Cymothoidae from Fishes of Kuwait (Arabian Gulf) (Crustacea: Isopoda)

THOMAS E. BOWMAN
and
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SMITHSONIAN CONTRIBUTIONS TO ZOOLOGY • NUMBER 382

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ABSTRACT

Bowman, Thomas E., and Inam U. Tareen. Cymothoidae from Fishes of Kuwait (Arabian Gulf) (Crustacea: Isopoda), *Smithsonian Contributions to Zoology*, number 382, 30 pages, 20 figures, 2 tables, 1983.—Cymothoid isopods, parasites of fishes, are reported from Kuwait and the Arabian Gulf. Six genera (1 new) and 9 species (6 new) are reported, including the new genus *Joryma* and the new species *Joryma sawayah*, *Anilocra monoma*, *Nerocila kisra*, *N. sigani*, *N. arres*, and *Catoessa gruneri*. *Nerocila phaiopleura* Bleeker is illustrated and redescribed. Notes and illustrations are given for *Cymothoa eremita* (Brünnich) and a species of *Mothocya* that is not identified to species because the single specimen is immature. A key is given to the species of *Nerocila* having serrate margins on the uropodal endopods. Three species of *Agarna*, *A. engraulidis* Barnard, *A. brachysoma* Pillai, and *A. tartoor* Pillai, are transferred to the new genus *Joryma*. *Agarna malayi* Tiwari, which had been transferred to *Idusa*, is returned to its original genus.

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Contents

Cymothoidae from Fishes of Kuwait (Arabian Gulf) (Crustacea: Isopoda)

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Introduction

It is not surprising that references to cymothoid isopods are found in some of the earliest works on natural history (e.g., Belon, 1553) for these crustaceans are conspicuous parasites of many fishes, including species that have provided us with food for centuries. Despite the antiquity of these published references, there are many parts of the world where the indigenous cymothoids are poorly known or completely unknown. One of the former regions is the Arabian Gulf, including Kuwait Bay, from which only 2 species of cymothoids have been reported, *Ichthyoxenus asymmetrica* Ahmed,1970a, and *Nerocila heterozota* Ahmed, 1970b. To partly correct this deficiency we report herein on a collection of cymothoids from Kuwait made by the second author, supplemented by collections from Kuwait Bay made by Stephen A. Grabe of the consulting firm, Dames and Moore (marked "SG" in "Material" sections), and specimens from Kuwait submitted by Welton Lee through Ernest W. Iverson (marked "WL" in "Material" sections). Sample not labled "SG" or "WL" were collected by I.U. Tareen. Figures 1 and 2 show the localities where collections were made.

The number listed after each specimen is the length in mm from the anterior margin of the head to the posterior margin of the telson.

All specimens are deposited in the Division of Crustacea, National Museum of Natural History, Smithsonian Institution. (USNM = collections of the former United States National Museum, deposited in the National Museum of Natural History, Smithsonian Institution.)

Acknowledgments.—We thank Mr. Grabe for making available the Dames and Moore material. Anne C. Cohen assembled and mounted the drawings. The syntype of *Nerocila serra* was borrowed from the Naturhistoriska Riksmuseet, Stockholm, through the courtesy of Charlotte Holmquist.

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Anilocra Leach, 1818

Anilocra monoma, new species

Figures 3*a–u*, 4

Material.—From *Acanthopagrus latus* (Houttuyn): Fish market, Jun 1977, USNM 190883, ♀ 23 (paratype). From *Hilsa ilisha* (Hamilton-Buchanan): Doha, 30 Aug 1976, USNM 190881, ♀

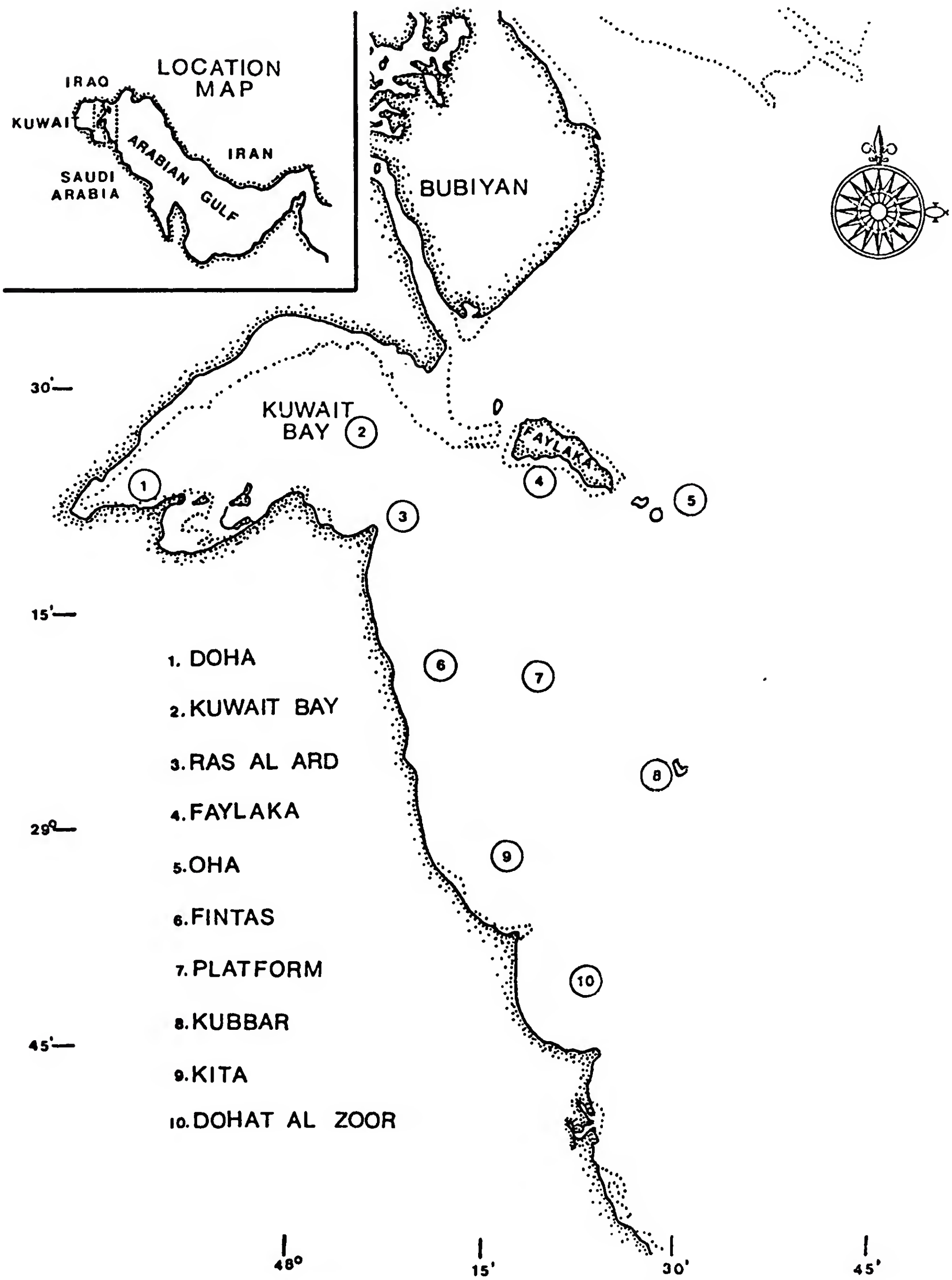

FIGURE 1.—Arabian Gulf along the coast of Kuwait, showing localities where cymothoid isopods were collected by Tareen.

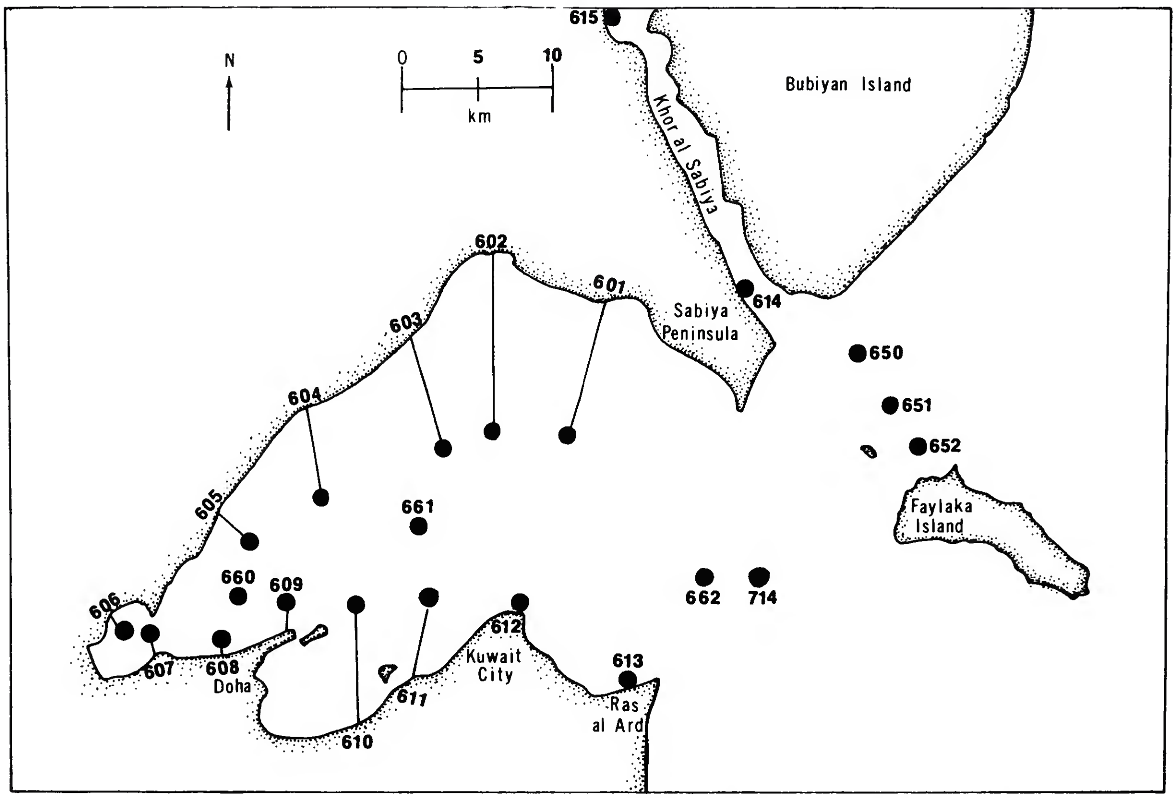

FIGURE 2.—Kuwait Bay, showing stations where cymothoid isopods were collected by Grabe; Offshore trawl stations are connected by lines to inshore stations having same station number where seined collections were made; exact position of latter depended upon tide level.

32 (holotype). From *Nematalosus nasus* (Bloch): SG 608 (seine), 5 Oct 1981, USNM 191044, juvenile 19.2 (paratype). From *Johnius aneus*: Kita, Mar 1977, USNM 190882, 2♀ 23.5, 46 (paratypes).

ETYMOLOGY.—From the Greek *mono* (one) plus *oma* (suffix signifying tumor), referring to the presence of a swelling on only one margin of the dactyl in pereopods 1–4.

DIAGNOSIS.—Head with nearly straight lateral margins, only slightly concave at level of antennae 1 and 2. Antenna 1 with segment 3 produced anteriorly into rounded lobe. Dactyls of pereopods 1–4 with swelling on anterior margin, without swelling or with only faint suggestion of swelling on posterior margin. Telson broadly rounded, that of smaller specimens longer than wide, with distinct caudomedial lobe; that of larger specimens wider than long, without caudomedial lobe. Uropods slightly longer than telson, rami linear, subequal or endopod slightly longer.

ADDITIONAL DESCRIPTION.—Antenna 1 8-merous; segments 1–3 and 8 each with a few distal setules. Antenna 2 longer and broader than antenna 1, reaching midlength of pereonite 1, 8-merous. Mandible with dense cluster of apical setae on 3rd segment of palp. Maxilla 1 with 4 apical spines. Maxilla 2 with 2 spines on inner and outer lobes. Maxilliped palp with 3 apical spines. Pereopods gradually increasing in size except pereopod 7 much longer than pereopod 6; pereopods 5–7 with a few setules on distal segments. Exopods of pleopods slightly longer than endopods, with partial suture on lateral margin.

