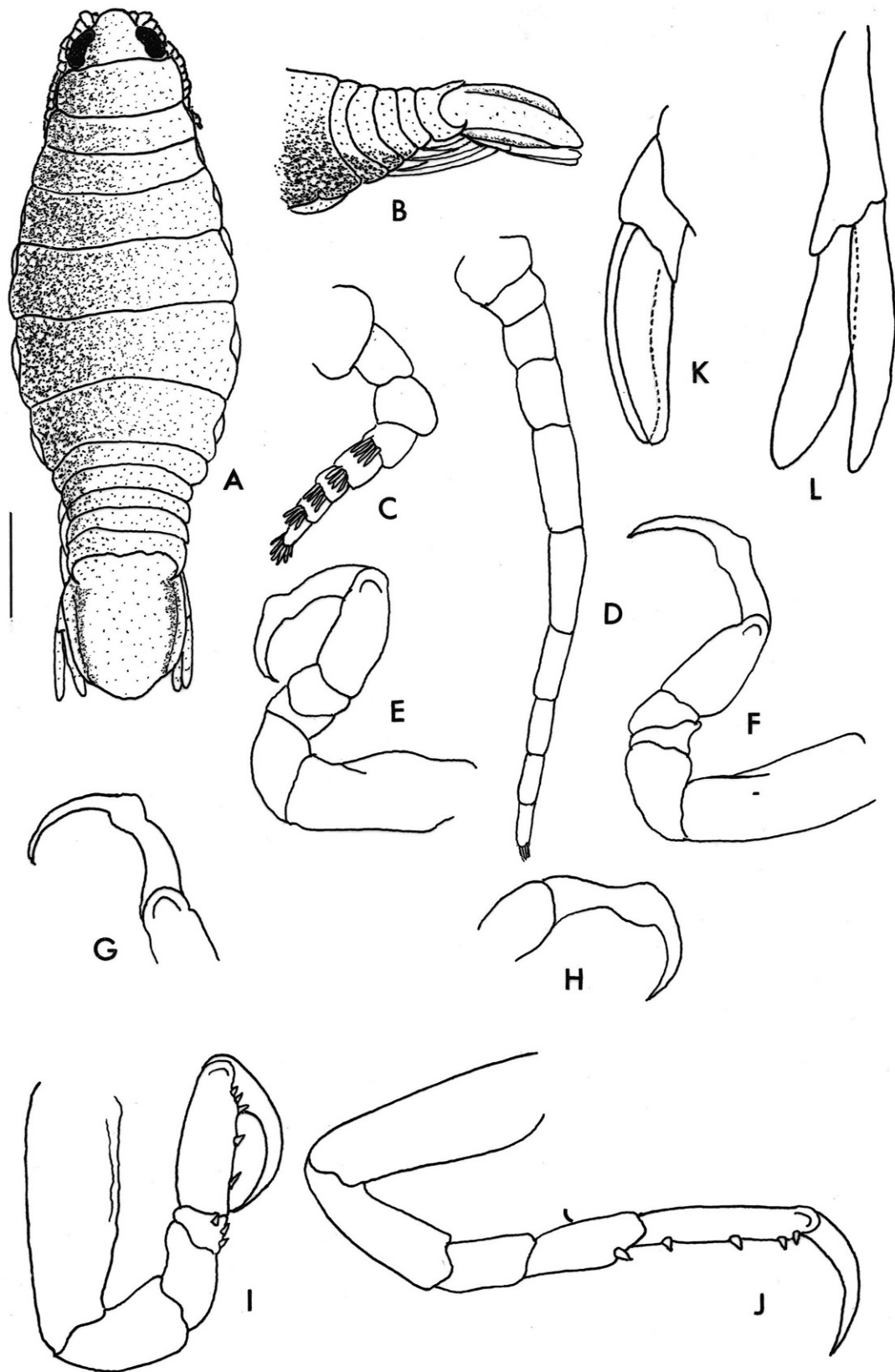
Size: Non ovigerous female, 20 mm; ovigerous female, 24 mm.

Remarks: *Nerocila longispina* has not been described and figured by Miers (1880); the lateral view of the coxae of the sixth pereonite was only drawn by the author. Bruce (1987) gave few figures (dorsal view, ventral view, cephalon, pereopod 7 and uropods) without description of the holotype of this species (BMNH: Holotype 1849: 86. Malabar; presented by I. Ward, according to Ellis 1981). So, a detailed description was necessary, particularly with precise drawings of the mouthparts and other appendages given here.

