CIROLANA MERCURYI SP. NOV., A DISTINCTIVE CIROLANID ISOPOD (FLABELLIFERA) FROM THE CORALS REEFS OF ZANZIBAR, EAST AFRICA

BY

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ABSTRACT

Cirolana mercuryi sp. nov. is described from the coral reef of Bawe Island, Zanzibar, East Africa. It is unusual in having the anterior margin of the head strongly produced and overriding the laterally inserted antennules and antennae. This character alone distinguishes the species from all others of the genus, but it is further characterized by large epimera on pleonites 3 and 4 and robust pereopods 1-3, the inferior margins of which are provided with cuticular spines. Brief discussion is given on the cirolanid diversity of East Africa in comparison to that of three other tropical locations.

ZUSAMMENFASSUNG

Der Isopode *Cirolana mercuryi* sp. nov. von dem Korallenriff Bawe, Zansibar, Ostafrika ist hier im Detail beschrieben. Die aussergewöhnlich stark ausgeprägte anteriore Kopfpartie überragt die lateral inserierten Antennen. Dieses Merkmal allein grenzt diese Art von anderen ihrer Gattung ab, allerdings ist sie zusätzlich durch grosse Epimeralplatten der 3. und 4. Pleonite, sowie robuste 1.-3. Pereopoden mit inferior inserierenden Borsten gekennzeichnet. Die Diversität der Cirolaniden Ostafrikas wird diskutiert und mit drei weiteren tropischen Gebieten verglichen.

INTRODUCTION

The Cirolanidae of East Africa have received modest attention in the latter quarter of the twentieth century (see Kensley, 2001). In 1995 and 1997 the author made detailed shallow-water collections (to about 35 metres) on the fringing reefs of Unguja around the town of Zanzibar and in the northeastern corner of the island at Matemwe and the nearby Mnemba Island. The more exposed and deeper reefs

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remain to be examined. The most recent contribution to cirolanids of the region is that of Bruce & Svavarsson (2003).

The single specimen described here, obtained in 1995, is an immature male, the seventh pair of pereopods being present but not fully developed, and the penial openings were not apparent; however, pleopod 2 does have a fully-developed appendix masculina. Using a global positioning system (GPS), the precise site of collection and adjacent reef was thoroughly recollected in 1997, but no further specimens were captured. The shape of the head, morphology of the pereopods, and pleon are unique within *Cirolana* (the shape of the head is unique within the family) and it is useful to describe this species in the interest of documenting the range of cirolanid morphological diversity.

Abbreviations. — CP, circumplumose; PMS, plumose marginal setae; RS, robust setae; ZMUC, Zoologisk Museum, University of Copenhagen.

TAXONOMY

Family CIROLANIDAE Dana, 1852

Cirolana Leach, 1818

Restricted synonymy. —
Bruce, 1986: 139; Kensley & Schotte, 1989: 132; Brusca et al., 1995: 17.

Remarks. — The genus *Cirolana* contains about 100 species (Brusca et al., 1995; Kensley et al., 2002). In general the morphology of the genus is conservative, with species dividing into two loose groups, those related to *Cirolana parva* Hansen, 1890 (see Bruce, 1995 for a list of those species to that date) and those that have a nodular ornamentation on the dorsal surfaces of the pereon, pleon, and pleotelson. No species in the genus has the head as strongly produced as *Cirolana mercuryi* sp. nov., nor does any species have the epimera of pleonites 3 and 4 so strongly expanded. Notwithstanding the strongly produced head and laterally inserted antennules and antenna, there are no outstanding characters to suggest that this species should be excluded from *Cirolana*.

Cirolana mercuryi sp. nov. (figs. 1-3)

Material examined. — Holotype ♂ (2.5 mm), south-western side of reef, Bawe Is., off Zanzibar town, 6°09.42′S 39°08.11′E, 21 September 1995, in small coral rubble, 6 m, coll. N. L. Bruce (ZMUC CRU3880).

Type locality. — Bawe Island, off Zanzibar, Unguja Island, Tanzania.