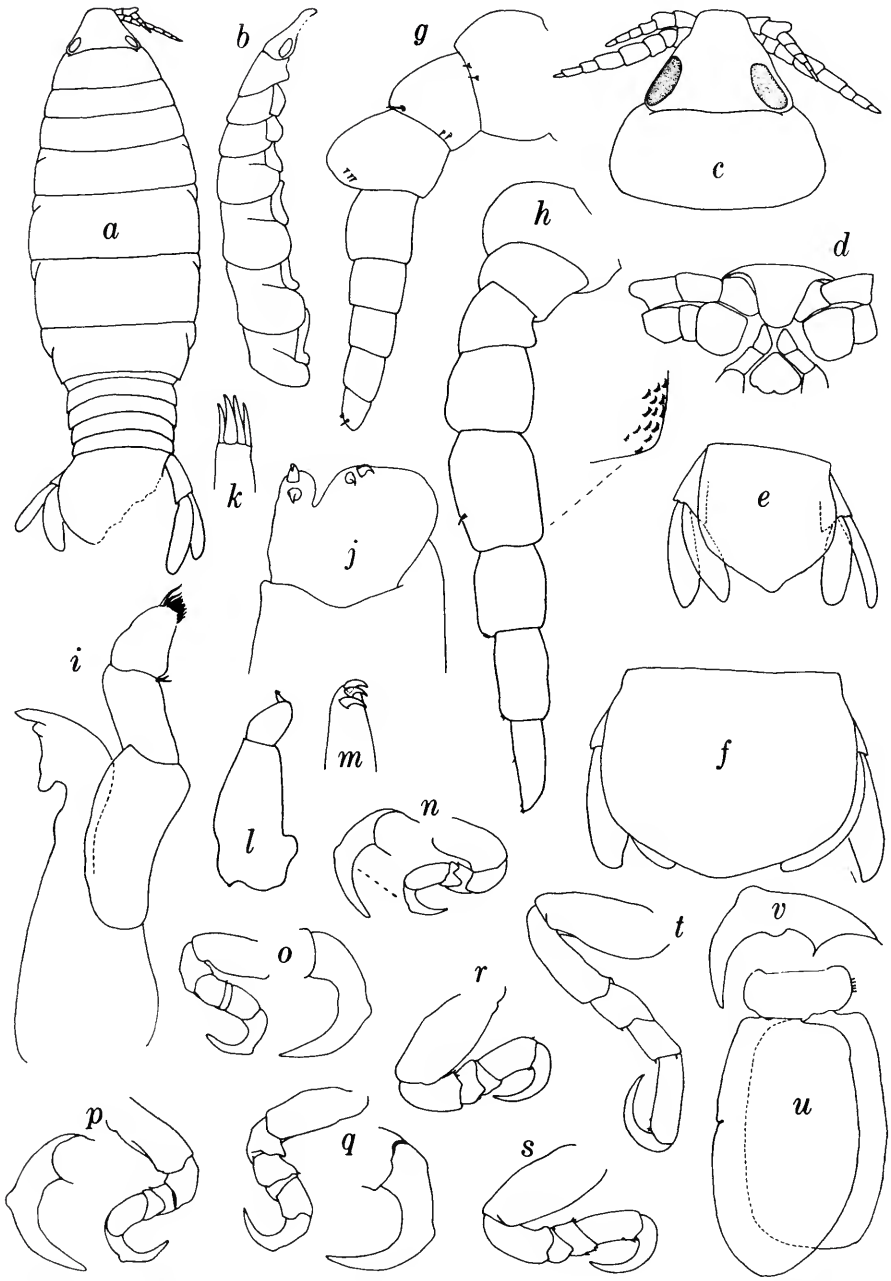

FIGURE 3.—*Anilocra monoma*, new species (*a–d*, *i–k*, *l–t* = 32 mm ♀ holotype from *Hilsa ilisha*; *e*, *g*, *h* = 23 mm ♀ paratype from *Acanthopagrus latus*; *f* = 46 mm ♀ paratype, *u* = 23.5 mm ♀ paratype, both from *Johnius aneus*: *a*, habitus, dorsal; *b*, head and pereon, lateral; *c*, head and pereonite 1, dorsal; *d*, head, ventral; *e*, *f*, telson and uropods, dorsal; g, antenna 1; *h*, antenna 2; *i*, mandible; *j*, maxilla 2; *k*, maxilla 1; *l*, maxilliped; *m*, apex of palp of maxilliped; *n–t*, pereopods 1–7; *u*, pleopod 1. *Anilocra leptosoma*, from Thailand: *v*, dactyl of pereopod 1, showing swellings on both margins.

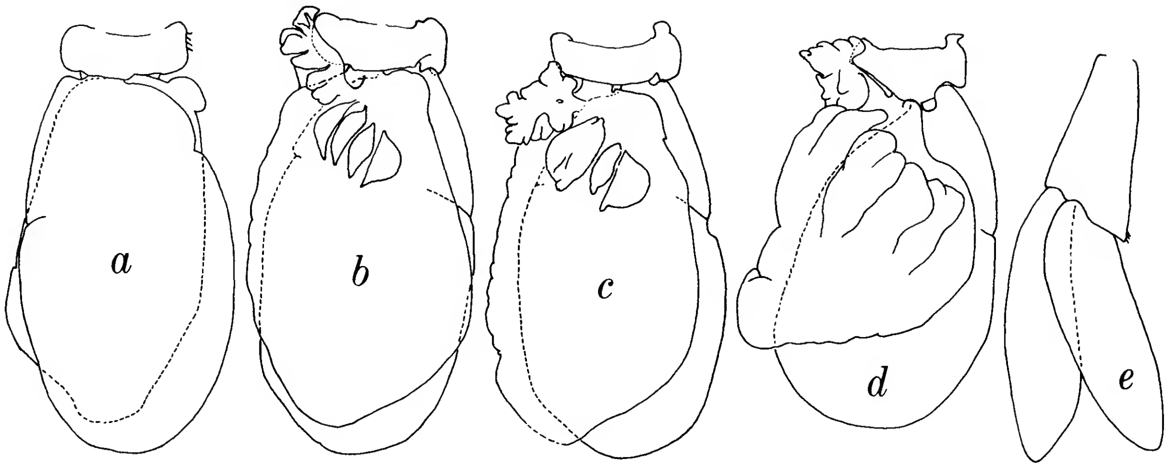

FIGURE 4.—*Anilocra monoma*, new species (*a–d* = 23.5 mm paratype from *Johnius aneus*; *e* = 23 mm paratype from *Acanthopagrus latus*): *a–d*, right pleopods 2–5, posterior; *e*, uropod.

Endopods of pleopod 2 with simple proximomedial lobe; endopods of pleopods 3 and 4 with complexly folded proximomedial lobes and 3 or 4 pockets on proximal third of posterior surface; endopod of pleopod 5 with very complex proximomedial lobes and surface folds, more so than shown in figure.

RELATIONSHIPS.—Only 2 known species of *Anilocra* have both a produced 3rd segment in antenna 1 and swellings in the dactyls of the anterior pereopods. *Anilocra leptosoma* Bleeker, known from Indonesia to the Gulf of Suez and South Africa, has a more slender body than *A. monoma*, the head is more abruptly narrowed at the level of antennae 1 and 2, the anterior pereopods have swellings on both sides, and the telson differs in shape, the sides being parallel for the proximal ⅔, then turning sharply inward and meeting in an angular apex. *Anilocra dimediata* Bleeker, known from Papua New Guinea, Indonesia, the Philippines, Vietnam, Sri Lanka, and Kerala, India, has a head shape similar to that of *A. leptosoma*, the posterolateral corners of pleonites 4 and 5 are acutely produced, and the telson is a third longer than wide.

Nerocila Leach, 1818

The Kuwait material of *Nerocila* is of considerable interest in that 3 of the 4 species are new. One of them is the second species in the heretofore monotypic subgenus *Emphylia* Koelbel, 1879, recently resurrected (Bowman, 1978). In all 3 of the new species the endopod of the uropod has a serrate lateral margin, a character known only in *Nerocila trivitatta* Bleeker, 1857, *N. serra* Schioedte and Meinert, 1881, and *N. monodi* Hale, 1940.

Nerocila (Nerocila) phaiopleura Bleeker, 1857

FIGURE 5

Nerocila phaiopleura Bleeker, 1857:25–26, pl. 1: fig. 3.
Nerocila phaeopleura Bleeker.—Miers, 1880:467.—Schioedte and Meinert, 1881:13–15, pl. 1: figs. 6, 7.—Gerstaecker, 1882:260.—Nierstrasz, 1915:75, 76, figs. 1, 2; 1918:113, 114, figs. 6, 7; 1931:124.—Barnard, 1925:392; 1936:164, 165, fig. 6a–c.—Chilton, 1926:180, 181, fig. 3a,b.—Monod, 1934:12.—Serène, 1937:69.—Morton, 1974:143–148, pl. 1.—Kensley, 1978:82, fig. 33D.—Bruce, 1982:316–318, figs. 1, 4a–c.

MATERIAL.—From *Chirocentrus dorab* (Forskål): SG, 22 Sep 1981, USNM 191051, ♀ 18.4. From *Dussumieria acuta* (Cuvier and Valenciennes): SG 606 (trawl), 22 Apr 1982, USNM 191056, ovigerous ♀ 21.5. From unknown host, SG 610 (seine), 12 Apr 1982, USNM 191053, ovigerous ♀ 23.3.

DIAGNOSIS.—Head broadly rounded anteriorly. Antennae 1 widely separated. Pereopods 1–5 with

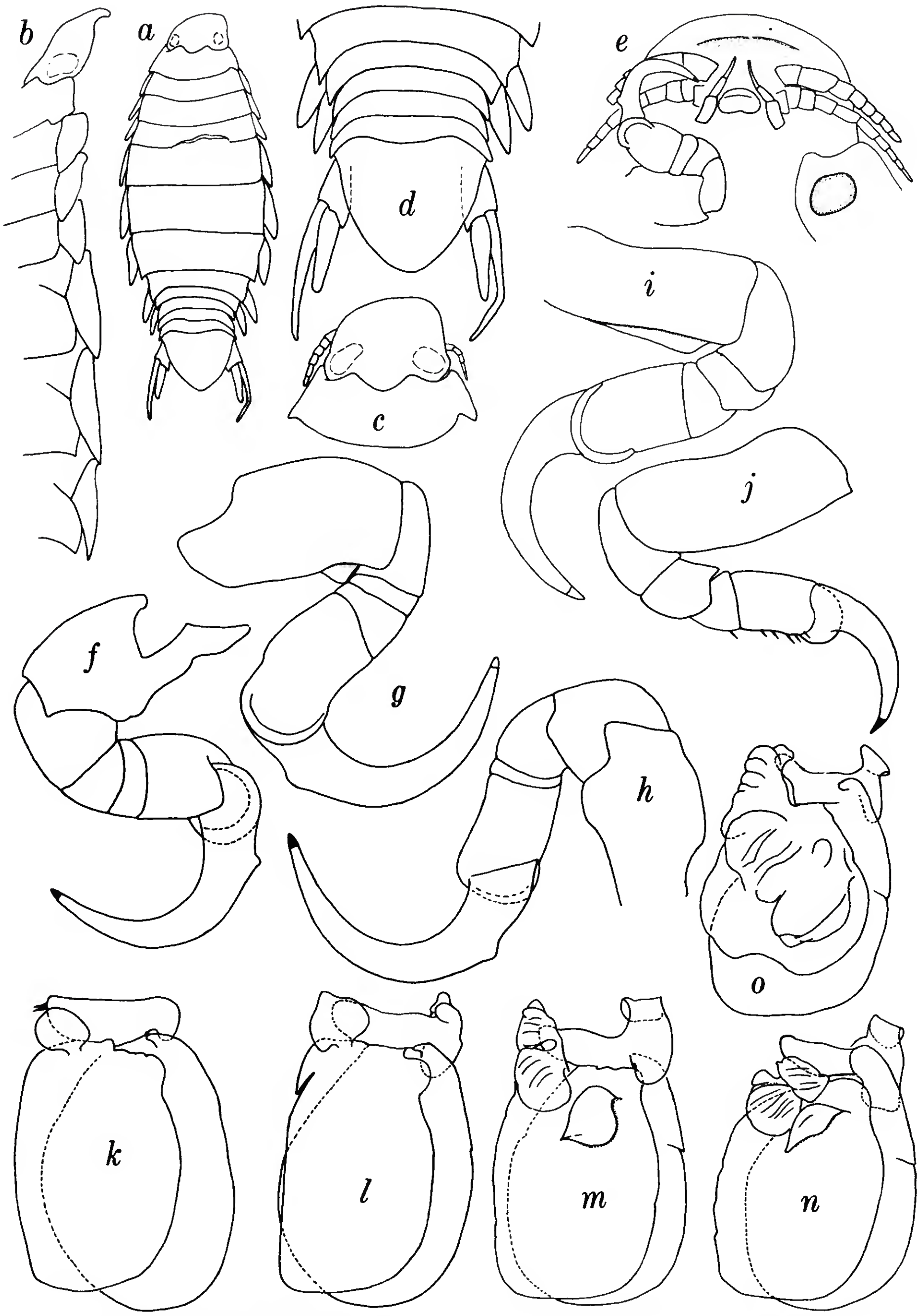

FIGURE 5.—*Nerocila phaiopleura* (*a–d*, *k–o* = 21.5 mm ♀ from *Dussumieria acuta*; *e–j* = 18.4 mm ♀ from *Chirocentrus dorab*): *a*, habitus, dorsal; *b*, head and pereon, lateral; *c*, head, dorsal; *d*, pleon and telson, dorsal; *e*, head, ventral; *f–h*, pereopods 1–3; *i*, pereopod 6: *j*, pereopod 7; *k–o*, pleopods 1–5.

slight swelling on proximal part of extensor margin of dactyl; pereopod 7 with marginal spines. Posteroventral corners of pereonites 1–4 rounded or quadrate, of pereonite 5 quadrate or slightly pointed, of pereonites 6 and 7 pointed but only slightly produced. Coxae broad, produced posteriorly slightly beyond their pereonites. Lateral processes of pleonites 1 and 2 broad, horizontal. Telson round-triangular, slightly wider than long. Uropods with long slender rami; exopod about 1.7 × longer than endopod. Uropod exopods each with dark stripe continued on lateral parts of pleon and posterior pereonites.

DISTRIBUTION.—A widespread species, recorded from Hong Kong (Morton, 1974; Bruce, 1982); Thale Luang (as Talé Sap), a lagoon on the east coast of the Malay Peninsula, Thailand (Chilton, 1926); Gulf of Siam (Monod, 1934, Serène, 1937); from the East Indies at Jakarta, Java (Bleeker, 1857), and the west coast of Sumatra (Nierstrasz, 1918); the Bay of Bengal (Barnard, 1936); and the coast of Natal, South Africa (Barnard, 1925). The Kuwait specimens extend the known distribution greatly.

HOSTS.—"Spratelle kowale" and "Spratelle tembang" (Bleeker, 1857) (probably species of *Spratelloides*); *Chirocentrus dorab* (Forskål) (Barnard, 1925); *Dusssumieria acuta* Cuvier and Valenciennes (Monod, 1934); *Xiphias gladius* Linnaeus (Barnard, 1936); *Sardinella gibbosa* (Bleeker), *S. perforata* (Cantor), *Dussumieria hasselti* Bleeker, and *Decapterus maruadsi* (Temminck and Schlegel), (Morton, 1974); *Sardinella zunasi* (Bleeker) (Bruce, 1982).

Note that both of the hosts in Kuwait have been reported previously as hosts of *N. phaiopleura*.

Morton (1974) found a constant position for *N. phaiopleura* on 4 host species of fishes at Hong Kong. The isopod was always found on the posterior third of the body, overlying the lateral line and facing the head of the fish. This position makes accessible the streak of red muscle underlying the lateral line, which contains much fat and myoglobin. It also allows the isopod's abdomen to be raised for pleopod ventilation without risking dislodgement when the fish's tail beats sideways. In contrast, when infesting *Dussumieria acuta* at Kuwait, *N. phaiopleura* was attached behind the operculum and above the pectoral fin.

ETYMOLOGY.—The specific name is derived from the Greek *phaios* (dusky) plus *pleura* (side) and refers to the 2 lateral stripes. Bleeker (1857) headed his description with the vernacular "Nérocile à flancs bruns." The correct latinization would have been *phaeopleura* rather than Bleeker's *phaiopleura*, and the former has been used by all authors subsequent to Bleeker. However, ICZN Article 32(a) states that improper latinization is not an inadvertent error, hence *phaiopleura* is the correct original spelling and must be used for this species.

The remaining species of *Nerocila* considered in this report are characterized by the serrate margin of the uropodal endopod. A key to these species is given below.

