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A REVIEW OF THE XARIFIIDAE (COPEPODA, POECILOSTOMATOIDA), PARASITES OF SCLERACTINIAN CORALS IN THE INDO-PACIFIC

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ABSTRACT

The family Xarifiidae, copepod parasites of corals, now contains four genera, *Xarifia* (with 75 species, including 27 new species described in this review), *Orstomella* (2 species), *Lipochrus* (1 species), and *Zazaranus* (1 species). For all previously known species, the host corals, the general locality, and features for recognition are given. Keys are provided for the four genera and for the species of *Xarifia.*

Xarifiids are known in the tropical Indo-Pacific extending from the Red Sea and Madagascar eastward to southern Japan, Enewetak Atoll, and New Caledonia, but have not been found farther eastward in Moorea, Hawaii, or Panama. In tabular form the host corals and the geographical distribution for each species of *Xarifia* are given.

Identification of species of *Xarifia* is easier when based on females rather than on males, since females often have diagnostic processes or knobs above the fifth legs. The armature of the rami of legs 1–4 provides important criteria for the determination of species. Six useful diagnostic features are given in tabular form for all species of *Xarifia.*

Nearly half of the species of *Xarifia* are known from a single species of coral. Host preference is suggested on the generic level, with 16 species occurring only in *Acropora.* Several species of *Xarifia* (as many as seven) may occur in a single coral colony. *Acropora* and *Pocillopora* are most often parasitized.

Since species such as *Xarifia sabiuraensis* and *Xarifia obesa* may show considerable variation in certain features, for example, the processes or knobs above the fifth legs in the female, the study of a large number of specimens from all hosts and a variety of localities is advisable.

Although evolutionary lines within the Xarifiidae are obscure, certain species may be assumed to be related on the basis of external morphological features and host preferences. In *Xarifia,* four groups, each with three or more species, and 10 pairs of species are distinguished.

Animal associates are commonly found living with corals in the Indo-Pacific (Patton, 1976). Among these associates are xarifiid copepods which parasitize hermatypic Scleractinia, where they live in the gastrovascular cavities of the polyps. Corals extending from the Red Sea and Madagascar to Enewetak Atoll and New Caledonia are frequently parasitized by these small, elongate, highly modified copepods. Such copepods were first noticed in corals by Dr. Sebastian A. Gerlach in 1957–1958 during the *Xarifa* Expedition to the Red Sea and the Maldive Islands. Two new species of the new genus *Xarifia* were described by Humes (1960) from the *Xarifia* material. Since then many more xarifiids have been described (Humes, 1962; Humes and Ho, 1967; 1968; Misaki, 1978; Humes and Dojiri, 1982; 1983). Sebastian (1972)[1] in an unpublished thesis briefly described two species of *Xarifia* from southeastern India. Including species described in this review, the family Xarifiidae now contains 79 species in 4 genera: 75 *Xarifia,* 2 *Orstomella* Humes and Ho, 1968; 1 *Lipochrus* Humes and Dojiri, 1982, and 1 *Zazaranus* Humes and Dojiri, 1983. A list of species and their coral hosts, together with their localities of collection, will be found in Table 5.

[1] Sebastian, N. J. 1972. Copepod associates of South Indian invertebrates. Ph.D. Thesis, University of Kerala, Trivandrum, India. 344 pp. Unpublished.

Additional material from the Indo-Pacific has made possible the description of many new species of *Xarifia* from a variety of corals. For the first time xarifiids are reported from the coral genera *Acrhelia, Favites, Fungia, Galaxea, Gardineroseris, Leptoria, Oxypora, Parahalomitra, Tubastraea,* and *Scapophyllia.* In this review 27 new species of *Xarifia* are described. They are listed here in alphabetical order followed by the page number where described: *acicularis* (471), *basilica* (475), *bullifera* (479), *clavellata* (483), *dissona* (488), *eminula* (491), *exserens* (495), *filata* (499), *finitima* (503), *fissilis* (507), *formosa* (511), *gibberula* (516), *imitans* (521), *imparilis* (524), *jugalis* (529), *lacerans* (535), *levis* (536), *plectrata* (544), *quinaria* (547), *rasilis* (551), *sectilis* (555), *simplex* (559), *tenta* (564), *torigera* (568), *umbonata* (572), *uncinata* (576), and *varilabrata* (580).