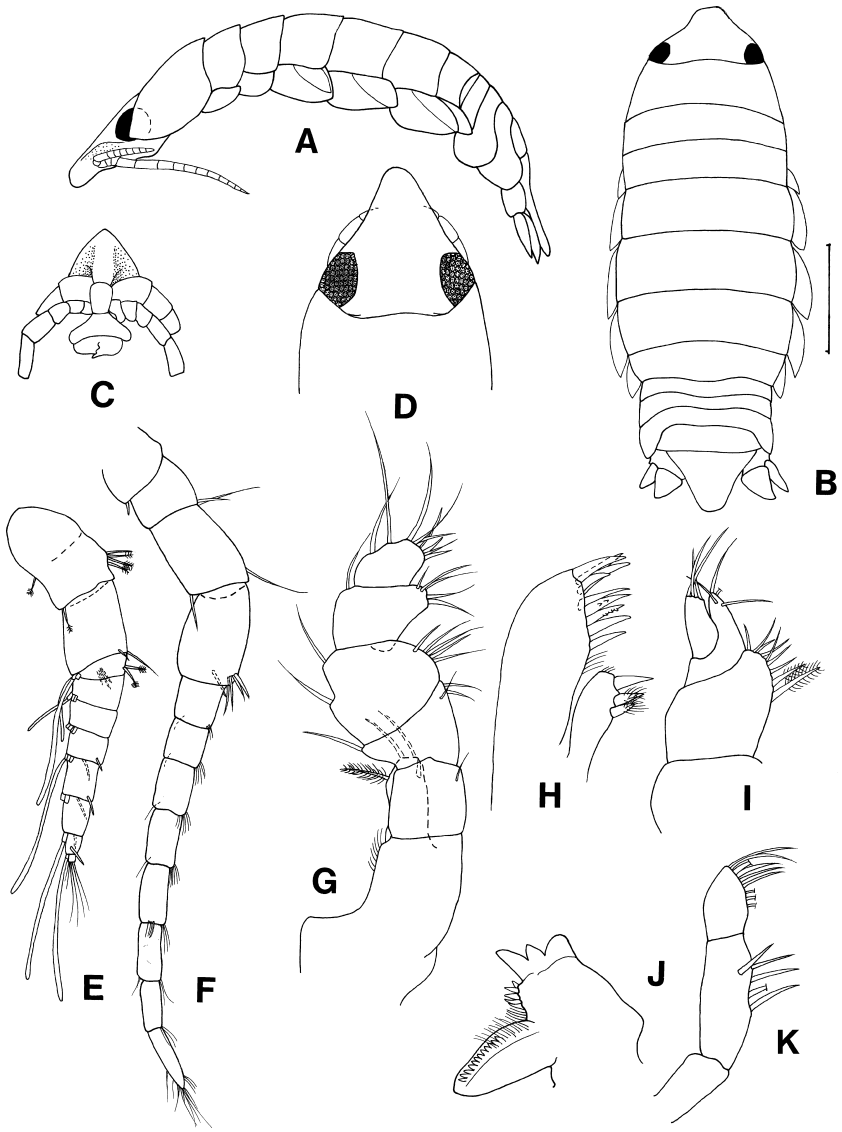

Fig. 1. *Cirolana mercuryi* sp. nov. A, lateral view; B, dorsal view; C, frons; D, head, dorsal view; E, antennule; F, antenna; G, maxilliped; H, maxillule; I, maxilla; J, mandible; K, mandible palp. Scale = 1.0 mm.