Key to Those Species of *Nerocila* with Serrate Uropodal Endopods

(* = Kuwait species)

1. Antennae 1 proximal segments swollen, close together. Head narrowed anteriorly .... ***N. kisra***, new species
   Antenna 1 proximal segments not swollen, well separated. Head broad anteriorly 2
2. Both margins of uropodal endopod serrate .... ***N. monodi***
   Lateral margin of uropodal endopod serrate; medial margin smooth ... 3
3. Telson evenly rounded posteriorly, without caudomedial lobe .... ***N. sigani***, new species
   Telson with distinct caudomedial lobe 4

4. Uropodal endopod about 3.5 × as long as broad, serrations shallow .... **N. serra (= N. trivittata?)**
   Uropodal endopod less than 3 × as long as broad, serrations deep .... ***N. arres**, new species

Nerocila (Emphylia) kisra, new species

FIGURES 6–8

MATERIAL (all specimens except the holotype are paratypes).—From *Therapon puta* (Cuvier and Valenciennes): Nov 1976, USNM 183794, ♀ with empty marsupium 24.4, 2 non-ovigerous ♀ 25.7, 26.6, ovigerous ♀ 28.5; Ras-al-Ard, Jan 1977, USNM 183790, 3 ovigerous ♀ 16.5, 17.3, 18.6; SG 615 (trawl), 28 Oct 1981, USNM 191054, ♀ 24; SG 602 (seine), 25 Sep 1981, USNM 191052, ♀18.0. From *Scomberomorus* species: Doha, 16 Feb 1977, USNM 183795, ovigerous ♀ 30.2. From *Lutjanus* species: Fish market, Apr 1980, USNM 183793, ♀ with empty marsupium 22.8; 2 ovigerous ♀ 25.0, 30.0. From *Polydactylus* species, caudal peduncle: Jan 1980, USNM 183792, ♀ with empty marsupium 25.0. From *Ilisha indica* (Swainson), on tail: Mar 1978, USNM 183791, ♀ with empty marsupium, anterior body not molted, 21.5. From *Helotes sexlineatus* (Quoy and Gaimard): Ras-al-Ard, Dec 1976, USNM 183788, ovigerous ♀ 28.4 (holotype); USNM 183789, 2 ovigerous ♀ 28.2, 28.2. From *Acanthopagrus cuvieri* (Day): Fish market, Mar 1977, USNM 189266, 2 ovigerous ♀ 19.6, 24.0. From *Pelates quadrilineatus* (Bloch), on lower jaw: SG 605 (seine), 24 Sep 1981, USNM 191047, ♀ 18.4; SG 604 (seine), 25 Sep 1981, USNM 191050, ovigerous ♀ 19.8. From *Kathala axillaris* (Cuvier): SG, 31 Oct 1981, USNM 191048, ♀ 16. From unknown host: Sep 1981, SG 605 (seine), USNM 191049, ♀ 18.8; SG 615 (trawl), USNM 191046, ♀ with embryos 23.

ETYMOLOGY.—The name *kisra* is an acronym derived from the Kuwait Institute for Scientific Research.

DIAGNOSIS.—Head narrowed anteriorly. Antenna 1 with inflated 1st segments nearly in contact. Pereopods without swelling in dactyls; pereopods 3, 6, and 7 with marginal spines. Pereopod 4 with largest dactyl. Posteroventral corners of pereonites 1–4 not produced into points, that of pereonite 5 sometimes slightly produced, that of pereonite 6 usually slightly or moderately produced, that of pereonite 7 slightly to strongly produced. Coxae produced into successively longer pointed processes, always exceeding posteroventral corners of pereonites. Pleotelson 1.2–1.4 × as wide as long, ending in weak caudomedial lobe. Exopod of uropod sublinear, distinctly longer than endopod; endopod with notch on medial margin and moderately coarse to finely serrate lateral margin.

ADDITIONAL DESCRIPTION.—Antenna 1 8-merous; last 5 segments (= flagellum) each with dense posterodistal cluster of esthetes. Antenna 2 11-merous; segments 6–10 each with anterodistal row of fine setae; segment 11 with cluster of apical setae. Mandibular palp with a few scattered setae at apex of 3rd segment. Maxilla 1 with 4 apical spines, one much stouter than others. Maxilla 2 with 2 spines on inner lobe and 1 on outer lobe; lobes covered with fine comb-like scales. Maxilliped distal palp segment with 3 terminal spines and smaller spine at about midlength of medial margin. Pleopods 1–5 with lateral accessory gills on protopod, pleopods 1–4 with medial accessory gills on endopod; lateral accessory gills of pleopods 2–5 bilobed, proximal lobe shown extended in figures, but was folded distally in specimen examined; appendix masculina of pleopod 2 slightly more than half length of endopod; endopods of pleopods 3 and 4 with pocket on posterior surface with lateral opening; endopod of pleopod 5 with complex folds.

VARIATIONS.—Body length varied considerably, from 16.5–30.2 mm for ovigerous females. The degree to which the coxae and posteroventral corners of the pereonites are produced is somewhat variable (Figure 6*a,h,g*). Pereonite 7 may be

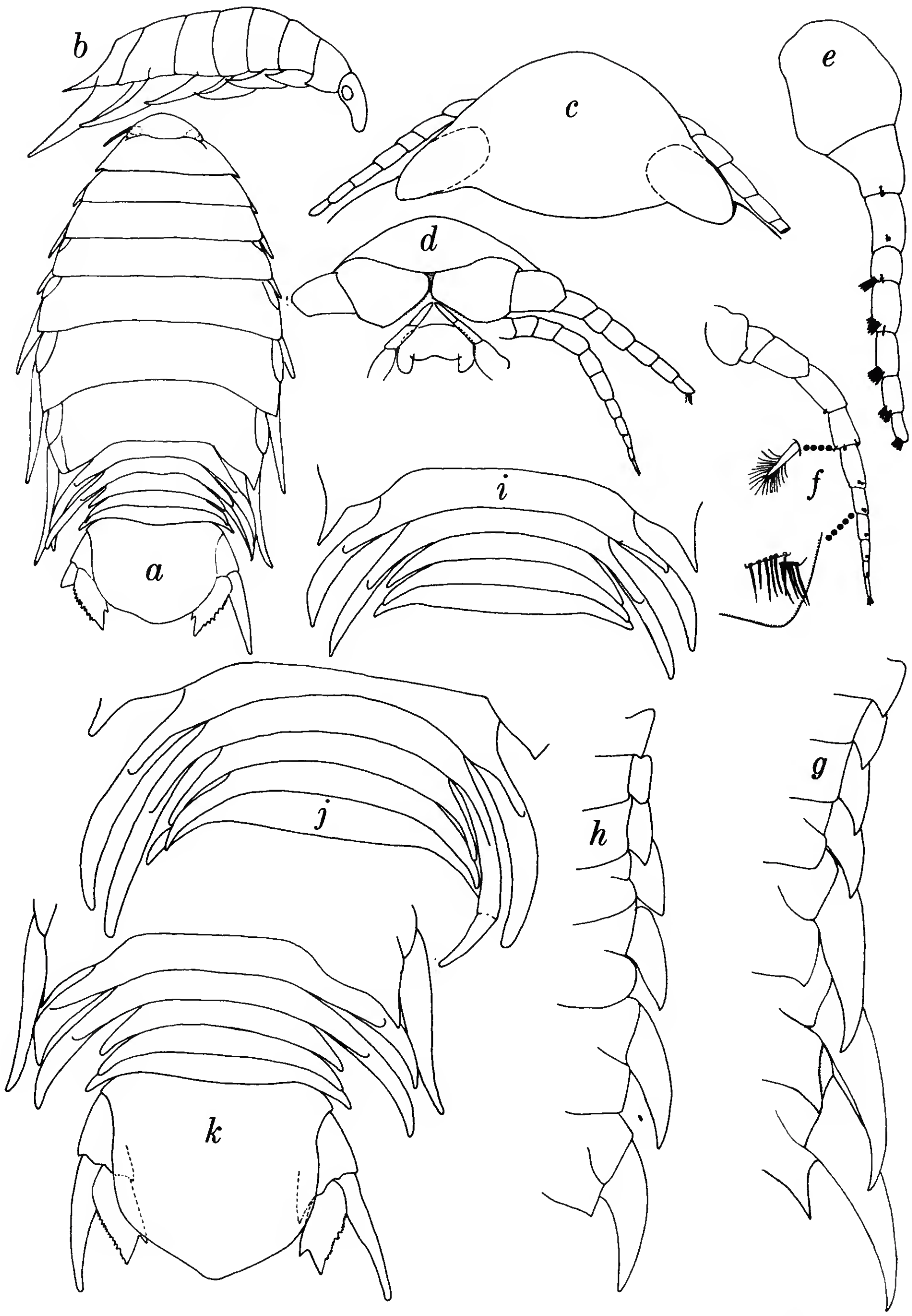

FIGURE 6.—*Nerocila kisra*, new species (*a*, *c–f* = 28.4 mm ♀ holotype from *Helotes sexlineatus*; *b* = ♀ paratype from *H. sexlineatus*; *g*, *i–k* = 22.8 mm ♀ paratype from *Lutjanus* sp.; *h* = 25 mm ♀ paratype from *Polydactylus* sp.): *a*, habitus, dorsal; *b*, head and pereon, lateral; *c*, head, dorsal; *d*, head, ventral; *e*, antenna 1; *f*, antenna 2; *g*, *h*, pereon, lateral; *i*, *j*, pleon, dorsal; *k*, pleon and telson, dorsal.

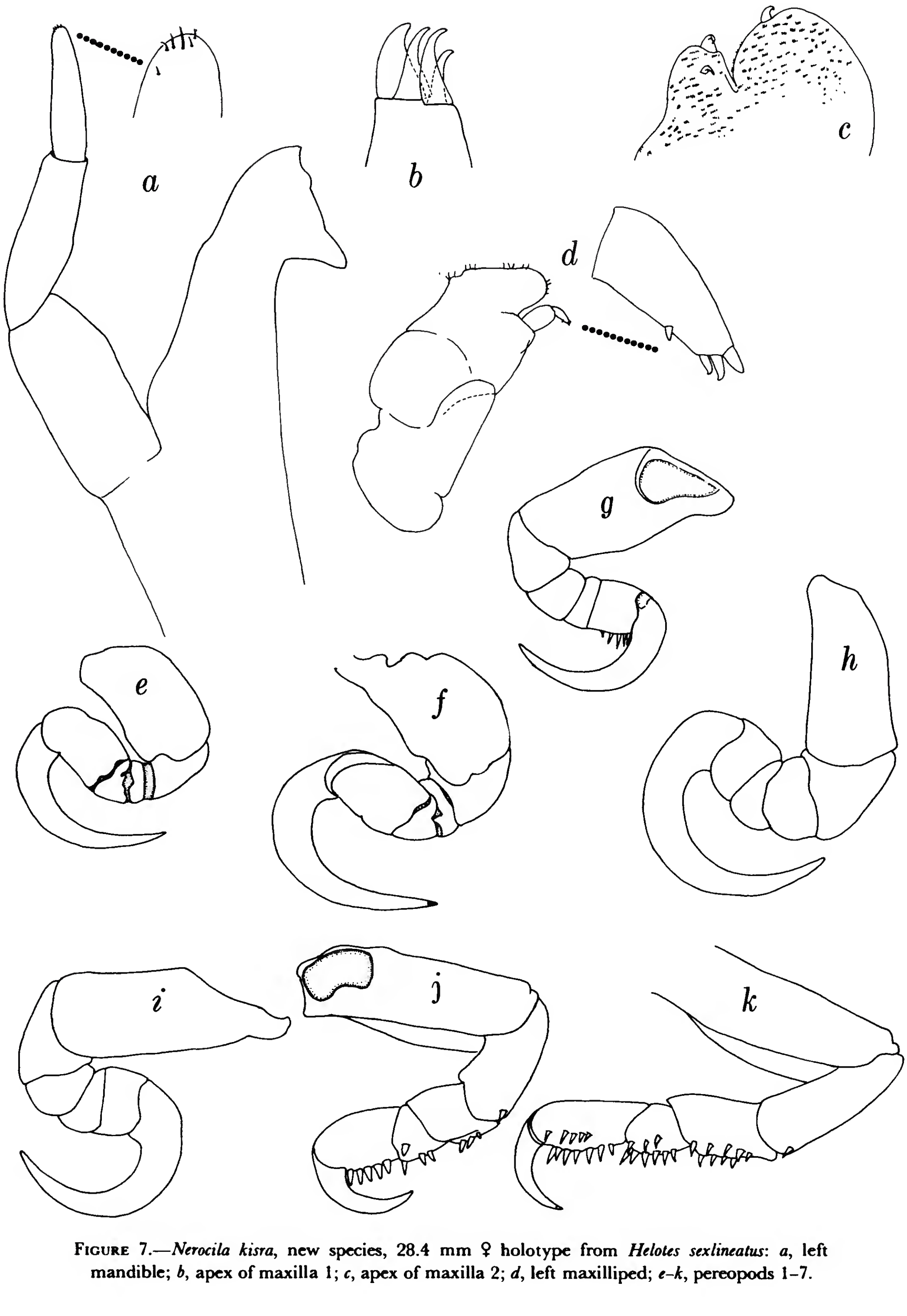

FIGURE 7.—*Nerocila kisra*, new species, 28.4 mm ♀ holotype from *Helotes sexlineatus*: *a*, left mandible; *b*, apex of maxilla 1; *c*, apex of maxilla 2; *d*, left maxilliped; *e–k*, pereopods 1–7.