*Nerocila longispina* belongs to the *Emphyllia* group of species (Bowman 1978, Bruce 1987). Until now, it is the single species of that group, other than *Nerocila sunndaica* Bleeker, 1857, that has the anterior margin of the cephalon narrowly rounded and the basal segments of the antennula inflated and close set. *Nerocila longispina* differs from *Nerocila sunndaica* in having the lateral margin of uropod endopod finely serrate, the coxae 5–7 more strongly angled away from the lateral margin of the body, the posterolateral angles of pereonite 7 weakly produced instead backward into a pointed process as in *Nerocila sunndaica*.

Hosts: Until now hosts were unknown. In this study, two hosts are identified: *Therapon puta* (Therapontidae) and *Otholites ruber* (Sciaenidae). *Therapon puta* is an Indo-West Pacific species known from the Northern Indian Ocean to the Indo-Australian Archipelago; this is a lessepsian migrant now prevalent in the Mediterranean. *Otholites ruber* is also an Indo-West Pacific species reported from East Africa including Madagascar (absent in the Red Sea) to the Southern China Sea and Queensland, Australia.

Chidambaram and Devidas Menon (1945) reported *Nerocila sunndaica* from six different species of fishes on the west coast of India, i.e. *Otholites ruber*, *Therapon jarbua*, *Engraulis mystax* (Engraulidae), *Serranus gilberti* (Serranidae), *Pellona indica* (Pristigasteridae) and *Sardinella fimbriata* (Clupeidae). It's likely that some specimens collected by these authors be-



**Fig. 5.** *Anilocra dimidiata* Bleeker, 1857, ovigerous female: **A** – dorsal view; **B** – pleon and pleotelson, lateral view; **C** – antennula; **D** – antenna; **E** – pereopod 1; **F** – pereopod 2; **G** – pereopod 3, dactylus; **H** – pereopod 4, dactylus; **I** – pereopod 6; **J** – pereopod 7; **K** – Indonesian specimen, uropod drawn by Bruce (1986); **L** – uropod. Scale bar = 0.4 mm