Description. — Body about 3.0 times as long as greatest width; widest at pereonite 5. Head with anterior margin strongly produced forming laterally compressed rostrum-like process; frontal lamina 1.3 times as long as wide, ventrally flat, anterior margin rounded, head without dorsal furrows; eyes small, round, transverse rows with about 5 or 6 rows of ommatidia, each with about 5 or 6 ommatidia. Pereonite 1, 2.3 times as long as pereonite 2, without longitudinal furrows; pereonites

$2 > 3 < 4 = 5 < 6 > 7$; pereonite not dorsally ornamented by furrows or nodules. Coxae all with entire oblique suture and fine ventral submarginal suture; posterior margins of coxae 2-7 sub-acute, coxae 2-5 not extending much to posterior of pereonite, coxae 6 and 7 extending well beyond posterior margin of respective pereonite. Pleonite 1 partly concealed in dorsal and lateral view by pereonite 7; lateral margins of pleonites 3-4 expanded and rounded, that of pleonite 4 extending posterior to pleonite 5; epimera of pleonite 5 entirely overlapped by pleonite 4. Pleotelson narrow, about as long as greatest width, lateral margins straight, converging to rounded apex, provided with 6 robust setae set among about 8 plumose marginal setae.

Antennule peduncle stout, 3 times as long as its greatest width; articles 1 and 2 fused, anterodistal angle of article 2 with 3 palmate and 1 simple setae; article 3, 0.7 times as long as combined lengths of articles 1 and 2; flagellum extending to anterior of pereonite 1, with 7 articles, all articles with aesthetascs. Antenna peduncle stout, article 3 superior distal angle with 2 long simple setae; article 4, 1.4 times as long as wide, distal angles each with 1 simple seta; article 5 about as long as article 4, 1.6 times as long as wide, anterodistal angle with cluster of 5 simple setae; flagellum 1.4 times as long as peduncle, extending to posterior of pereonite 2, 8-articled, each article with anterodistal cluster of 6-8 short simple setae, inferodistal angle with 1 short simple seta.

Frontal lamina about twice as long as basal width, lateral margins straight, anteriorly rounded; clypeus not ornamented, laterally and posteriorly produced around labrum.

Mandible molar process with proximal long microtrichs (“scale setae”), with about 12 spines; palp article 2 with 5 large and 1 small stiff simple setae. Maxillule lateral lobe with 10 robust setae on gnathal surface, some of which are weakly serrate, medial lobe with 3 stout circumplumose robust setae. Maxilla lateral and middle lobe with 3 and 4 long simple setae, respectively, medial lobe with 8 marginal stout simple setae, proximal 2 of which are distally circumplumose. Maxilliped palp article 1 with single mediodistal seta; article 2 with 1 long distolateral seta, 3 short simple setae; article 3 lateral margin with 2 long simple setae, medial margin not lobate with 5 long simple setae; article 4 lateral margin with single long distal simple seta, medial margin weakly lobate, with 5 long simple setae; article 5 lateral margin with 2 long simple setae, distal margin with 2 long and 2 short simple setae and 3 finely biserrate setae; endite short, extending to mid-point of palp article 2, distally with 1 coupling hook and 3 CP setae.

Pereopods all stout, with few setae. Pereopod 1 robust, basis 1.9 times as long as wide, superior margin convex, with single simple seta; inferior margin weakly concave, distal angle with single seta; ischium 0.7 times as long as basis, 1.4 times as long as wide, inferodistal angle without seta, medial distolateral margin with 1