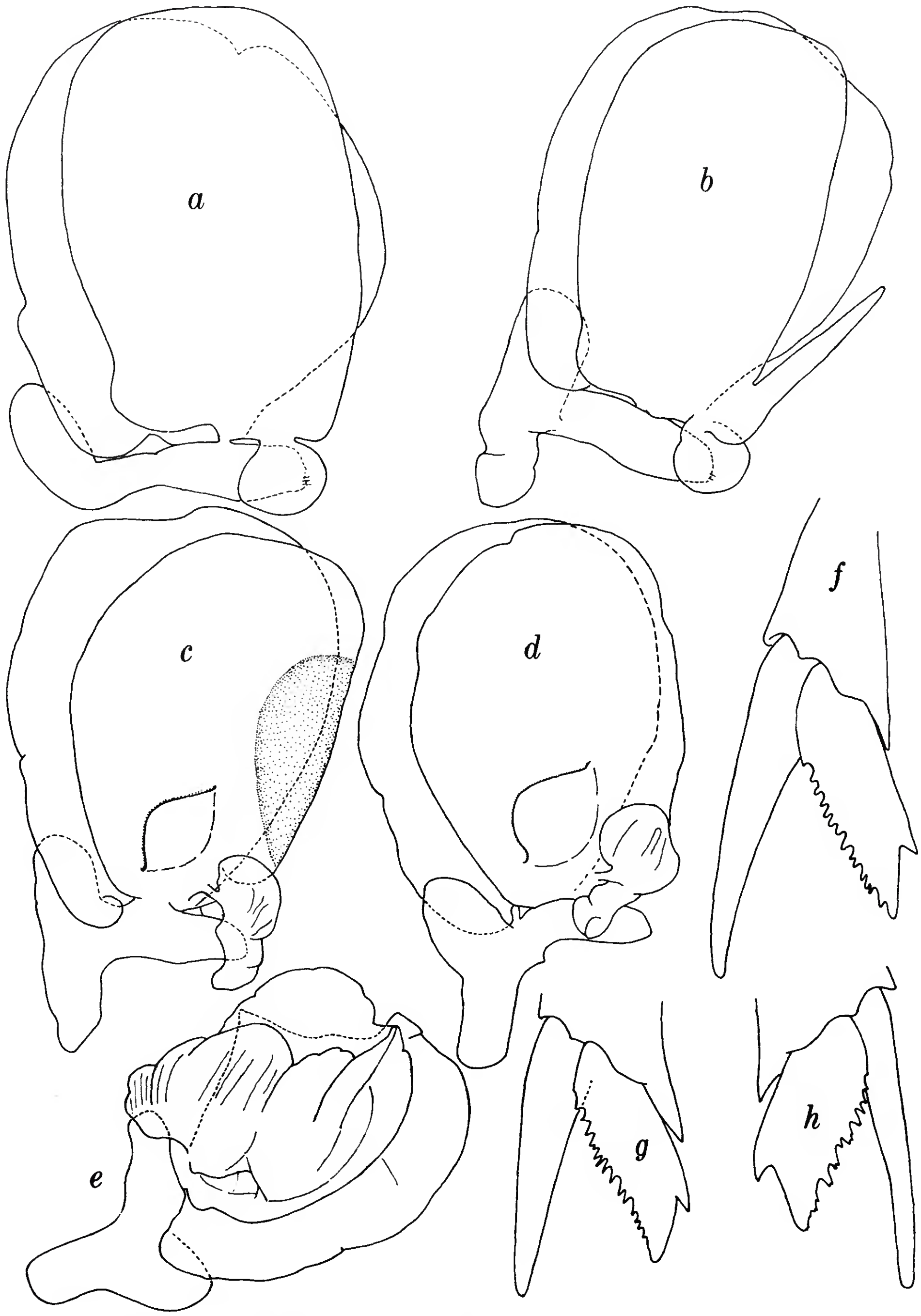

FIGURE 8.—*Nerocila kisra*, new species (*a–e* = 28.4 mm ♀ holotype from *Helotes sexlineatus*; *f* = ♀ from *H. sexlineatus*; *g*, *h* = ♀ paratype from *Therapon puta*): *a–e*, pleopods 1–5; *f–h*, uropod.

distinctly pointed or produced into only a small point. The length and direction of the lateral processes of pleonites 1 and 2 vary (Figure 6*i-k*), as do the size and spacing of the teeth on the uropodal endopod (Figure 6*f-h*).

Nerocila (Nerocila) sigani, new species

FIGURE 9

Material.—From caudal fin of rabbit fish, *Siganus oramin* (Block and Scheider): Ras-al-Ard, Dec 1977, USNM 190714, non-ovigerous ♀ 18.6 (holotype).

ETYMOLOGY.—From the generic name of the host.

DIAGNOSIS.—Head broadly rounded anteriorly, produced into shelf anterior to antennae 1. Antennae 1 separated by nearly 0.8 length of proximal segment. Pereopods without swelling in dactyls; pereopods 6 and 7 with marginal spines; pereopods 1–5 with subequal dactyls. Posteroventral corners of all pereonites produced into points. Coxae produced into successively longer pointed processes, those of coxae 1–5 subequal to posteroventral processes of pereonites, those of coxae 6, 7 distinctly longer. Pleotelson about ⅓ wider than long, smoothly rounded, with no trace of caudomedial lobe. Exopod of uropod linear, slightly longer than endopod; endopod with deep notch on medial margin and serrate lateral margin.

ADDITIONAL DESCRIPTION.—Antennae 1 and 2 as in *N. kisra*, except esthete clusters in antenna 1 are more distal than posterodistal. Mouthparts not removed in order to avoid damaging buccal region of single specimen. Pleopods essentially as in *N. kisra*, with minor differences the taxonomic significance of which cannot be evaluated from the single specimen.

Nerocila (Nerocila) arres, new species

FIGURES 10–12

Material.—From *Epinephalus tauvina* (Forskål), caudal fin: Seif fish market, Kuwait City, 13 Feb 1977, USNM 189268, ♀ 26.2 (paratype). From *Acanthopagrus latus* (Houttuyn): north of platform, 29 Apr 1977, USNM 189265, ovigerous ♀ 29.0 (paratype). From *Nemipterus japonicus* (Bloch), caudal fin: Jan 1977, USNM 189264, ovigerous ♀ 30.5 (holotype). From *Nemipterus tolu* (Cuvier and Valenciennes), caudal fin: SG 611 (trawl), 12 Apr 1982, USNM 191055, ovigerous ♀ 28.4 (paratype).

ETYMOLOGY.—From *serra* spelled backwards, referring to its similarity to *Nerocila serra*.

DIAGNOSIS.—Head rounded anteriorly, produced into broad shelf anterior to antennae 1. Antennae 1 separated by 0.2–0.7 length of proximal segment. Pereopods 1–5 with swelling in dactyls (*Acanthopagrus* and *Nemipterus* specimens), or only pereopod 5 with swelling (*Epinephalus* specimen); dactyls of pereopods 1–5 subequal. Pereopod 3 with 3 marginal spines on propus in *Nemipterus* specimen, without spines in other specimens. Pereopods 6 and 7 with marginal spines. Posteroventral corners of all pereonites produced into points, those of pereonites 1–5 subequal, those of pereonites 6 and 7 progressively longer. Coxae produced into pointed processes subequal to posteroventral processes of pereonites. Pleotelson nearly ⅓ wider than long; posterior end damaged in *Epinephalus* and *Acanthopagrus* specimens, with low, broad, caudomedial lobe in *Nemipterus* specimen. Exopod of uropod sublinear, curving medially, slightly longer than endopod; endopod with deep notch on lateral margin and coarsely serrate medial margin.

ADDITIONAL DESCRIPTION.—Antennae 1 and 2 as in *N. kisra*, but segments 1 and 2 of antenna 1 may be partly fused and number of segments may differ by 1 or 2. Mouthparts not examined. Pleopods similar to those of *N. kisra* and *N. sigani*.

RELATIONSHIPS.—Uropods with serrate endopod margins have been reported in 3 species of *Nerocila*: *N. trivittata* Bleeker, 1857, *N. serra* Schioedte and Meinert, 1881, and *N. monodi* Hale, 1940. Monod considered *N. serra* to be a junior synonym of *N. trivittata* (see Niestrasz, 1931:124, footnote; Hale, 1940:301). Monod's opinion may very well be correct; the color patterns appear to be identical, and there is nothing in Bleeker's

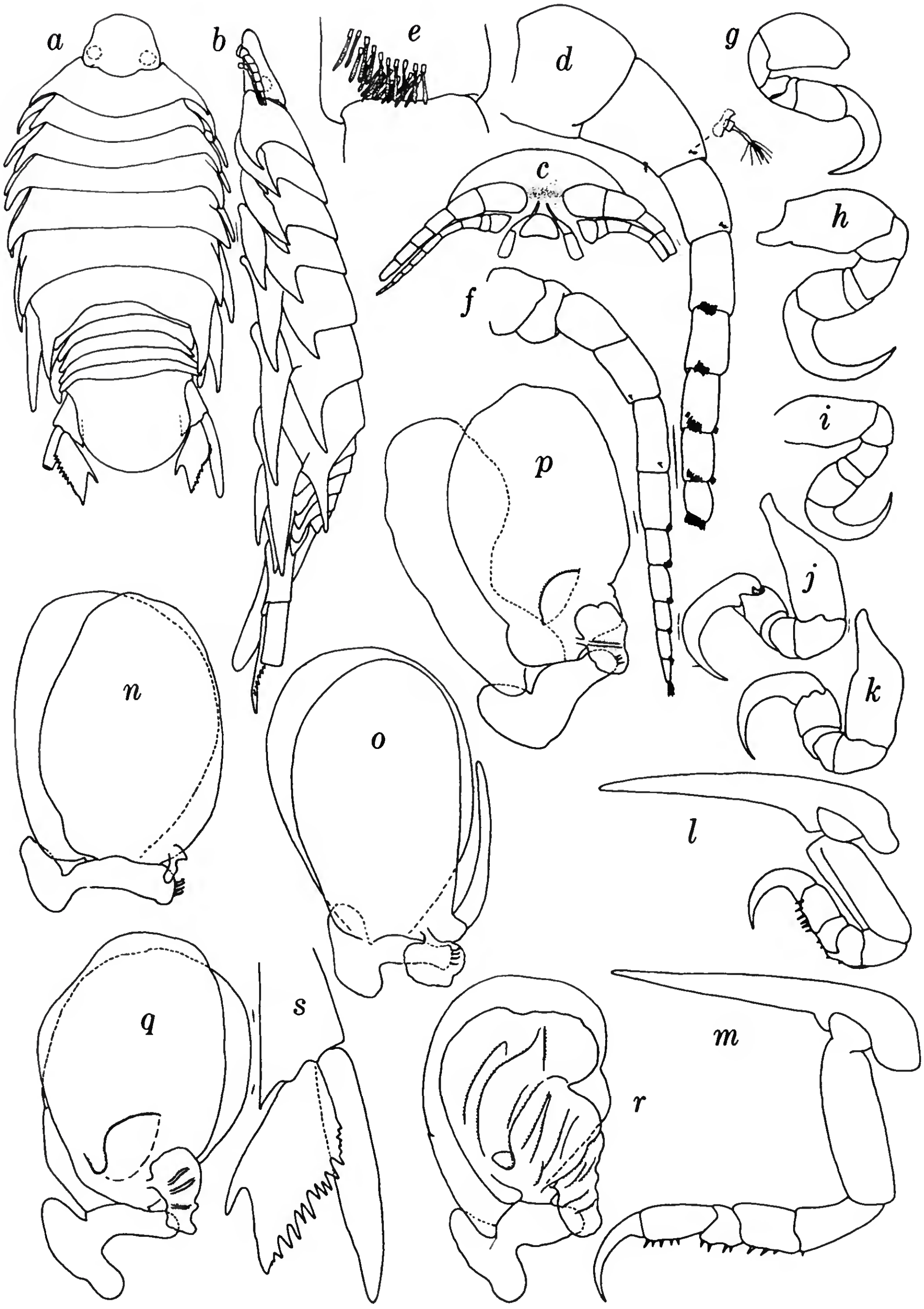

FIGURE 9.—*Nerocila sigani*, new species, 18.6 mm ♀ holotype from *Siganus oramin*: *a*, habitus, dorsal; *b*, habitus, lateral; *c*, head, ventral; *d*, antenna 1; *e*, distal margin of segment 5 of antenna 1 showing cluster of esthetes; *f*, antenna 2; *g–m*, pereopods 1–7; *n–r*, pleopods 1–5; *s*, right uropod.

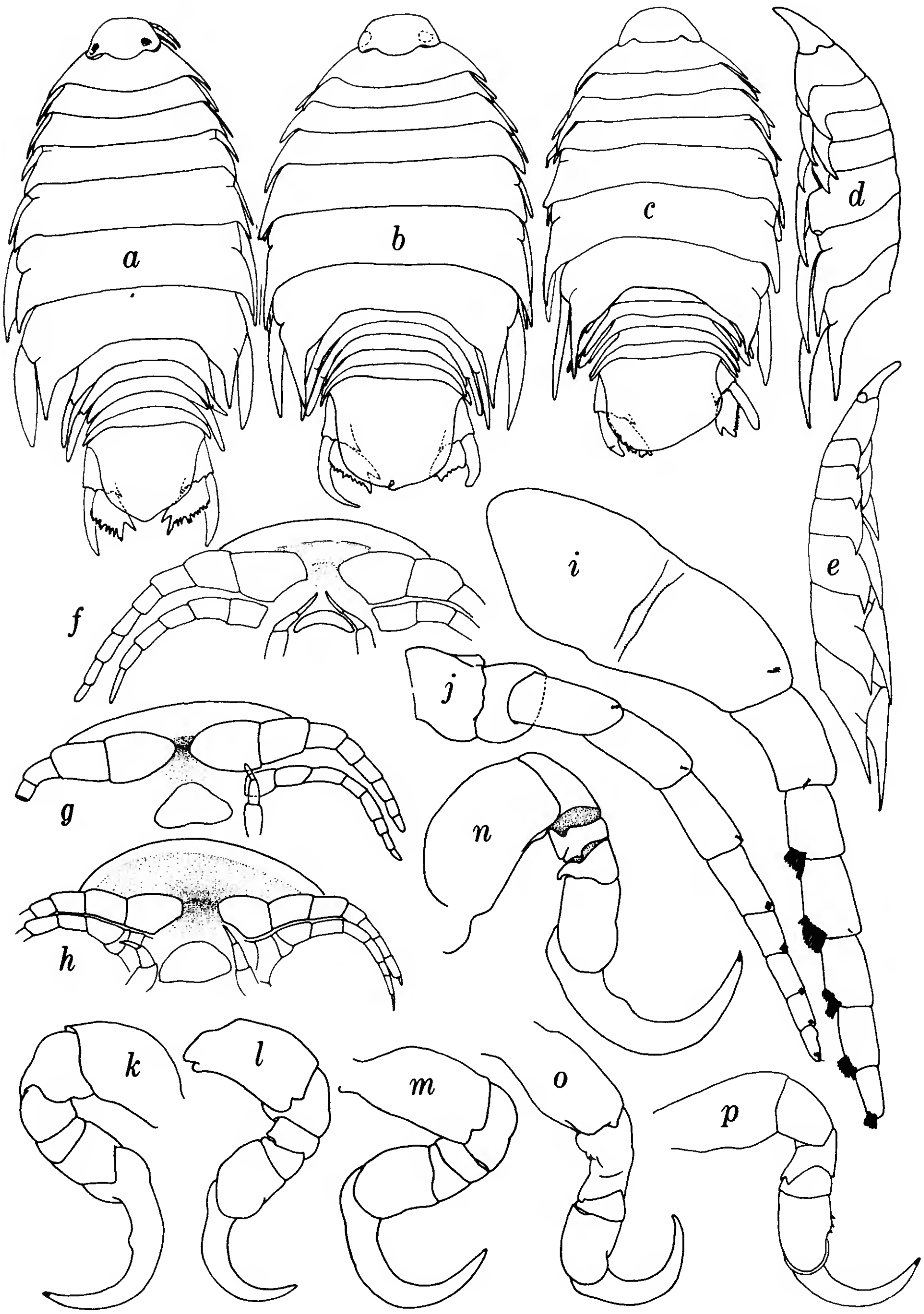

FIGURE 10.—*Nerocila arres*, new species (*a, e, f, i, j, k, n, o, p* = 30.5 mm ♀ holotype from *Nemipterus japonicus; b, g* = 29.0 mm ♀ paratype from *Acanthopagrus latus*; *c, d, h, l, m* = 26.2 mm ♀ paratype from *Epinephalus tauvina*): *a–c*, habitus, dorsal; *d, e*, head and pereon, lateral; *f–h*, head, ventral; *i*, left antenna 1; *j*, left antenna 2; *k, l*, pereopod 1; *m, n*, pereopod 2; *o, p*, pereopod 3.