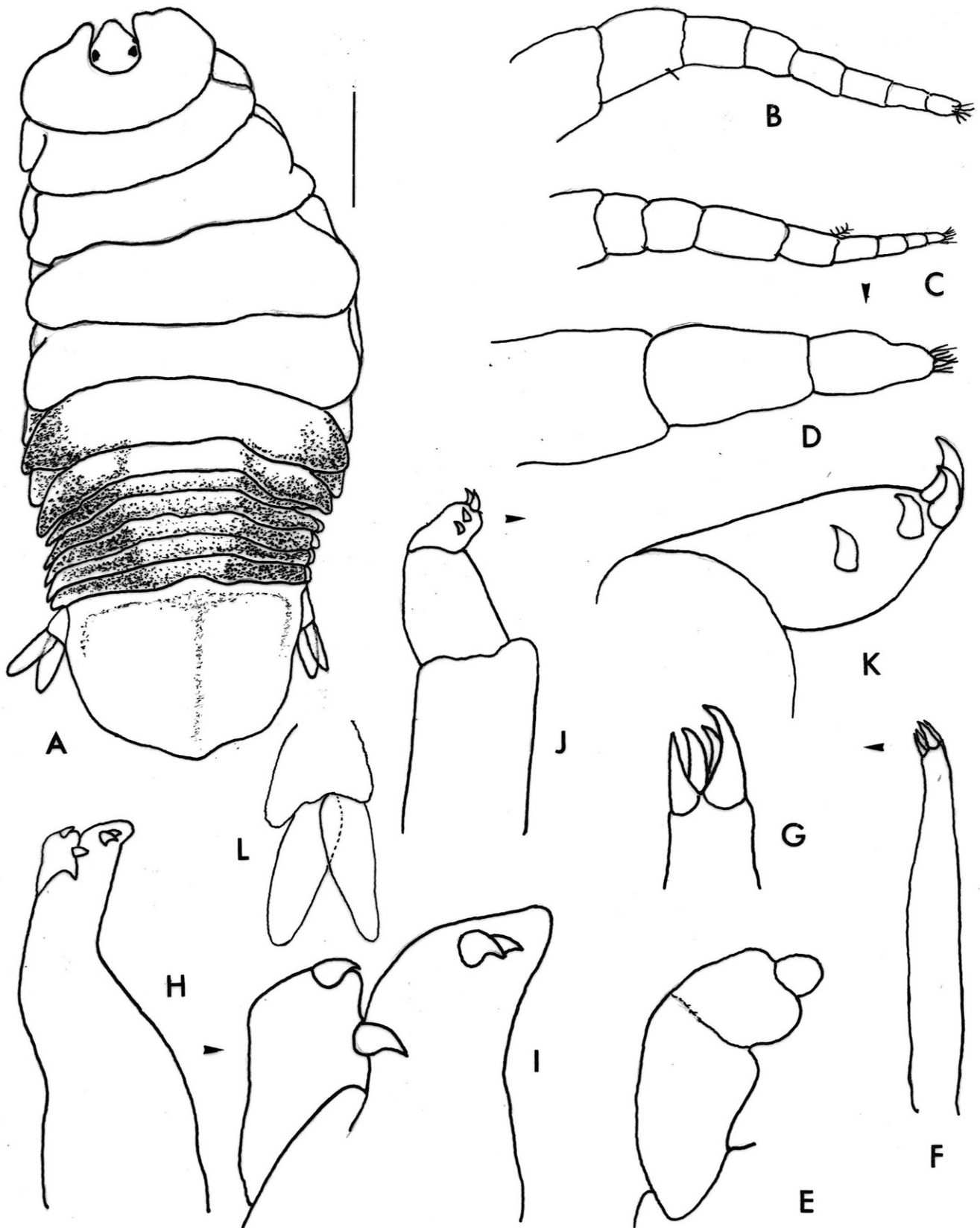


Fig. 6. *Joryma hilsae* sp. nov., ovigerous female: A – dorsal view; B – antennula; C – antenna; D – antenna apex; E – mandible palp; F – maxillula; G – maxillula apex; H – maxilla; I – maxilla apex; J – maxilliped; K – maxilliped article 3; L – uropod. Scale bar = 0.35 mm



Fig. 7. *Joryma hilsae* sp. nov., ovigerous female: A – pereopod 1; B – pereopod 2; C – pereopod 3; D – pereopod 5; E – pereopod 6; F – pereopod 7; G-K – pleopods 1 to 5

longed to *Nerocila longispina*. However, since the inaccuracy of the single drawing (dorsal view) given by them, we are not able to resolve this question.

Distribution: Malaysian region (Miers 1880, Bruce 1987; Malabar, Java (Ellis 1981), Vedaranyam coast, Southeastern India (present study).

### Genus *Anilocra* Leach, 1818

#### *Anilocra dimidiata* Bleeker, 1857

Synonymy (\*unconfirmed records or citations according to Bruce 1986): *Anilocra dimidiata* Bleeker, 1857: 21, 30, 31–32, pl. 2, fig. 10. Miers, 1880: 462–463. Schioedte and Meinert, 1881: 111–113, pl. VIII (Cym. XV), figs 5–6. \*Stebbing, 1900: 639–640, \*1905: 26. \*Gerstaecker, 1882: 261. Richardson, 1910: 18 (part). Nierstrasz, 1915: 81–83, \*1918: 114, \*1931: 128. Monod, 1934: 10–11, pls XVII, C-D, XXIV, A, XXV, D-F. \*Serene, 1937: 69. \*Pillai, 1954: 14. \*Trilles, 1975: 305–306, pl. 1, fig. 2; \*1979: 249; 1994: 60–61. Bruce, 1986: 85, 93, 99–102, 117, figs 9–11. Bruce and Harrison-Nelson, 1988: 588. *Anilocra carpentariensis* Avdeev, 1977: 143–144, fig. 3. Trilles, 1994: 59. *Anilocra dimidiata* Bowman and Tareen, 1983: 5 (lapsus).

Material examined: 3 females (2 ovigerous, 22 and 24 mm; 1 non ovigerous, 19 mm), (AUCR C23), on *Sardinella longiceps* (148 mm) and 2 females (ovigerous, 20 and 28 mm) (AUCR C24) on *Leiognathus* sp. (102 mm) from Vedaranyam coast, Southeastern India, 30 January 2010.

Additional material: From the RMNH, several female, intermediate stage and male specimens (nos. 13, 24, 25, 29, 37, 41, 49, 62, 63 and 64) from Java and Sumatra, already reported by Trilles (1979). From the MNHN, 7 ovigerous females (no. 90) from Batavia (= Djakarta), Bleeker: 97, 1857 and 1 ovigerous female from New Guinea, N. Rix: 38–119, 1891, already reported by Trilles (1975).