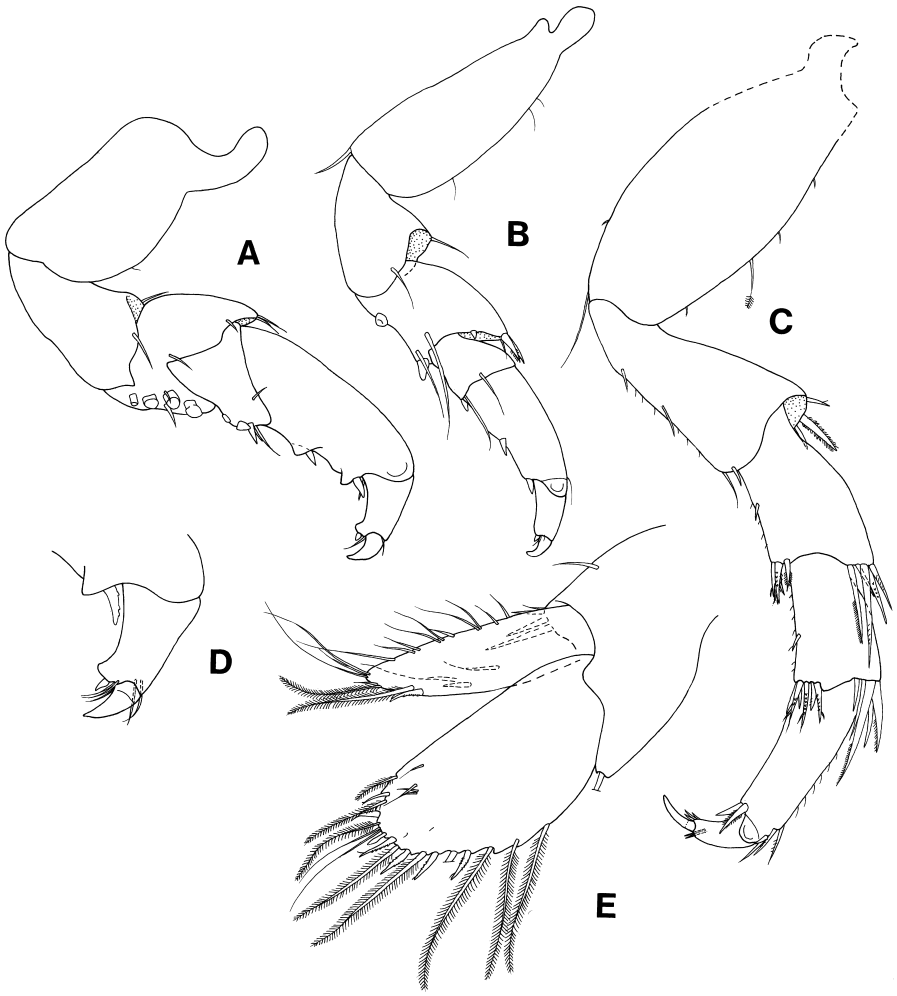

Fig. 2. *Cirolana mercuryi* sp. nov. A-C, pereopods 1, 2, 6, respectively; D, pereopod 1 dactylus; E, uropod.

simple seta, superior distal angle with 1 simple seta; merus about 0.8 times as long as ischium, superior distal angle with 3 simple setae, medial distolateral margin with 1 simple seta, inferior margin with 4 sub-marginal molariform and 2 acute RS; carpus inferodistal angle with 1 flat button-like RS, single conate spine and 1 acute RS and 1 simple seta, medial distolateral margin with 1 short slender seta; propodus 0.9 times as long as ischium, about 2.4 times as long as wide, inferior margin with 1 conate spine on palm and 1 short small acute RS against base of spine, distally with conate spine and acute RS at base of propodal organ, superior distal angle with 1 short slender seta; dactylus about 0.5 times as long as propodus. Pereopod 2 similar to pereopod 1 but slightly longer and basis notably more