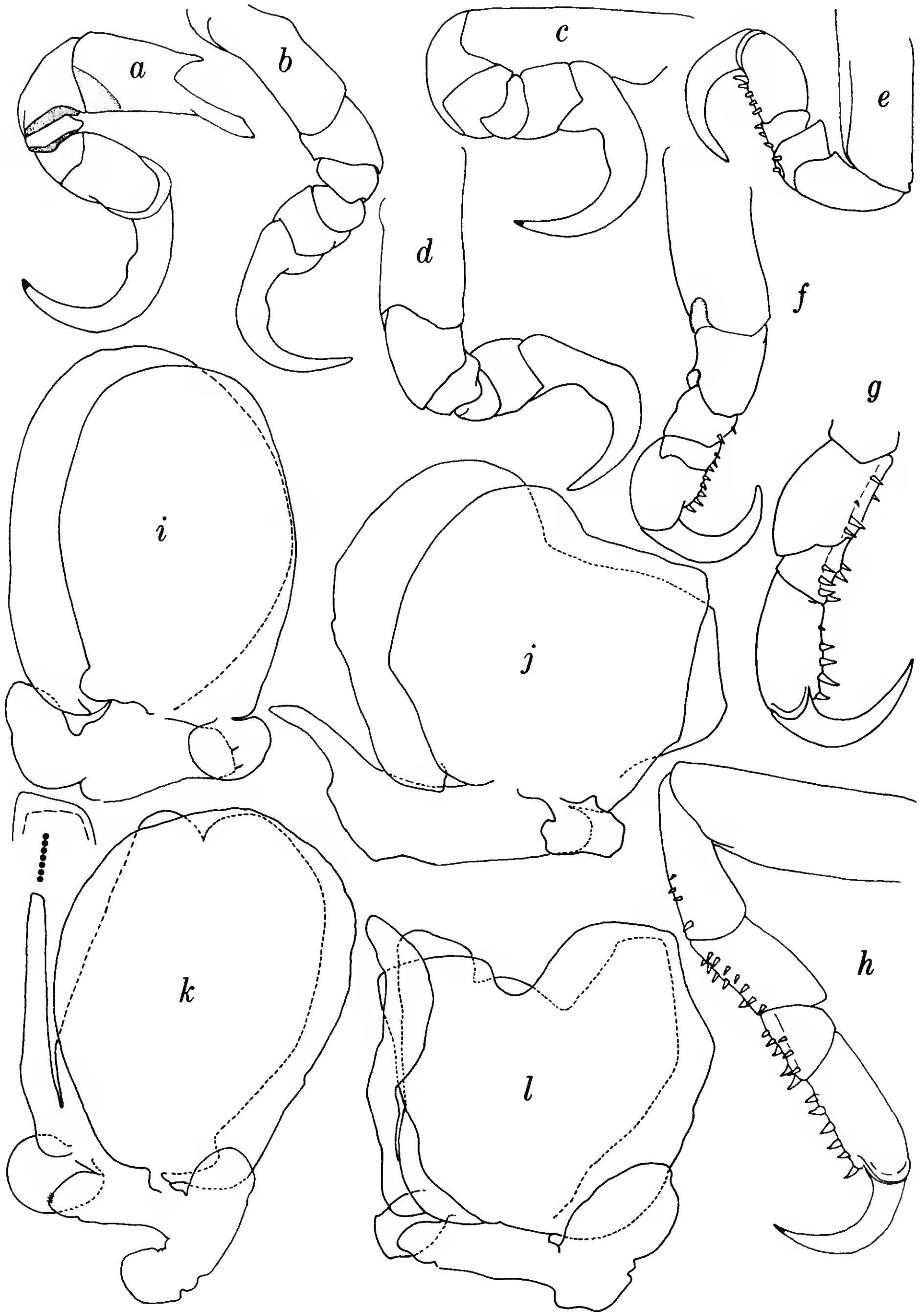

FIGURE 11.—*Nerocila arres*, new species (*a, c, e, h, i, k* = 30.5 mm ♀ holotype from *Nemipterus japonicus*; *b, d, f, g, j, l* = 26.2 mm ♀ paratype from *Epinephalus tauvina*): *a, b,* pereopod 4; *c, d,* pereopod 5; *e, f,* pereopod 6; *g,* pereopod 7, distal segments; *h,* pereopod 7; *i, j,* pleopod 1; *k, l,* pleopod 2.

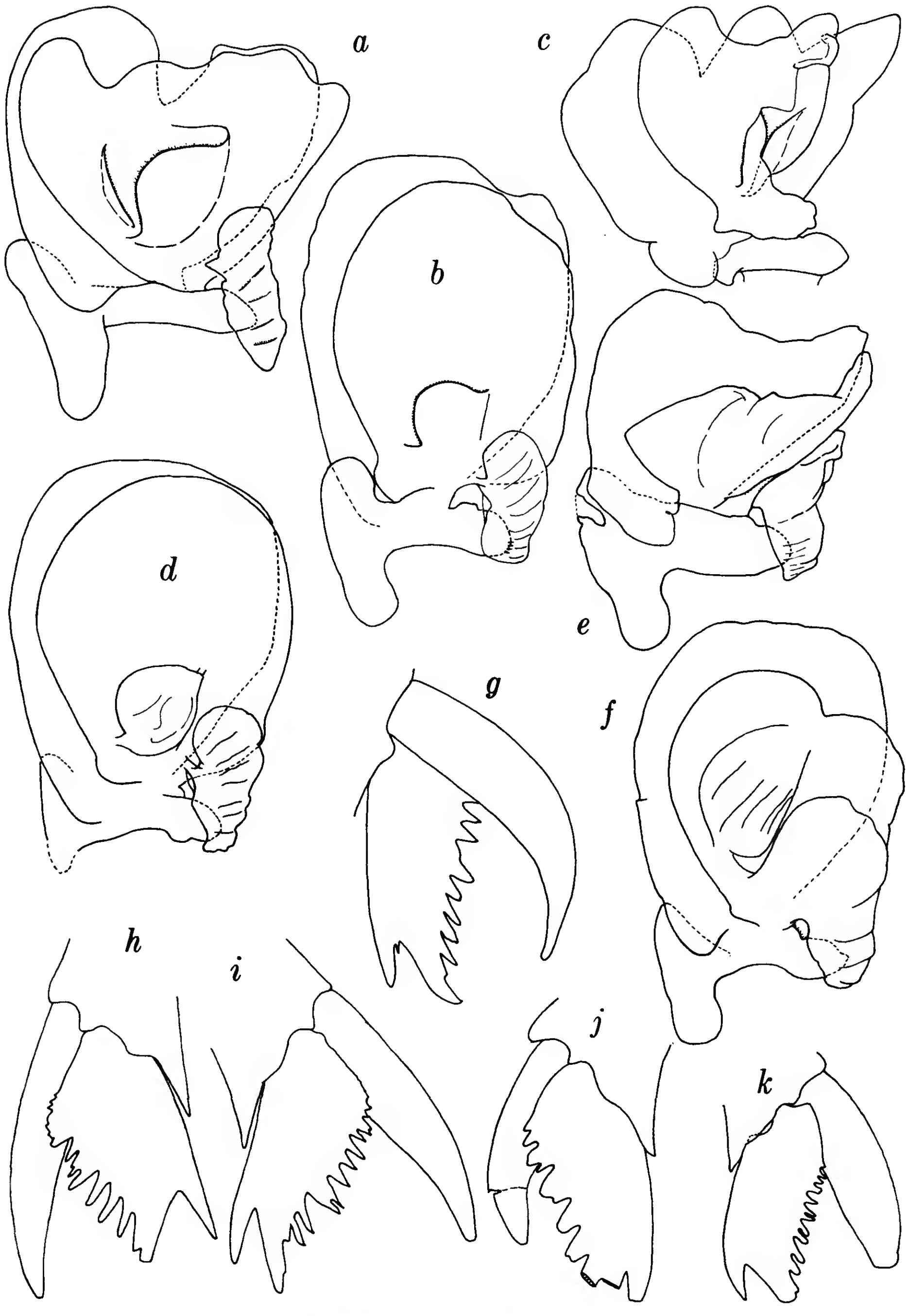

FIGURE 12.—*Nerocila arres*, new species (*a, c, e, j, k* = 26.2 mm ♀ paratype from *Epinephalus tauvina*; *b, d, f, h, i* = 30.5 mm ♀ holotype from *Nemipterus japonicus*; *g* = 29.0 mm ♀ paratype from *Acanthopagrus latus*): *a, b*, pleopod 3; *c, d*, pleopod 4; *e, f*, pleopod 5; *g–k*, uropod.

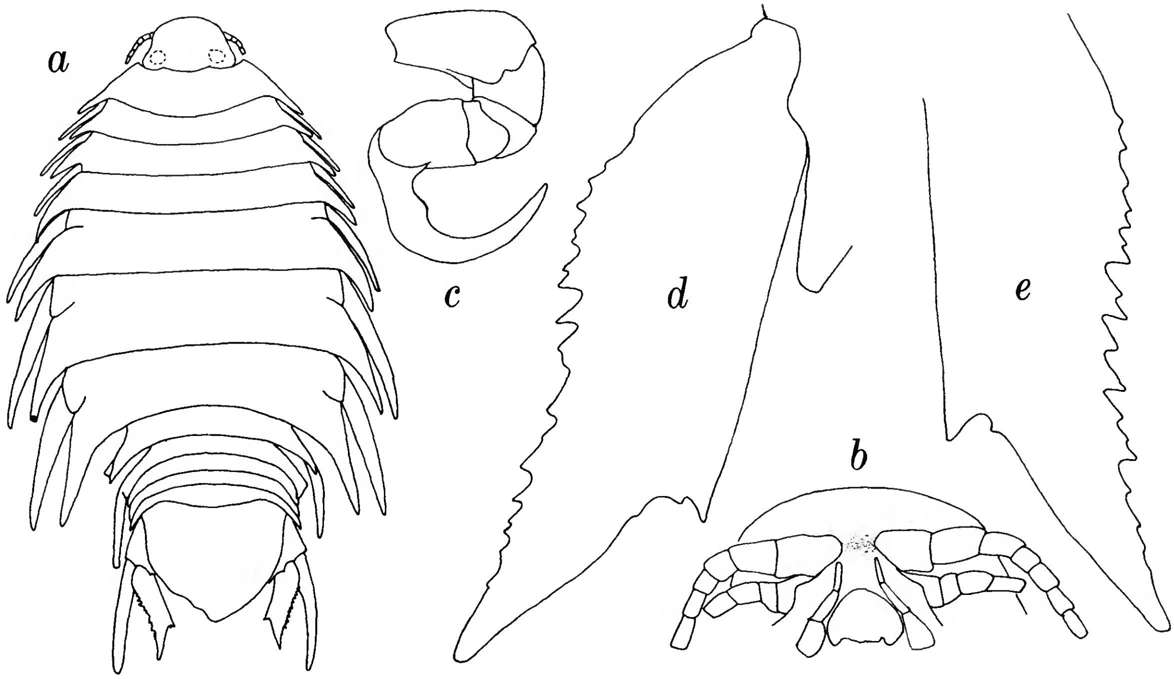

FIGURE 13.—*Nerocila serra*, ♀ syntype from Bangka Strait, Indonesia, Evertebratavd. Riksmuseum Stockholm, Isopoda 4974: *a*, habitus, dorsal; *b*, head, ventral; *c*, left pereopod 1; *d*, *e*, endopods of left and right uropods.

brief description and illustrations with few details that conflicts with the account of Schioedte and Meinert. The type-locality of *N. trivittata* is Amboina, that of *N. serra* Bangka, both in Indonesia. But Bleeker did not mention some important characters now known to be useful in distinguishing species of *Nerocila*. Hoping to better characterize *N. trivittata* and *N. serra*, we attempted to compare type material of the 2 species. From the Naturhistoriska Riksmuseet we obtained, through the courtesy of Dr. Charlotte Holmquist, one of the 2 syntypes of *N. serra* used by the authors in preparing the description. Unfortunately, we have not been able to locate Bleeker's single specimen of *N. trivittata*. It is not in the Rijksmuseum van Natuurlijke Historie, Leiden, as are specimens of Bleeker's other isopod species, and Dr. L.B. Holthuis, who kindly furnished this information, pointed out that *N. trivittata* was not included in Nierstrasz's (1915) account of the Cymothoidae in the Leiden Museum. It seems likely that the type of *N. trivittata* is not extant, and the question of the identity of *N. trivittata* and *N. serra* cannot be resolved now.

The syntype of *N. serra* is very similar to *N. arres*. Swellings are present on the dactyls of pereopods 1, 4, and 5, but not pereopod 3 (pereopod 2 lacks dactyls). Pereopod 3 has a single distal spine on the propus. It differs from *N. arres* in the uropodal endopod, which is longer and narrower, with a shallower notch on the medial margin, and with smaller serrations on the lateral margin. The body has 3 longitudinal dark stripes, which have persisted in preservative for more than a century. Three of our Kuwait specimens of *Nerocila* lack pigmentation; the specimen from *Nemipterus tolu* has 3 stripes as in *N. serra*, but lighter in shade.