The following *Xarifia* species are partially redescribed on the pages indicated: *fimbriata* Humes, 1960 (502); *obesa* Humes and Ho, 1968 (542); *reducta* Humes, 1962 (554); *sabiuraensis* Misaki, 1978 (554) and *tumorisa* Misaki, 1978 (571).

Keys are provided for the four genera of the Xarifiidae (*Lipochrus, Orstomella, Xarifia,* and *Zazaranus*) and for the species of *Xarifia.*

Materials and Methods

For the collection of xarifiid copepods special techniques have been described (Humes, 1962; Humes and Ho, 1967; Humes and Dojiri, 1982; 1983). If a freshly collected coral colony, or fragments thereof, is washed rapidly in dilute ethanol or formaldehyde, very few xarifiids will usually be recovered. Very small numbers of copepods are found if the coral is crushed and then washed, since the sediment and mucus make the search extremely difficult.

Successful techniques for the recovery of xarifiids have been described by Humes and Dojiri (1982) as follows: "In order to recover xarifiids from fragments or whole colonies of Scleractinia the corals were treated in the following manner. Immediately upon collection in the field each colony was isolated in a plastic bag. Later in the laboratory the coral and sea water were placed in a pail to which sufficient 95% ethyl alcohol was added to make approximately a 5% solution. The coral remained in this solution at ambient temperature for several hours or overnight. Then the coral was thoroughly rinsed by shaking well, and the wash water was poured through a fine net (120 holes per 2.5 cm, each hole approximately 100 μm square). The copepods were then picked from the sediment retained in the net. The dilute alcohol together with the accumulated products of decomposition apparently stimulates the copepods to leave the polyps, at which time they fall to the bottom of the container, since they are unable to swim."

For the study of the copepods in the laboratory the lactic acid/wooden slide technique described by Humes and Gooding (1964) was used. All figures were drawn with the aid of a camera lucida. The letter after the explanation of each figure refers to the scale at which it was drawn. All measurements were made on specimens cleared in lactic acid. The length does not include the setae on the caudal rami. The abbreviations used are indicated on each figure. In the formulas for legs 1–4 Roman numerals indicate spines, Arabic numerals represent setae.

Paratype specimens not deposited in the National Museum of Natural History are in the collection of the author.

Identification of the Corals

Over the span of 22 years when collections of corals were made at various localities in the Indo-Pacific, the assistance of several coral specialists was sought for the identification of these hosts. Those who provided identifications were as follows: Dr. Donald F. Squires (1960, 1967) corals from Madagascar; Dr. Michel Pichon (1963–1964) corals from Madagascar and Mauritius; Dr. John W. Wells (1969) corals from Enewetak; (1971) corals from New Caledonia; (1975) corals from the Moluccas; Dr. Peter W. Glynn (1981) corals from Panama; Dr. Michel Pichon (1982) corals from Moorea and the Great Barrier Reef; and Dr. Dennis M. Devaney and Mr. Paul Jokiel (1982) corals from Hawaii.

In an effort to be as up-to-date and consistent as possible, the names of the corals are here used in accordance with the monographic studies on the Scleractinia of eastern Australia by Veron and Pichon (1976; 1979; 1982), Veron et al. (1977), and Veron and Wallace (in press). The advice of Dr. Michel Pichon has been invaluable, for the corals generally but in particular for the large genus *Acropora.*

The name *Acropora corymbosa* (Lamarck) represents a complex of several species, and "*corymbosa*" as such has no validity (Pichon, pers. comm.). Specimens from Madagascar ascribed to *A. corymbosa* are either *Acropora humilis* (Dana) or (much more unlikely) *Acropora digitifera* (Dana). Throughout the following text and tables the species name has been enclosed in quotation marks as "*corymbosa,*" in order to emphasize its nature as a "species complex."

Systematic Descriptions

Family XARIFIIDAE Humes, 1960

Diagnosis.—Body elongate, mostly slender, external segmentation weakly defined. Urosome often short. Region dorsal to fifth legs in female smooth or with processes or knobs (1, 2, 3, or 5). Caudal ramus either separated from or fused with anal segment.