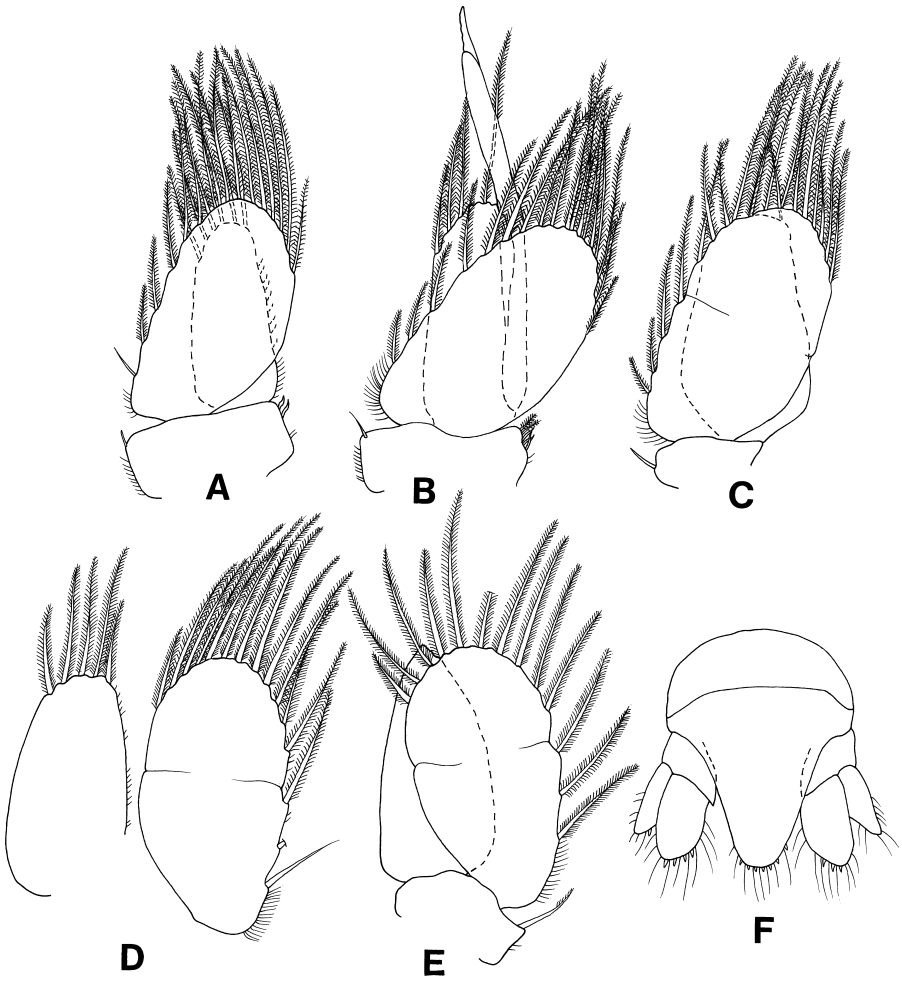

Fig. 3. *Cirolana mercuryi* sp. nov. A-E, pleopods 1-5, respectively; F, pleoteson and uropods, dorsal view.

slender, carpus proportionally longer; basis 2.4 times as long as wide; ischium 0.6 times as long as basis, setation similar to pereopod 1; merus superior distal angle with about 2 acute serrate RS, inferior margin concave, with 1 proximal and 1 distal stout blunt RS and 2 long stiff simple setae, medial distolateral margin with 1 short acute RS; carpus inferodistal margin with 2 small acute RS medial distolateral margin with 1 simple seta; propodus about 2.4 times as long as wide, about as long (1.1) as ischium, inferior margin with 1 small acute RS, slightly larger RS opposing dactylus; dactylus about 0.5 times as long as propodus. Pereopod 6 basis 2.2 (approximation as proximal part of basis broken in dissection) times as long as wide, superior margin distinctly convex, inferior margin convex with 1 palmate and 3 evenly-spaced small simple setae, superior distal angle with 1 slender seta;

ischium 0.7 times as long as basis, 1.8 times as long as wide, superior distal angle with 3 acute RS, 2 of which are biserrate, inferior margin with 2 slender setae set as 1 and 1, inferodistal angle with 1 slender seta and 1 acute RS; merus about 0.5 times as long as ischium, as long as wide, superior distal angle with 6 acute serrate and biserrate RS, inferior margin with 1 seta, inferodistal angle with 4 acute biserrate RS; carpus about as long as merus, 1.6 times as long as wide, superior distal angle with 6 long simple and biserrate RS, inferior margin with 1 RS, inferodistal angle with 7 serrate and biserrate RS; propodus superior distal angle with 2 acute serrate RS and 1 slender seta, inferodistal angle with 2 acute RS, inferior margin without RS. Pereopod 7 not developed.