Catoessa Schioedte and Meinert, 1884

Catoessa Schioedte and Meinert, 1884:309, 310. [Type-species, by monotypy, *Catoessa scabricauda* Schioedte and Mei-

TABLE 1.—Comparison of species of *Catoessa*

Species	Head	Antennae	Pleonites	Telson	Uropods
C. scabricauda	pointed anteriorly	2 longer than 1	5 narrower than 2–4	much wider than long	reach mid-length of telson
C. gruneri	rounded anteriorly	1 and 2 subequal	2–5 subequal in width	slightly wider than long	reach posterior end of telson

nert, 1884, Adonara I, Lesser Sunda Is., Indonesia. Host unknown. Deposition, Berlin Museum.]

The genus *Catoessa* was proposed for *C. scabricauda*, represented by a single ovigerous ♀ from Adonara Island, one of the Lesser Sunda Islands east of Flores Island. Schioedte and Meinert's (1884) Latin diagnosis of *Catoessa* contains almost nothing of generic value, and there is little justification for separating *Catoessa* from *Lironeca* on the basis of their diagnosis. However, the narrow pleonite 1 and the form of the pleura of pleonites 2–5 distinguish *C. scabricauda* and the new species described below from all of the more than 50 species of *Lironeca*, hence we continue to recognize the little known genus *Catoessa* as valid.

Catoessa gruneri, new species

FIGURES 14*b-n*, 15

MATERIAL (all specimens except the holotype are paratypes).—From *Leiognathus fasciatus* (Lacépède), gills: North of platform, 30 Aug 1976, USNM 191069, ♀ with empty marsupium 14.4, transitional ♀ with small appendix masculina 15.0; Ras-al-Ard, 30 Aug 1976, USNM 191067, 2♂ 7.6, 8.0, WL, ♂ 6.4. From *Ilisha indica* (Swainson), gills: Doha, 18 Dec 1976, USNM 191066, 3♀ 10.6, 11.5, 12.8. From *Therapon puta* (Cuvier and Valenciennes), WL, USNM 191070, ovigerous ♀ 15 (holotype). From *Leiognathus daura*: SG 611 (trawl), Apr 1982, USNM 191064, 2 ovigerous ♀ 13.2, 13.4, 3 non-ovigerous ♀ 11.2, 12.5, 13.0; SG 611 (trawl), Apr 1982, 3 ovigerous ♀ 12.7, 13.8, 15.0, 2 non-ovigerous ♀ 14.0, 14.2. From unknown host: SG 714 (seine), 31 Oct 1981, USNM 191065, ovigerous ♀ 13.5, non-ovigerous ♀ 10.8; SG 605 (seine), Sep 1981, USNM 191063, 2 ovigerous ♀ 9.3, 10.4, 2 non-ovigerous ♀ 9.6, 10.4, 15♂ 4.4, 5.6, 5.6, 5.8, 6.0, 6.0, 6.2, 6.3, 6.4, 6.5, 6.7, 6.7, 7.0, 7.1, 8.0.

ETYMOLOGY.—Named for Hans-Eckard Gruner, Zoologishes Museum der Humboldt-Universität zu Berlin, in appreciation of his noteworthy contributions to the biology of the Isopoda.

DESCRIPTION.—Body symmetrical, sides of pereon nearly parallel. Head pyriform, narrowed anterior to eyes, reflexed ventrally into rounded lobe separating antenna 1. Eyes well developed. Pereonites 1–6 subequal in length; pereonite 7 apparently shorter because of overlapping by pereonite 6. Coxae 2–6 much shorter than their pereonites, coxa 7 only slightly shorter. Pleonite 1 partly to nearly completely overlapped by pereonite 7, narrower than rest of pleon. Pleonites 2–5 about as wide as pereonite 7; epimera directed laterally, narrower than central parts of pleonites, more or less separated from one another by gaps. Telson subtriangular, slightly wider than long.

Antenna 1 reaching anterior margin of pereonite 1, broader than antenna 2, basal segments of antennae 1 widely separated; 3 segments of peduncle successively longer, 5 flagellar segments each with distal row of esthetes. Antenna 2 subequal in length to antenna 1, more slender, 8–10-segmented.

Incisors of right and left mandibles differing in form (Figure 14*i,j*); 3rd segment of palp with a few distal serrate spines. Maxilla 1 with 4 apical spines. Maxilla 2 with 2 spines on inner lobe and

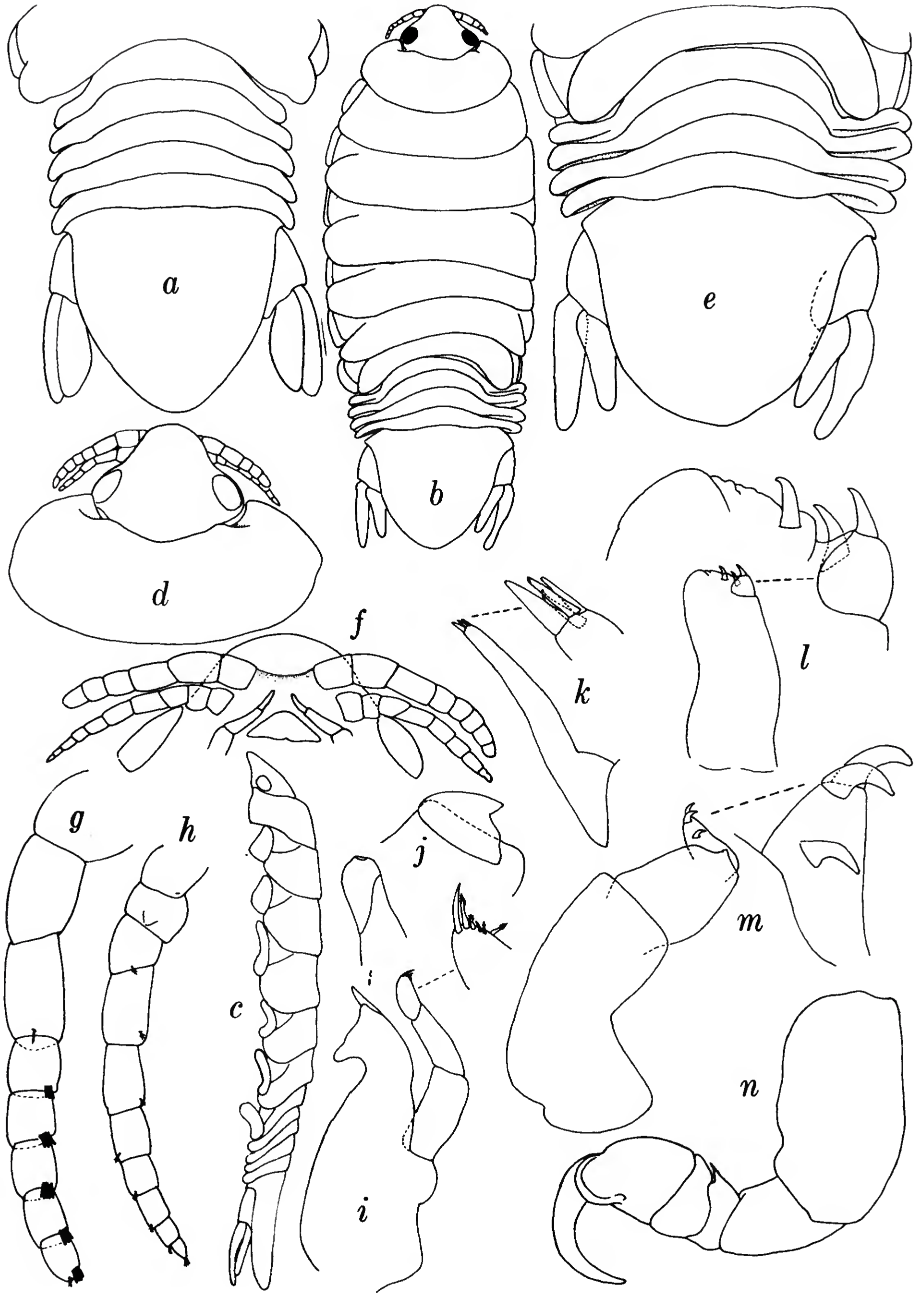

FIGURE 14.—*Joryma sawayah*, 12.5 mm ♂ paratype from *Ilisha indica*: *a*, pleon and telson, dorsal. *Catoessa gruneri* (*b–f* = 14.4 mm ♀ paratype from *Leiognathus fasciatus*; *g–n* = 15 mm ♀ holotype from *Therapon puta*): *b*, habitus, dorsal; *c*, habitus, lateral; *d*, head and pereonite 1, dorsal; *e*, pleon and telson, dorsal; *f*, head, ventral; *g*, right antenna 1; *h*, right antenna 2; *i*, left mandible; *j*, incisor of right mandible; *k*, maxilla 1; *l*, maxilla 2; *m*, maxilliped; *n*, pereopod 1.

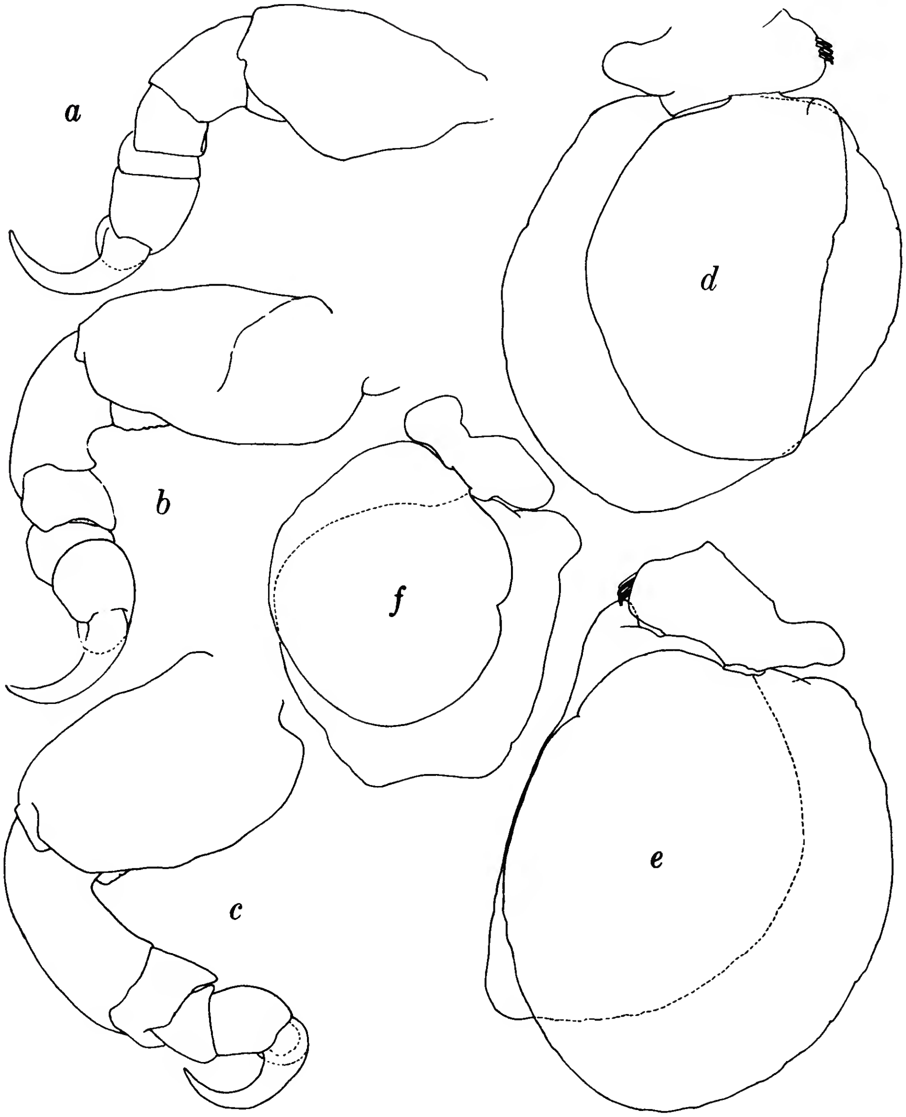

FIGURE 15.—*Catoessa gruneri*, new species, 15 mm ♀ holotype from *Therapon puta*: *a*, pereopod 2; *b*, pereopod 4; *c*, pereopod 7; *d*, pleopod 1; *e*, pleopod 2; *f*, pleopod 5.

1 on outer lobe. Maxilliped with 3 spines on apical segment.

Pereopods with rather broad bases. Pereopods 1–6 subequal. Pereopod 7 distinctly longer, with elongate ischium; ischium and merus notably broader than carpus and propus. Pleopods without accessory gills or surface folds; peduncles of pleopods 1–4 each with 4 retinacula.

Uropods reaching slightly beyond telson; rami sublinear, narrowing slightly distally, exopod slightly longer than endopod.

RELATIONSHIPS.—Until now the genus *Catoessa* has been known only from the type-species, *C. scabricauda*, based on a single ovigerous ♀. The most obvious differences between *C. scabricauda* and *C. gruneri* are summarized in Table 1.

Joryma, new genus

Agarna Schioedte and Meinert 1884:328-329 [partim].—Barnard 1936:169.—Pillai 1964:211.

DIAGNOSIS.—Pereonite 1 produced into lobe along 1 or both lateral margins of head. Coxae of pereonites 2 and 3 inflated, much larger than remaining coxae; area medial to coxa may be inflated also, resembling dorsolateral bosses ("ovarian bosses") of epicarideans. Pleon nearly as wide as pereon; pereonite 1 partly or completely covered by pereonite 7. Antennae 1 well separated at bases. Mandibular palp enlarged, very stout, indistinctly or non-segmented.

TYPE-SPECIES.—*Joryma sawayah*, new species.

COMPOSITION.—*Agarna engraulidis* Barnard, 1936, *Agarna tartoor* Pillai, 1954, *Agarna brachysoma* Pillai, 1954.

ETYMOLOGY.—In the tradition of William Elford Leach, who formed a number of flabelliferan generic names from anagrams of Caroline and Carolina, the name of our new genus is an anagram of Mary Jo, wife of the first author. Gender feminine.

RELATIONSHIPS.—The inflated anterior coxae and especially the mandibular palps will immediately identify *Joryma*. In *Agarna* the posterior pereon is much elevated mid-dorsally, and pereonites 4–7 are greatly expanded laterally; antennae 1 are narrowly separated at their bases, and the mandibular palp is not enlarged. Richardson (1905) made the curious statement that pereonite 4 has 2 coxae and 2 pereopods and pereonite 7 has no appendages. This statement is erroneous; pereonites 4 and 7 each have 1 pair of coxa and 1 pair of pereopods, although overlapping of coxae and lateral pereonite expansions tends to obscure the arrangement. Pillai (1954) described *Agarna tartoor* as lacking coxa 7, and in 1964 he stated that coxa 7 was absent and pereonite 4 had 2 coxae.