Descriptive notes (Fig. 5): Previously briefly described by Bleeker (1857) and Schioedte and Meinert (1881), *Anilocra dimidiata* was most recently carefully treated by Bruce (1986). The strongly produced and acute posterolateral margins of pleonite 5, antennula 8 articulated, extending to posterior of eye, with article 3 strongly produced, antenna with 10 articles, extending to the posterior of pereonite 2, pereopods 1–4 with nodules on dactylus anterior and posterior margins are the principal characters of the female by which this species can be identified.

Variations: Indian and Indonesian specimens are similar, i.e. slightly wider than Australian specimens. However, according to Bruce (1986) width ranges of the Indonesian and Australian populations overlap. In the Indian specimens the uropod rami are subequal in length, as in the Indonesian specimens, while they are unequal in Australian specimens according to Bruce (1986); antennulae are with 8 articles as in the Australian specimens but erroneously mentioned with 6–7 articles in the text; pereopods 6–7 are with less spines on carpus and propodus.

Colour: Body size which is uppermost when attached on host is dark as first reported by Bleeker (1857) and later by Bruce (1986). Such character was carefully studied by Trilles (1968) in the Mediterranean species *Anilocra physodes*.

Size: Non ovigerous female 16.0–23.0 mm; ovigerous female 18.5–29.0 mm; male 21.0 mm.

Hosts: Bleeker (1857) just stated “habite la peau de diverses espèces de poissons de la mer de Batavia” (It lives on the skin of different fish species of the Batavia Sea). Later, *Anilocra dimidiata* was reported from *Psettus evansi* (Monodactylidae; name unconfirmed) (Nierstrasz 1915, Bruce 1986), *Leiognathus bindus* (Leiognathidae) and unspecified *Nemipterus* spp. (Nemipteridae) (Bruce 1986).

Some other records need confirmation: “fish called *Losilili*”? (Stebbing 1900); *Scolopsis* (Nemipteridae) (Richardson 1910); *Epinephelus* (Serranidae) (Monod 1934); *Lactarius lactarius* (Lactariidae) (Pillai 1954).

The range of host fishes is here extended and now includes *Sardinella longiceps* (Clupeidae).

Distribution: *Anilocra dimidiata* has a wide distribution. It was previously recorded from the Malaysian area, Batavia/Djakarta (Bleeker 1857, Miers 1880), Indonesia, Vietnam (Monod 1934), Philippines (Richardson 1910), Sri Lanka and Palk Bay (Stebbing 1905, Bruce and Harrison-Nelson 1988), Travancore, Southwestern coasts of India (Pillai 1954). Later it was recorded from Wessell Islands, Gulf of Carpentaria and Townsville in Australia (Bruce 1986) and the Tsiupaika Bay, Madagascar (Bruce and Harrison-Nelson 1988). The distribution of this species is here extended to the Vedaranyam coast, Southeastern coasts of India.

### Genus *Joryma* Bowman et Tareen, 1983

#### *Joryma hilsae* sp. nov.

Material examined: Holotype female (ovigerous, 22 mm), (MNHN 6289), Muttam, Southwestern coasts of India, 09 June 2009, on *Sardinella* sp. (163 mm).

Paratypes: 3 females (non ovigerous, 13 mm) (AUCR C19) from *Stolephorus commersonii* (175 mm) and 2 females (non ovigerous, 14 and 15 mm) (AUCR C20) from *Hilsa kelee* (126 mm), 9 June 2009, Muttam, Southwestern coasts of India.

Description of the female (Figs 6 and 7): Body asymmetrical, twisted to one side, 2.1 times as long as wide, widest at pereonite 5. Cephalon as long as wide, anterior margin rounded. Eyes moderately developed, partly covered by pereonite 1, visible dorsally. Pereonite 1 produced on each side into slightly bilobed processes reaching the anterior margin of cephalon; pereonites 1 and 4 longest, 2 and 7 shortest, 3, 5 and 6 subequal in length. Coxae dorsally visible, 2 and 3 largest; coxae 4 and 7 reaching the middle of the pereonite margins; posterolateral margins of pereonite 2–7 inflated particularly at the hunched side of pereon. Pleon not immersed in pereon. All pleonites visible, pleonite 1 slightly shortest and 5 longest, others subequal in length, lateral parts curving posteriorly only at one side,