Pleopod 1 endopod 0.6 times as wide and about 0.9 times as long as exopod, 2.7 times as long as wide, medial and lateral margins straight, distally with 6 PMS; exopod axis oblique towards medial, lateral margin straight, with proximal acute RS, medial margin convex, with 14 PMS; peduncle 2.2 times as wide as long, medial margin with 2 coupling hooks. Pleopod 2 exopod and endopod of similar proportions to pleopod 1, with 18 and 8 PMS, respectively; peduncle with 4 coupling hooks; appendix masculina basal, 8 times as long as wide, 1.7 times as long as endopod, apex with abruptly narrowed vermiform tip; peduncle with 2 coupling hooks and 1 plumose seta. Pleopods 3-5 with indistinct and incomplete exopod suture. Pleopod 3 exopod and endopod with 16 and 5 PMS, respectively. Pleopod 4 exopod and endopod with 15 and 5 PMS, respectively, peduncle with 4 coupling hooks. Pleopod 5 exopod with about 13 PMS, endopod with weakly developed proximomedial lobe.

Uropod peduncle ventrolateral angle with 1 acute RS and 2 simple setae; exopod 2.9 times as long as greatest width, about 0.9 times as long as endopod, lateral margin without RS, with 4-6 PMS, medial margin with 1 small RS and continuous PMS, both margins weakly convex, apex not bifid; endopod about 1.9 times as long as wide, lateral margin with proximal two-thirds straight, distal one-quarter with few PMS, medial margin with 4 RS, set amidst continuous PMS, apex not bifid.

Colour. — Translucent; white once preserved, with scattered dark brown chromatophores.

Remarks. — *Cirolana mercuryi* is immediately distinguished from all other species of *Cirolana* and all other cirolanids by the anteriorly produced head forming a snout-like process that overrides the antennules and antenna, which are laterally inserted on either side of the process.

Etymology. — Named for Farokh Bulsara (5 September 1946 – 24 November 1991), better known as Freddy Mercury of the rock-band “Queen”, arguably Zanzibar’s most famous popular musician and singer (there is some debate about the spelling of his first name, being also given as Farrokh and Farouk). The species name thus is a noun in the genitive singular.

CIROLANID DIVERSITY IN EAST AFRICA

Cirolanid diversity in East Africa (the coasts of Kenya and Tanzania including the islands of Pemba, Unguja, and Mafia) is high (table I), currently estimated at 33 species in 11 genera (see Appendix). Considering that these records are entirely from shallow-water habitats (with the exception of *Parabathynomus*), with exploration of the continental shelf and slope the total should increase substantially. The number of genera and species known from East Africa is comparable to that found at Madang by Bruce (1993), who cited 27 species in 11 genera from a far smaller area. Similarly, the significantly larger area of the Queensland coast, including the coral-reef habitats of the Great Barrier Reef, has 63 species in 16 genera including species from the continental shelf and slope (Bruce, 1986, 1992, 1994; Keable, 1998, 1999, 2001; J. K. Lowry, pers. comm.). Five weeks of collecting around Phuket Island in Thailand in 1995, and the BIODEEP shelf and slope surveys 1995 – 1999 (Bruce & Olesen, 2002, and pers. coll. data) yielded 15 species in 8 genera. The diversity in East Africa is therefore high, and of a similar level to that of the south-west Pacific. East Africa is known to be a region of exceptional climatic stability (see Fjeldså & Lovett, 1997; Fjeldså, 1999) which, in terrestrial environments, is linked to high diversity, and this may also contribute towards shallow-water marine diversity.

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TABLE I

Number of genera and species from studied Indo-West Pacific regions, with an estimate of the potential number of species likely to be found

Region	Number of genera	Number of species	Potential total
East Africa	11	33	~ 100
Eastern Queensland	16	63	~ 150
Madang, Papua New Guinea	11	27	~ 60
Phuket region, Thailand	8	15	~ 30

Teunis Jansen for his capable field assistance in 1997; Brian Kensley, Marilyn Schotte (Smithsonian Institution), Jim Lowry (Australian Museum), and Hans-Georg Müller (formerly of Labor für tropische Ökosystemforschung, Germany) are all thanked for providing unpublished data from their collections; Anne-Nina Lörz (NIWA) for a critical reading of the manuscript and translation of the abstract; Sylvie Bruce for her inking of my drawings.

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[Note that Appendix follows on p. 1081.]