First antenna with at most 7 segments, usually fewer. Second antenna 3- or 4-segmented. Mandible a small blade or absent. First maxilla 1-segmented. Second maxilla 2-segmented. Maxilliped in female 3-segmented (rarely 2-segmented), in male 4-segmented, assuming that proximal part of terminal claw represents fourth segment (male unknown in *Lipochrus*).

Legs 1–4 with exopods 2- or 3-segmented; endopods 1- or 2-segmented, rudimentary, or absent. Terminal segment of exopods usually with single clawlike spine (but 2–4 spines in *Zazaranus*). Leg 5 with free segment bearing 1 or 2 terminal setae, reduced to 2 or 3 setae, or absent.

Type-genus.—*Xarifia* Humes, 1960.

Family contains 4 genera: *Xarifia, Orstomella, Lipochrus,* and *Zazaranus.*

Genus *Lipochrus* Humes and Dojiri, 1982

Diagnosis.—Body elongate, with weak segmentation. Region dorsal to fifth legs in female without processes or knobs. First antenna 3-segmented. Second antenna 3-segmented with terminal claw. Mandible present. Legs 1–4 with 3-segmented exopods but endopods rudimentary. Legs 5 and 6 absent. Male unknown.

Lipochrus acroporinus Humes and Dojiri, 1982

Hosts.—*Acropora rosaria* (Dana) and *Acropora patula* (Brook).

Locality.—New Caledonia.

Features for Recognition.—Length of female 2.09 mm. Ratio of length to width about 12.7:1. Exopod of leg 1 with I,I,I; exopods of legs 2–4 with I,0,I.

Lipochrus sp.

Host.—*Acropora rambleri* (Bassett-Smith).

Locality.—Ceram.

Only 1 female specimen known.

Genus *Orstomella* Humes and Ho, 1968

Diagnosis.—Body elongate, with indistinct segmentation. Region dorsal to fifth legs in female without processes or knobs. Rostrum weak. First antenna 6-segmented, first segment with anterior process. Second antenna 3-segmented. Labrum sexually dimorphic, in male with lateral sclerotized crenated depressions. Mandible and paragnath absent. Legs 1 and 2 with 2-segmented rami. Legs 3 and 4 with 2-segmented exopods but endopods absent. Leg 5 a ridge with 3 setae.

Orstomella faviae Humes and Ho, 1968

Host.—*Favia* sp.

Locality.—Madagascar.

Features for Recognition.—Length of female 2.19 mm (2.10–2.26 mm) and male 2.12 mm (1.99–2.24 mm). Ratio of length to width in female about 6.4:1. First antenna with segments 2–6 bearing short obtuse setae. Second antenna with jointed seta on first segment. Leg 5 with obtuse setae.

Orstomella lobophylliae Humes and Ho, 1968

Hosts.—*Lobophyllia costata* (Dana) and *Lobophyllia corymbosa* (Forskål).

Locality.—Madagascar.

Features for Recognition.—Length of female 1.31 mm (1.23–1.39 mm) and male 1.30 mm (1.20–1.45 mm). Ratio of length to width in female about 5.5:1. First antenna with segments 2 and 3 bearing modified setae with flagellate tips. Second antenna with first segment unarmed. Leg 5 with attenuate setae.

Genus *Xarifia* Humes, 1960

Diagnosis.—Body elongate with weak external segmentation. Region dorsal to fifth legs in female usually with processes or knobs (1, 2, 3, or 5) but in a few species smooth. Caudal ramus free or fused with anal segment. First antenna with 3–6 segments. Second antenna 3- or 4-segmented, with terminal claw. Labrum often indented medially, in some species sexually dimorphic. Mandible smooth or spinulate. Paragnath present in most species. First maxilla a small lobe with 2 or 3 setae. Second maxilla 2-segmented. Maxilliped 3-segmented, but in a few species 2-segmented by fusion of second and third segments.