Despite our respect for the quality of Pillai's taxonomic contributions, and although we have not seen the specimens he described, we are firmly convinced that Pillai made the same mistake as Richardson, and that his *Agarna tartoor* and *A. brachysoma* have normal arrangements of coxae. Furthermore, Pillai considered the coxal arrangement to have generic value, for he transferred *Agarna malayi* Tiwari, 1953, to *Indusa* (lapsus for *Idusa* as in Richardson 1904, 1905) saying, "That Tiwari's species does not show this [distribution of coxae] is sufficient proof that it does not belong to *Agarna*." The important generic feature of *Agarna*, however, is the hunched asymmetrical pereon, with the posterior pereonites flattened and expanded laterally on one side. In this feature *A. malayi* is similar to the type-species, *A. carinata* Schioedte and Meinert 1884, and should be returned to its original genus.

The remaining nominal species of *Agarna*, *A. engraulidis* Barnard, 1936, was described from off the mouth of the Devi River (~ 20°N), Orissa State, India. Pillai (1964) transferred it to *Livoneca*, but it agrees in all respects with our diagnosis of *Joryma* and is transferred herein to the latter genus.

Joryma sawayah, new species

FIGURES 14*a*, 16–18

MATERIAL.—From *Ilisha indica* (Swainson), gills: South of Faylaka, 29 Jul 1976, USNM 191060, ovigerous ♀ 21.5, non-ovigerous ♀ 21.0, ♂ 12.5 (paratypes). Doha, 29 Jul 1976, USNM 191058, ovigerous ♀ 20.8 (holotype), USNM 191059, non-ovigerous ♀ 17.7 (paratype); North of platform, 29 Jul 1976, USNM, 191061, ovigerous ♀ 22.3, ♂ 13.3 (paratypes), USNM 191057, ovigerous ♀ 22.3, ♂ 13.4 (paratypes). "Gord of Oha," WL, 22 Jan 1978, ovigerous ♀ 21.8. From *Therapon puta* (Cuvier and Valenciennes): WL, ovigerous ♀ 19.0.

ETYMOLOGY.—"Sawayah" is the local name and the host fish, *Ilisha indica*.

DESCRIPTION.—Body slightly asymmetrical, curving slightly to one side, flattened dorsoventrally. Head pyriform, posterior part covered by

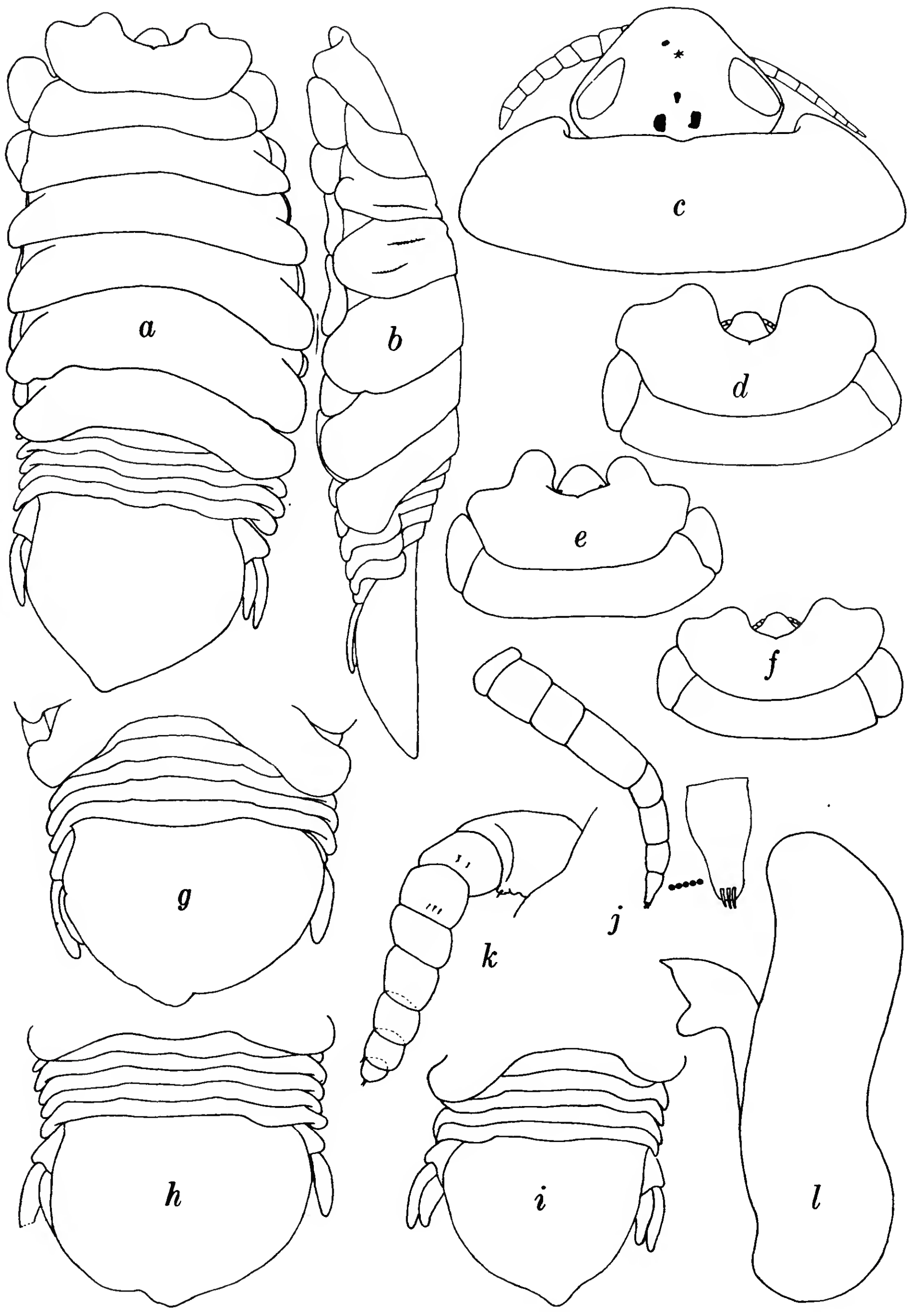

FIGURE 16.—*Joryma sawayah*, new species (*a*, *b*, *j*, *k*, *l* = 20.8 mm ♀ holotype from *Ilisha indica*; *c* = 12.5 mm ♂ paratype from *Ilisha indica*; *d*, *h* = 21.8 mm ♀ from *Ilisha indica*; *e*, *g* = 22.3 mm ♀ paratype from *Ilisha indica*; *f*, *i* = 19 mm ♀ from *Therapon puta*): *a*, habitus, dorsal; *b*, habitus, lateral; *c–f*, head and pereonite 1, dorsal; *g–i*, pleon and telson, dorsal; *j*, antenna 1; *k*, antenna 2; *l*, mandible.

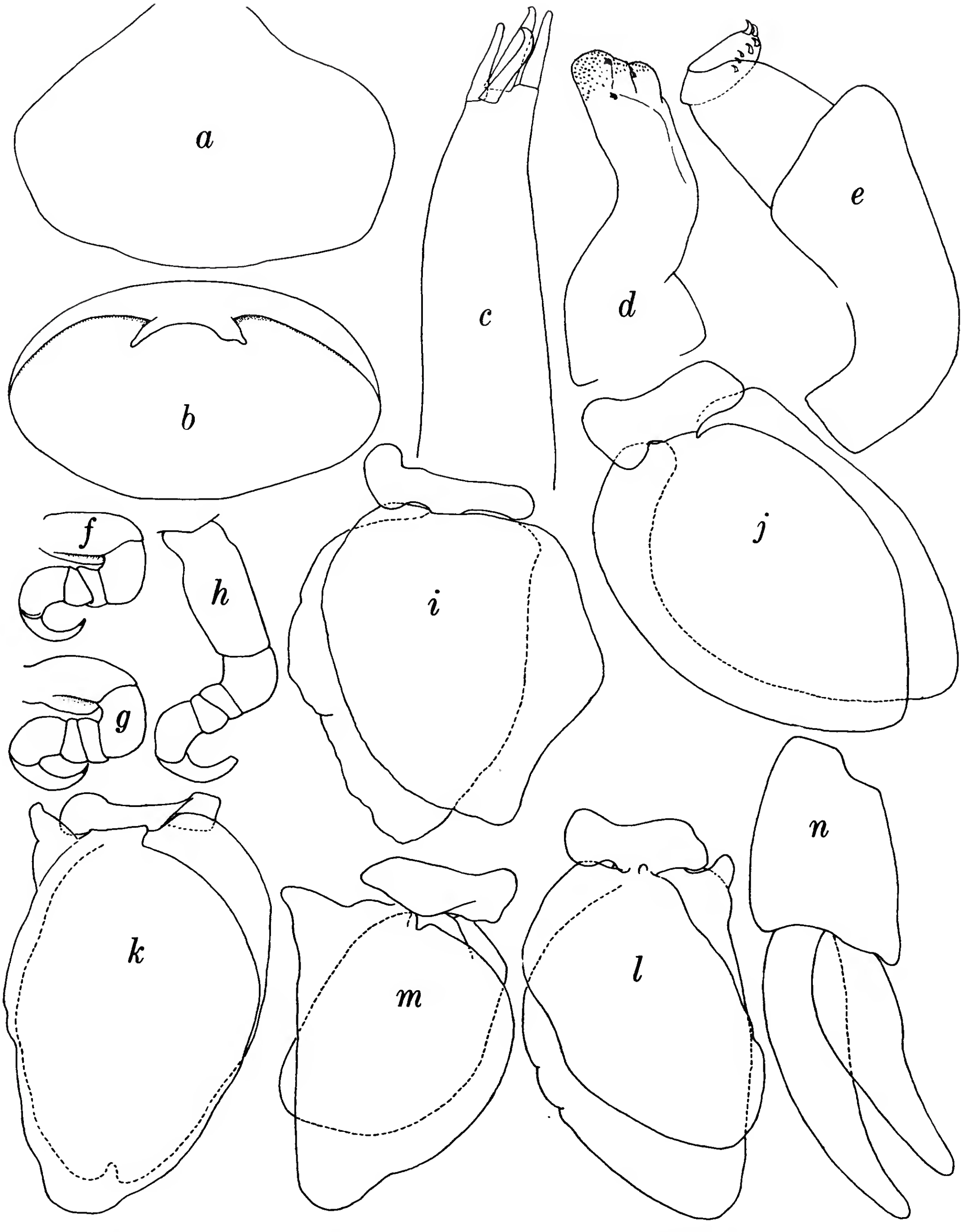

FIGURE 17.—*Joryma sawayah*, new species 20.8 mm ♀ holotype from *Ilisha indica*: *a*, labrum, dorsal; *b*, labrum, ventral; *c*, maxilla 1; *d*, maxilla 2; *e*, maxilliped; *f–h*, pereopods 1–3; *i–m*, pleopods 1–5; *n*, uropod.

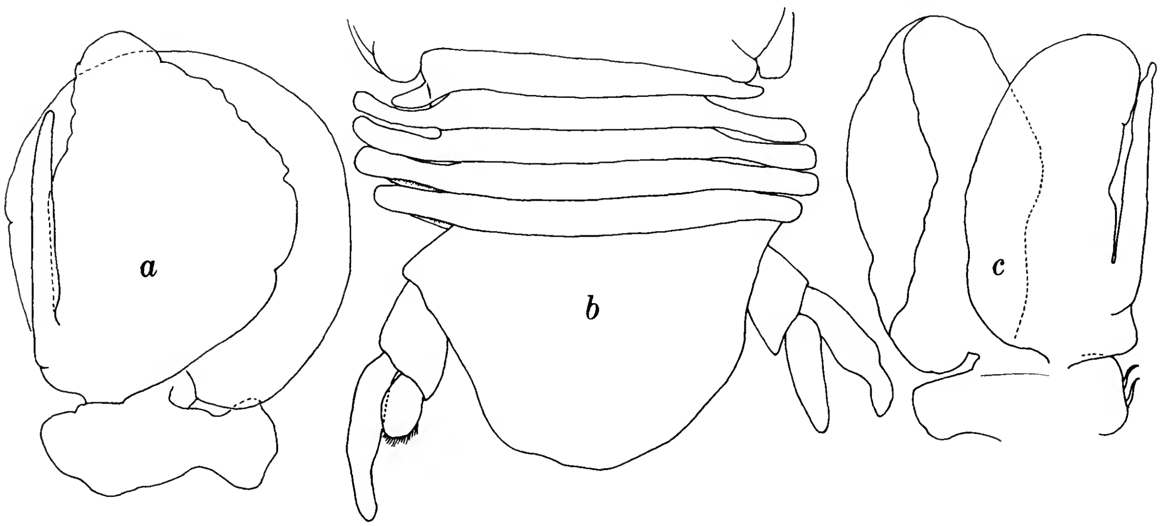

FIGURE 18.—*Joryma sawayah*, new species, 13.3 mm ♂ from *Ilisha indica*: *a*, pleopod 2. *Catoessa gruneri*, new species (*b* = 15.0 mm transitional ♀ from *Leiognathus fasciatus*; *c* = 6.3 mm ♂ from unknown host): *b*, pleon and telson, dorsal, *c*, pleopod 2.

TABLE 2.—Comparison of species of *Joryma*

Species	Head	Pleonite 1 lateral expansion	Telson
J. sawayah	exposed dorsally, not reaching margin of pereonite 1 expansion	bilateral, distinctly bilobed	triangular
J. engraulidis	exposed dorsally, exceeding pereonite 1 expansion	unilateral, not bilobed	broadly rounded
J. tartoor	covered dorsally by pereonite 1	bilateral, slightly bilobed	acutely triangular
J. brachysoma	exposed dorsally, not reaching pereonite 1 expansion	bilateral, slightly bilobed	round-triangular

pereonite 1, anteriorly not reflexed but produced into short shelf in front of antenna 1. Eyes moderately well developed, but usually covered by pereonite 1 and not visible dorsally. Pereonite 1 produced on each side into inflated bilobed process reaching well beyond anterior margin of head. Coxa 2 much enlarged and inflated, produced anteriorly into lobe underlying process of pereonite 1. Coxa 3 inflated, shorter than lateral margin of pereonite 3. Coxae 4–7 occupying anterior halves of pereonite margins; anterior halves of pereonites 4–7 overlapped laterally by preceding pereonites, giving impression that coxa belongs to pereonite anterior to its own. Posterolateral parts of pereonites somewhat inflated. Anterior 1, 2, or 3 pleonites overlapped laterally by pereonite 7.