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APPENDIX

Cirolanidae known from East Africa. —

Based on my records and published accounts from the region (Jones, 1971, 1976; Bruce, 1981), an unpublished manuscript by Hans-Georg Müller (pers. comm.), and also on material from Kenya and work in preparation by Brian Kensley and Marilyn Schotte. Species marked with an asterisk are known from other regions (i.e., are not endemic).

1. *Annina lacustris* Budde-Lund, 1908. Zanzibar and Kenya. Matemwe in open pools on uplifted fossil Pleistocene reef (Bruce coll.). *Excirolana bowmani* Jones & Icely, 1981 is a junior synonym (Jones, 1983).
2. *Atarbolana* sp. Bawe Island, off Zanzibar town.
3. *Baharilana richmondi* Bruce & Svavarsson, 2003. Matemwe and Mnemba Island, northeastern Unguja.
4. **Cirolana bovina* Barnard, 1940. Watamu, by Jones (1976).
5. *Cirolana carina* Jones, 1976. Watamu, Kenya.
6. *Cirolana corrugis* Jones, 1976. Watamu, Kenya.
7. *Cirolana parva*-group sp. 1. Shallow coral reefs around Unguja Island (Bruce coll.).
8. *Cirolana parva*-group sp. 2. Kisakasaka, Unguja Island, intertidal sea grass beds (Bruce coll.).
9. *Cirolana parva*-group sp. 3. Watamu, Kenya (Jones, 1976; Müller coll.).
10. *Cirolana sulcaticauda* Stebbing, 1904. Watamu, Kenya (Jones, 1976).
11. *Cirolana* 'nodule tail' sp. 1. Zanzibar (Bruce coll.).
12. *Cirolana* 'nodule tail' sp. 2. Zanzibar (Bruce coll.).
13. *Cirolana* 'nodule tail' sp. 3. Kenya (Müller coll.).
14. *Cirolana* sp., aff. *pleonastica*. Watamu, Kenya. [See below.]
15. *Cirolana* sp. 'excised uropod'. Murogo reef, Zanzibar (Bruce coll.).
16. *Cirolana mercuryi* sp. nov. Bawe Island reef, off Zanzibar.
17. *Eurydice agilis* Jones, 1971. Watamu, Kenya.
18. *Eurydice cavicaudata* Jones, 1971. Watamu, Kenya.
19. *Eurydice chelifer* Jones, 1971. Watamu, Kenya.
20. *Eurydice inornata* Jones, 1971. Watamu, Kenya; Zanzibar (Bruce coll.).
21. *Eurydice longipes* Jones, 1971. Watamu, Kenya.
22. *Excirolana affinis* (Jones, 1971). Watamu, Kenya.
23. *Excirolana geniculata* Jones, 1971. Watamu, Kenya.
24. **Excirolana orientalis* (Dana, 1953). Watamu, Kenya (Jones, 1971), Zanzibar (Bruce coll.).
25. *Metacirolana mbudya* Bruce, 1981. Tanzania; Kenya (Müller coll.).
26. **Metacirolana rotunda* (Bruce & Jones, 1978). Tanzania (Bruce, 1981), also Red Sea.
27. *Metacirolana* sp. 1. Zanzibar, common (Bruce coll.).
28. *Metacirolana* sp. 2. Zanzibar (Bruce coll.).
29. *Natatolana* sp. 1. Zanzibar channel (Bruce coll.).
30. *Natatolana* sp. 2. Zanzibar channel (Bruce coll.).
31. *Natatolana* sp. 3. Matemwe, Zanzibar northeast coast (Bruce coll.).
32. *Neocirolana* sp. nov. Kenya (Müller coll.).
33. **Parabathynomus natalensis* Barnard, 1924. Photographic record by A. J. Bruce.

Excluded from the region:

Cirolana pleonastica. — Cf. Jones (1976); not *C. pleonastica* Stebbing, 1900. Misidentification, see Bruce (1995). This species is known only from Madang and New Britain.

Cirolana parva. — Cf. Jones (1976); not *C. parva* Hansen, 1890. Misidentification, see Bruce (1995). This species is restricted to the Caribbean and Panamanian eastern Pacific.