Table II. Comparison species of *Joryma*

Species	Head	Pereonite 1 antero-lateral expansion	Pleonites	Pleotelson	Antenna	Mandibular palp	Maxilliped recurved spines	Uropods rami
<i>J. hilsae</i>	conspicuous dorsally, reaching margin of pereonite 1 expansion	bilateral, slightly bilobed	not overlapped	broadly rounded	9 articles	3 segmented	4	equal
<i>J. sawayah</i>	exposed dorsally, not reaching margin of pereonite 1 expansion	bilateral, distinctly bilobed	1, 2, 3 overlapped laterally	triangular	8	not segmented	7	unequal
<i>J. engraulidis</i>	exposed dorsally, reaching beyond pereonite 1 expansion	unilateral, not bilobed	not overlapped	broadly rounded	8	3 segmented	3	unequal
<i>J. tartoor</i>	covered dorsally by pereonite 1	bilateral, slightly bilobed	1 and 2 overlapped laterally	acutely triangular	9 or 10	3 segmented but segmentation incomplete	4	unequal
<i>J. brachysoma</i>	exposed dorsally, not reaching pereonite 1	bilateral, slightly bilobed	1 entirely overlapped, not visible in dorsal view	round-triangular	8	distinctly 3 segmented	3	unequal

posterior margin of pleonite 5 bisinuous. Pleotelson 1.2 times as wide as long, smoothly rounded with caudomedial lobe. Uropods much shorter than pleotelson.

Antennula well separated at base, composed of 8 articles; article 2 with 1 spiny seta and article 8 with few setae. Antenna slightly shorter and more slender than antennula, 9 articulated but the separation between articles 8/9 is sometimes visible with difficulty, article 5 with a plumose seta and a cluster of setae on the distal margin of article 9.

Mandible with a thick palp, three segmented but separation apparently incomplete between the segments 1 and 2; maxillula as usual styliform, with 3 or 4 apical hooks; maxilla with 2 spines on medial and lateral lobes; terminal segment of the maxilliped with 4 recurved spines.

Pereopods short, increasing in size from PI to PVII, with dilated basis and ischium, and reduced dactylus. All pereopods are without spines.

All pleopod rami lamellar, endopod smaller than exopod; protopod without coupling hooks and expanded laterally into rounded lobes; pleopod 2 without appendix masculina; proximo-medial lobe increasing in size from endopod 1 to 5. Uropods reaching the middle of the lateral margin of pleotelson, rami equal in length, apically rounded, endopod widest.

Male: Not known.

Colour: Body pale tan with large dark stripes on lateral parts of pereonites 6 and 7 and pleonites 1–5.

Size: Non ovigerous female, 13–15 mm; ovigerous female, 22 mm.

Remarks: Until now, four species were included in the genus *Joryma*: *J. engraulidis* (Barnard 1936), *J. tartoor* (Pillai 1954), *J. brachysoma* (Pillai 1964) and *J. sawayah* Bowman and Tareen 1983. The first three species were transferred from the genus *Agarna* Schioedte and Meinert 1884 by Bowman and Tareen (1983). However, *J. engraulidis* was first assigned to the genus *Livoneca* Leach, 1818 by Pillai (1964).

The most obvious distinctive characters between all species until now assigned to the genus *Joryma* are given in (Table II).

Hosts: Known only from the type hosts, *Sardinella* sp., *Hilsa kelee* and *Stolephorus commersonii*.

Until now, all the species belonging to the genus *Joryma* are almost exclusively parasitic on Clupeiformes fishes: *Joryma engraulidis* on

*Engraulis setirostris* and *Anchoviella zollingeri* (Engraulidae), *J. tartoor* on *Opisthopterus tardoore* (Clupeidae), *J. brachysoma* on *Pellona brachysoma* (Pristigasteridae), *J. sawayah* on *Ilisha indica* (Pristigasteridae) and *Therapon puta* (Perciformes, Terapontidae), *J. hilsae* on *Hilsa kelee*, *Sardinella* sp. (Clupeidae) and *Stolephorus commersonii* (Engraulidae). According to Froese and Pauly (2010), *Ilisha indica* and *Pellona brachysoma* are junior synonyms of *Ilisha melastoma* (Bloch and Schneider 1801).

Distribution: Known only from the type locality, Muttam, Southwestern coasts of India.

All the species assigned to *Joryma* are reported from the Northwestern Indian Ocean: most of them, *J. hilsae*, *J. engraulidis*, *J. tartoor* and *J. brachysoma*, from the Southwestern coasts of India and only one out of the Indian coasts, *J. sawayah* from Kuwait.

Etymology: Epithet is derived from that of a host genus.

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