Legs 1–4 with similar segmentation. Exopods 3-segmented, last segment always with terminal spine. Formulas for armature of exopods I,I,I; 1,I,I; 1,1,I; I,1,I; I,0,I; or 0,0,I. In a few species this formula in leg 1 different from that in legs 2–4. Endopods 1- or 2-segmented, in some species separation of segments indistinct; if 2-segmented, first segment unarmed. Terminal armature consisting of 0, 1, 2, or 3 setae, or in a few species spines, producing formula characteristic for species. In one species this endopod formula sexually dimorphic.

Leg 5 usually with free segment bearing 2 terminal setae, in a few species only 1 terminal seta. This leg reduced in several species to 2 or 3 setae, and in a few species completely absent. Leg 5 often sexually dimorphic. Leg 6, absent in female, represented in male by 2 setae on genital flap.

Eggs in egg sac seriate or in cluster.

Xarifia ablusa Humes and Dojiri, 1982

Hosts.—*Acropora* "*corymbosa*" (Lamarck), *Acropora elseyi* (Brook), *Acropora rambleri* (Bassett-Smith), and *Acropora rosaria* (Dana). [The name *Acropora* "*corymbosa*" (Lamarck) represents a mixture of 5 or 6 species, and *Acropora exilis* (Brook), a host for this species reported by Humes and Dojiri (1982), is a synonym of *Acropora elseyi* (Brook) (Pichon, pers. comm.).]

Localities.—Ceram, New Caledonia.

Features for Recognition.—Length of female 1.00 mm (0.93–1.06 mm) and male 0.98 mm (0.93–1.03 mm). Ratio of length to width in female about 6.5:1. Three long equal processes above fifth legs in female. Caudal ramus elongate in female, but fused with anal segment in male. Second antenna 4-segmented. Legs 1–4 with exopods having outer armature 1,I,I and 2-segmented endopods having terminal armature 3, 3, 0, 1. Segment of leg 5 in female elongate, 116 μm. Leg 5 in male represented by 3 small setae. Eggs seriate.

Xarifia acicularis new species
Figures 1a–i, 2a–i

Type Material.—34 ♀♀, 14 ♂♂, and 1 copepodid from *Pachyseris rugosa* (Lamarck), in 2 m, midway between Isle Noumbo and Isle Ndié, Baie Dumbea, near Noumea, New Caledonia, 22°12′47″S, 166°24′41″E, 9 July 1971. Holotype ♀ (USNM 210335), allotype (USNM 210336), and 41 paratypes (30 ♀♀, 11 ♂♂) (USNM 210337) deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C.

Other Specimens.—1 ♂ from *Pachyseris rugosa*, in 2 m, western end of Isle Maître, near Noumea, New Caledonia, 22°20′05″S, 166°24′05″E, 21 June 1971.

Female.—Body (Fig. 1a, b) elongate and slender, 8.4 times longer than wide. Length 1.98 mm (1.68–2.18 mm) and greatest width 0.22 mm (0.19–0.24 mm), based on 10 specimens. Region dorsal to fifth legs smooth, without processes or knobs (Fig. 1c). Genital and postgenital segments together about 21 percent of body length. Caudal ramus (Fig. 1d) elongate, 57 × 9 μm, ratio 6.3:1, bearing 1 outer lateral seta and 3 terminal setae. Entire egg sac not seen, but single egg in nearly empty egg sac measuring 140 × 125 μm.

Rostrum (Fig. 1e) broadly rounded. First antenna (Fig. 1e) 54 μm, 5-segmented. Lengths of segments (measured along posterior side): 11 (19 μm along anterior side), 14, 4.5, 6.5, and 6 μm, respectively. Formula: 3, 13, 3, 2 + 1 aesthete, and 7 + 1 aesthete. Second antenna (Fig. 1f) 4-segmented, 77 μm long not including claw. Armature: 1, 1, 2, and 1 + I. Claw 17 μm long.

Labrum (Fig. 1g) with posteroventral margin slightly indented medially and having broad lateral areas. Mandible (Fig. 1h) 28 μm, blade smooth. Paragnath (Fig. 1h) a smooth lobe. First maxilla (Fig. 1h) with 2 setae. Second maxilla (Fig. 1i) 2-segmented, elongate second segment with large swollen seta. Maxilliped (Fig. 2a, b) 3-segmented, first segment unarmed, second segment with prominent antero-inner lobe and 2 small setae, and small third segment with 2 small spines (processes?).