Pleonites as wide as pereon, all subequal in width and length, rather short, lateral parts curving posteriorly. Telson a little wider than long, subtriangular, with distinct caudomedial lobe.

Antennae 1 well separated at base, rather short, reaching midlength of eye, 8-segmented. Antenna 2 slightly longer and distinctly thicker than antenna 1, 8-segmented.

Mandible with very thick palps forming lateral boundaries to other mouthparts, no segmentation evident in palps. Maxilla 1 with 4 strong apical spines. Maxilla 2 inner and outer lobes with minute scales, each with 2 spines. Maxilliped with 7 spines on apical segment.

Pereopods rather short, bases not expanded. Pereopods 1–3 subequal; pereopods 4–7 subequal, longer than pereopods 1–3.

Peduncles of pleopods without retinacula, expanded laterally into rounded lobes. Exopods of pleopods 3–5 with proximolateral triangular lobes. Appendix masculina of ♂ pleopod 2 shorter than endopod, nearly straight, tapering gradually to narrowly rounded apex.

Uropods much shorter than telson; rami longer than peduncle, pyriform, exopod longer than endopod.

COMPARISONS.—The most obvious differences between *J. sawayah* and the other species assigned to *Joryma* are given in Table 2.

Mothocya Costa, 1851

Mothocya species

FIGURE 19

MATERIAL.—From gill chamber of *Strongylura strongylura* (van Hasselt): SG, 6 Oct 1981, immature ♀ 18.5 mm, ♂ 13.7 mm.

Monod (1971) showed convincingly that the supposed differences between *Mothocya* Costa, 1851, and *Irona* Schioedte and Meinert, 1884, cannot be substantiated. Hence we consider *Irona* a junior synonym of *Mothocya*.

The difficulty in assigning specimens of *Mothocya* to a species has been pointed out by Monod (1971, 1976). Clear-cut distinctions among the 10 nominal species are rare, and the limits of variability within the species are poorly known. Changes in body proportion associated with sexual maturation further complicate the picture. Since neither Kuwait specimen is fully differentiated, identification to species with confidence is not possible now. When revisionary studies improve our knowledge of the taxonomy of *Mothocya*, we hope the illustrations given herein (Figure 19) will aid in specific identification of the Kuwait specimens.

Cymothoa Fabricius, 1793

Cymothoa eremita? (Brünnich, 1783)

FIGURE 20

Oniscus eremita Brünnich, 1783:319–325.
Cymothoa eremita.—Trilles, 1975:987–989 [synonymy, distribution, hosts].

MATERIAL.—From *Pampus argenteus* (Euphrasen): 28 Feb 1979, USNM 191043, ♀ with empty marsupium, 39. From *Sphyraena obtusata* Cuvier: Doha, Mar 1977, USNM 191045, ♀ without oostegites, 22.

DISCUSSION.—Several nominal species of *Cymothoa*, characterized by large size, nearly quadrate head, moderately wide amphicephalic processes of pereonite 1, and relatively short and wide telson, cannot be distinguished from one another at present with confidence. These species include *Cymothoa eremita* Brünnich, 1783; *C. stromatei* Bleeker, 1857; *C. borbonica* Schioedte and Meinert, 1884; *C. eximia* Schioedte and Meinert, 1884; and *C. truncata* Schioedte and Meinert, 1884. *Cymothoa pulchrum* Lanchester, 1902, is similar to the above species, but appears to be distinguishable by the broader amphicephalic processes. The Kuwait specimens are provisionally assigned to the oldest of the above species. The validity of the other species listed above must be considered questionable until revisionary studies based on adequate material can be carried out. Details of their morphology are poorly known or unknown, and a detailed description of the Kuwait specimen would contribute little in support of our provi-

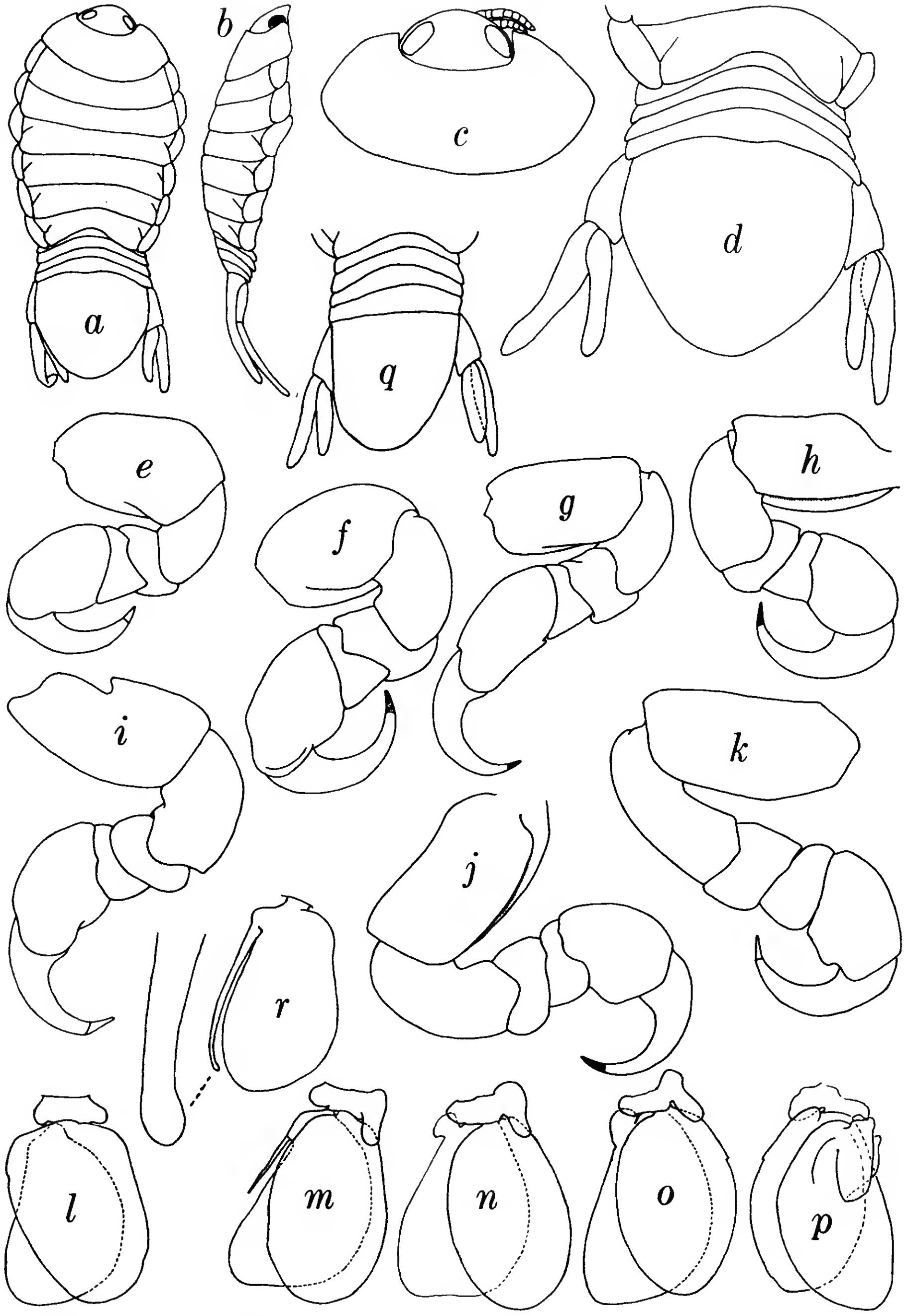

FIGURE 19.—*Mothocya* species from *Strongylura strongylura* (*a–p* = 18.5 mm ♀; *q–r*, 13.7 mm ♂): *a*, habitus, dorsal; *b*, habitus, lateral; *c*, head and pereonite 1, dorsal; *d*, pleon and telson, dorsal; *e–k*, pereopods 1–7; *l–p*, pleopods 1–5; *q*, pleon and telson, dorsal; *r*, pleopod 2.

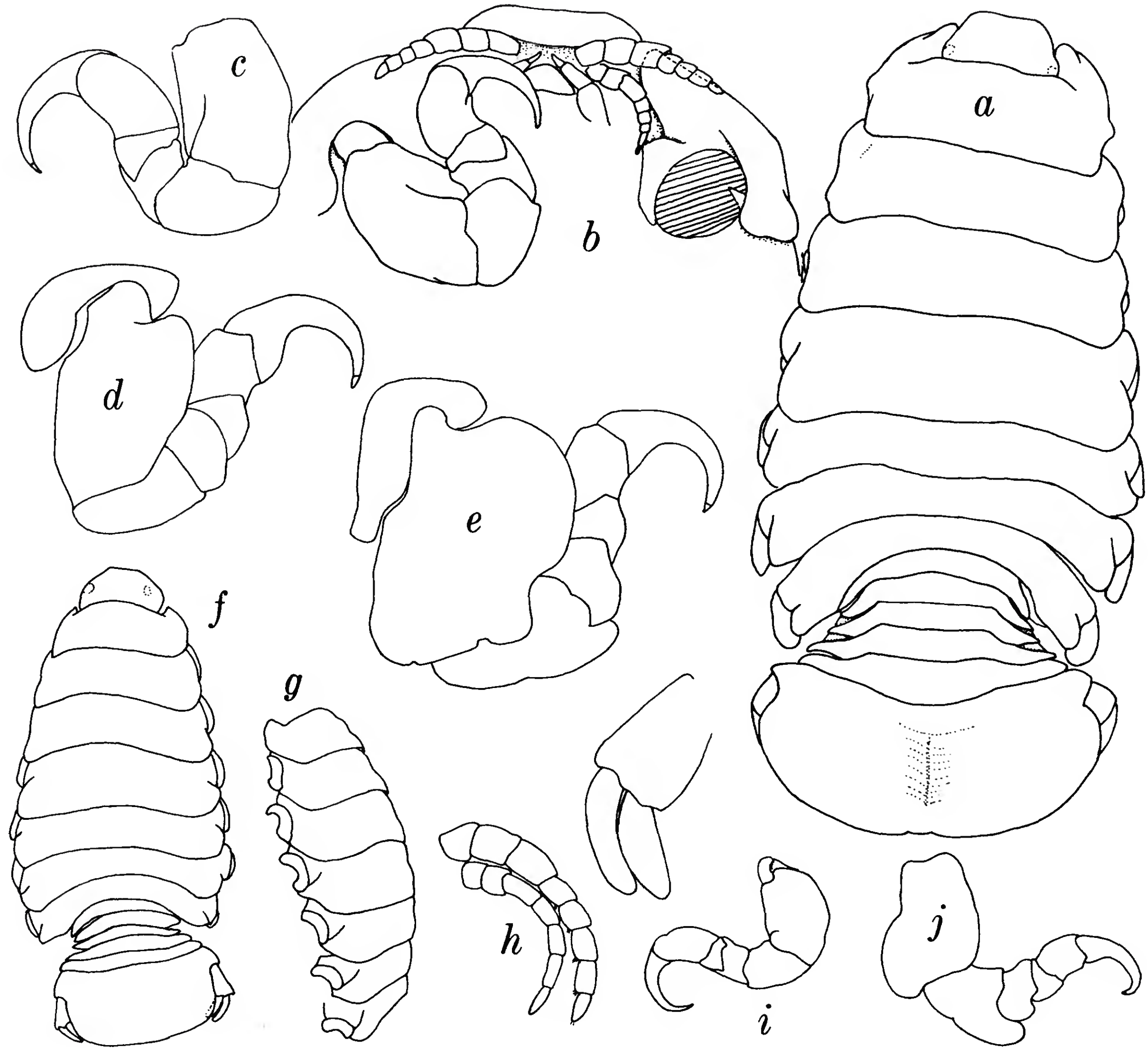

FIGURE 20.—*Cymothoa eremita?* (*a–e* = 39 mm ♀ from *Pampus argenteus*; *f–j*, 22 mm ♀ from *Sphyraena obtusata*): *a*, habitus, dorsal; *b*, head and pereopod 1, ventral; *c*, pereopod 2; *d*, pereopod 4; *e*, pereopod 7; *f*, habitus, dorsal; *g*, pereon, lateral; *h*, antennae 1 and 2; *i*, pereopod 1; *j*, pereopod 7.

sional identification, hence our account is limited to a few illustrations of salient features. As in Schioedte and Meinert's (1884) specimens, the amphicephalic processes are relatively larger in the larger specimen.

DISTRIBUTION.—*Cymothoa eremita* is very widely distributed in the Indo-Pacific. Accepting Trilles' (1975) synonymy, this species ranges from Japan through the Pescadores, the Philippines and Indonesia to the Cape York Peninsula, Australia, and east to the Society Islands. To the west it has been reported from Singapore, Malaysia and Bangkok, Ceylon, the Indian Peninsula from Madras to Bombay, Mauritius, the Seychelles, and the Red Sea. If *C. recta* Dana (1853) is a synonym, as has been reported, the range is extended to Hawaii. It has not been reported previously from the Arabian Gulf.

HOSTS.—The list of recorded hosts given by Trilles (1975) includes 10 species in 6 genera. Neither *Pampus argenteus* nor *Sphyraena obtusata* has been reported as a host for *C. eremita*, but 7 of the Philippine specimens of Richardson (1910) were accompanied by a label reading, "Parasitic in mouths (gill chamber?) of a barracuda-like fish."

Discussion

It may seem surprising that 6 of the 9 species of Cymothoidae from Kuwait have not been previously described, considering that about 135 nominal species of this family have been reported from Indo-Pacific waters. However, a recent study by Williams and Williams (1981), demonstrating that what had been thought to be a single species of *Anilocra* was actually at least 9 species, suggests that there must be many Indo-Pacific species of Cymothoidae yet to be discovered, some of them incorrectly identified as described species.

The Arabian Gulf is so shallow (average depth 35 m) that any exchange of water between it and the adjacent Indian Ocean through the narrow (100 km) Strait of Hormuz is modest (Sverdrup, Johnson, and Fleming, 1946). Nevertheless, the Arabian Gulf has no endemic species of fishes (Blegvad, 1944), and we predict that the new cymothoids described herein will be found in the Indian Ocean proper as well as in the Arabian Gulf. The Arabian Gulf was completely emptied several times during the Pleistocene (Kassler, 1973), and there has not been sufficient time for it to develop endemic species.

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