Legs 1–4 (Fig. 2c, e) with 3-segmented exopods and indistinctly 2-segmented endopods. Spine and setal formula as follows:

P_{1+2}	coxa	0-0	basis	1-0	exp	I-0;	I-0;	I,2
					enp	0-0;	2	
P_{3+4}	coxa	0-0	basis	1-0	exp	I-0;	I-0;	I,1
					enp	0-0;	1	

Endopods variable in shape (Fig. 2c, d), with only few minute hairs on outer margins. Terminal armature of endopods 2, 2, 1, 1.

Leg 5 (Fig. 1c) represented only by 2 small setae.

Color in life in transmitted light opaque gray, intestine reddish brown with slight greenish tinge, eye red, egg sacs dark gray.

Male.—Body (Fig. 2f, g) long and slender, 9.9 times longer than wide. Length 1.34 mm (1.27–1.43 mm) and greatest width 0.12 mm (0.11–0.13 mm), based on 10 specimens. Caudal ramus similar to that of female.

Rostrum as in female. First antenna resembling that of female but 1 aesthete added on second segment (at point indicated by dot in Fig. 1e). Second antenna like that of female.

Labrum, mandible, paragnath, first maxilla, and second maxilla as in female. Maxilliped (Fig. 2h) 4-segmented. First segment unarmed. Slender second segment with 2 inner setae, one seta stout with mucronate tip. Small third segment un-

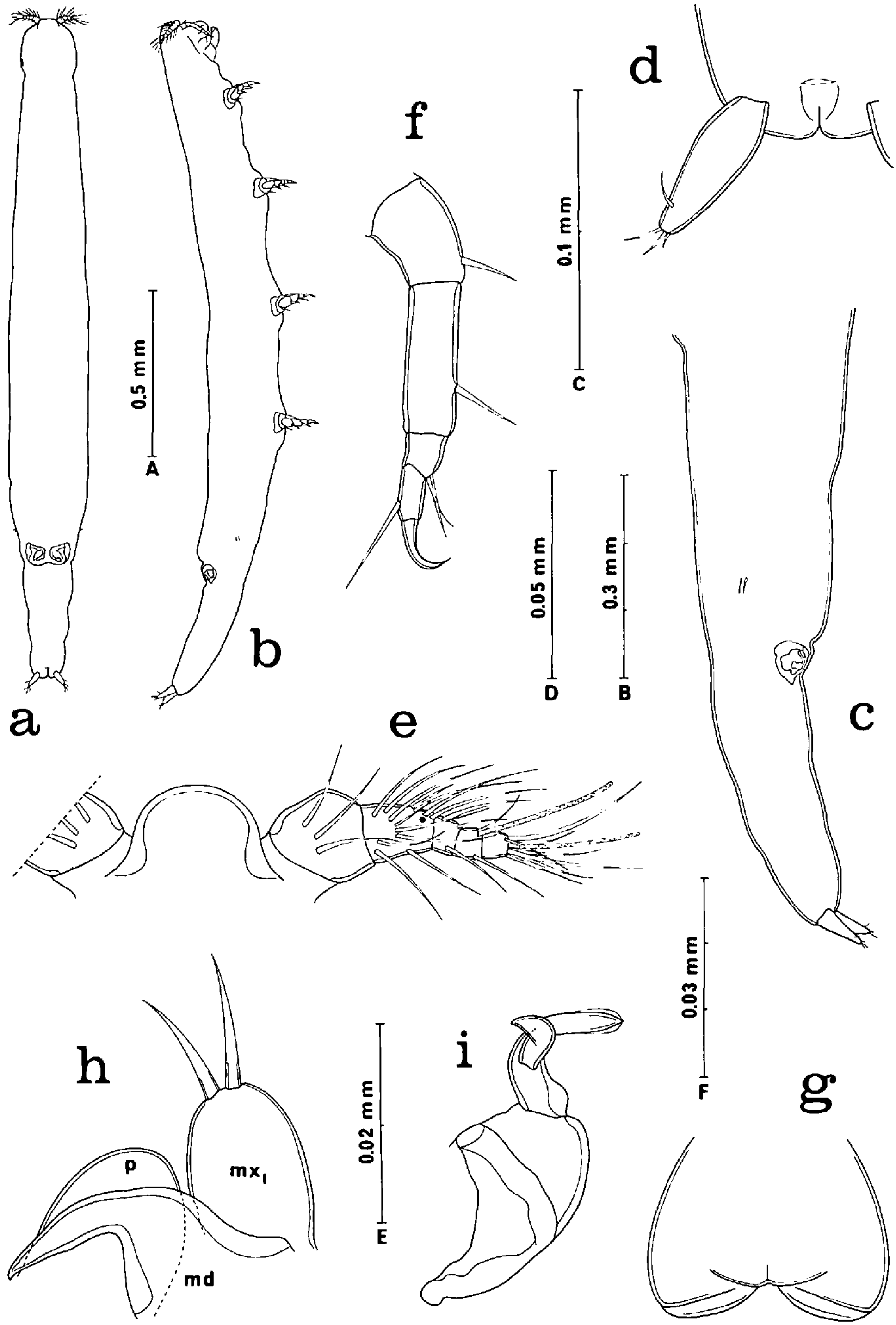


Figure 1. *Xarifia acicularis* new species, female: a, dorsal (scale A); b, lateral (B); c, urosome, lateral (B); d, caudal ramus, dorsal (C); e, rostrum and first antenna, with dot indicating position of aesthete added in male, dorsal (D); f, second antenna, dorsal (D); g, labrum, ventral (D); h, mandible, paragnath, and first maxilla, ventral (E); i, second maxilla, anterior (F). md = mandible, p = paragnath, mx_1 = first maxilla.

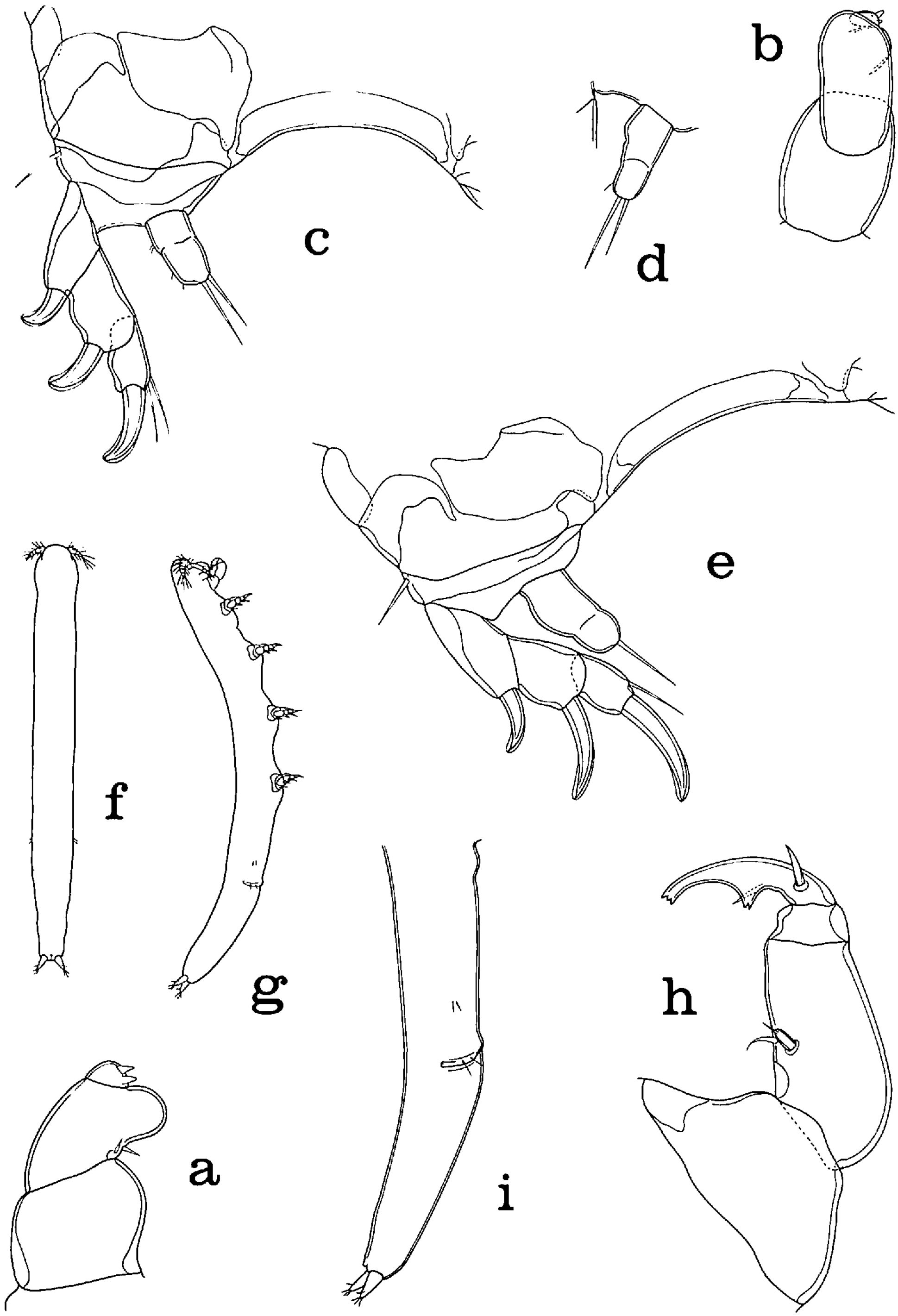


Figure 2. *Xarifia acicularis* new species. Female: a, maxilliped (scale D); b, maxilliped, posterior (D); c, leg 1 and intercoxal plate, posterior (D); d, endopod of leg 1, posterior (D); e, leg 4 and intercoxal plate, posterior (D). Male: f, dorsal (A); g, lateral (A); h, maxilliped, inner (D); i, urosome, lateral (B).

armed. Claw (fourth segment) short, 43 μm, bearing 2 proximal setae, its concave margin having prominent process with bifurcate apex, and its tip trifurcate.

Legs 1–4 as in female.

Leg 5 (Fig. 2i) as in female.

Leg 6 (Fig. 2i) represented by 2 small setae on posteroventral flap on genital segment.

Color as in female.

Etymology.—The specific name *acicularis,* Latin meaning like a needle, refers to the elongate slender body.

Remarks.—Among the eight species of *Xarifia* in which the female lacks processes or knobs on the region above the fifth legs, only three species, *Xarifia anopla* Humes and Dojiri, 1982, *Xarifia extensa* Humes and Dojiri, 1982, and *Xarifia levis* new species, described below, lack a free segment in leg 5, as in the new species. *Xarifia anopla* differs from *X. acicularis* in having a 3-segmented second antenna, 1-segmented endopods in legs 1–4, and no trace of leg 5. In *Xarifia extensa,* although leg 5 is reduced to only 2 setae as in the new species, the body of the female is 15 times longer than wide, the genital and postgenital segments comprise only 10 percent of the body length, and the endopods of legs 1–4 are 1-segmented. In *Xarifia levis* leg 5 is represented by 3 setae and the formula for the terminal armature of the endopods of legs 1–4 is 3, 2, 1, 1.

Xarifia anomala Humes and Ho, 1968

Hosts.—*Acropora abrotanoides* (Lamarck), *Acropora convexa* (Dana), *Acropora "corymbosa"* (Lamarck), *Acropora florida* (Dana), *Acropora humilis* (Dana), *Acropora hyacinthus* (Dana), *Acropora intermedia* (Brook), *Acropora palifera* (Lamarck), and *Acropora* sp. [Of three hosts reported for this species by Humes and Dojiri (1982), *Acropora danai* (Milne Edwards and Haime) is a synonym of *Acropora abrotanoides* (Lamarck), and *Acropora gravida* (Dana) and *Acropora affinis* (Brook) are synonyms of *Acropora florida* (Dana) (Pichon, pers. comm.).]

Localities.—Madagascar, New Caledonia, Moluccas (Ceram, Halmahera, Obi).

Features for Recognition.—Length of female 1.25 mm (1.25–1.26 mm) and male 1.21 mm (1.15–1.25 mm). Ratio of length to width of female 7.8:1. Female with 3 moderately long, nearly equal processes above fifth legs. Caudal ramus elongate in female, but fused with anal segment in male. Second antenna 4-segmented. Legs 1–4 with exopods having outer armature I,I,I and 2-segmented endopods having terminal armature 0, 3, 0, 0. Leg 5 in female with elongate segment, 100 μm. Leg 5 in male represented by 3 small setae.

Xarifia anopla Humes and Dojiri, 1982

Previously Known Hosts.—*Montipora* sp. cf. *M. undata* Bernard and *Montipora* sp.

New Host.—29 ♀♀, 11 ♂♂ from *Montipora composita* Crossland, in 2 m, Mermaid Cove, Lizard Island, Great Barrier Reef, northeastern Australia, 14°39′50″S, 145°27′00″E, 27 October 1982.

Localities.—Madagascar, Ceram, Great Barrier Reef (Lizard Island).

Features for Recognition.—Length of female 0.98 mm (0.85–1.08 mm) and male 0.93 mm. Ratio of length to width of female 8.8:1. Region dorsal to fifth legs in female without processes or knobs. Caudal ramus fused with anal segment in both sexes and lacking setae. Second antenna probably 3-segmented, but third segment showing traces of subdivision. Legs 1–4 with exopods having outer armature I,I,I and 1-segmented endopods having terminal armature 2, 2, 0, 0. Leg 5 absent in both sexes.

Xarifia apertipes Humes and Dojiri, 1983

Hosts.—*Gyrosmilia interrupta* (Ehrenberg) and *Montipora verrucosa* (Lamarck).

Locality.—Madagascar.

Features for Recognition.—Length of female 1.48 mm (1.36–1.59 mm) and male 1.49 mm. Ratio of length to width in female about 6:1. Female with 3 long equal processes above fifth legs. Caudal ramus elongate in both sexes. Second antenna 4-segmented. Legs 1–4 with exopods having outer armature I,I,I and 2-segmented endopods having terminal armature 2, 1, 1, 1. Leg 5 in female with segment elongate, 205 μm. Leg 5 in male with small lobe 8 μm.

Xarifia basilica new species
Figures 3a–k, 4a–j

Type Material.—3 ♀♀, 3 ♂♂ from *Acropora hyacinthus* (Dana), in 2 m, Mermaid Cove, Lizard Island, Great Barrier Reef, northeastern Australia, 14°39′50″S, 145°27′00″E, 26 October 1982. Holotype ♀ (USNM 210317), allotype (USNM 210318), and 1 paratype ♂ (USNM 210319) deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C.

Other Specimens.—7 ♀♀, 1 copepodid, from *Acropora formosa* (Dana), in 2 m, Mermaid Cove, Lizard Island, Queensland, 26 October 1982.

Female.—Body (Fig. 3a, b) large, moderately stout, 6.15 times longer than wide. Length 2.53 mm (2.23–2.88 mm) and greatest width 0.42 mm (0.36–0.51 mm), based on 3 specimens. Greatest dorsoventral thickness 0.45 mm (0.37–0.52 mm). External segmentation not defined. Region dorsal to fifth legs bearing 3 short processes (knoblike lobes) (Fig. 3c). Genital and postgenital segments together about 26 percent of body length. Genital areas located dorsally (Fig. 3d). Caudal ramus (Fig. 3e) fused with anal segment and bearing 1,1,4 small setae. Egg sac not seen. Body surface mostly without ornamentation.

Rostrum (Fig. 3f) elongate and rounded. First antenna (Fig. 3f) very short, 32 μm, 3-segmented. Lengths of segments (measured along posterior side): 8.5 (15.5 μm along anterior side), 15, and 5.5 μm, respectively. Armature: 3, 17 + 1 aesthete, and 6 + 1 aesthete. All setae smooth. Second antenna (Fig. 3g) 4-segmented, 34 μm long including short claw. Armature: 1, 1, 2, and I + 1 + 1 spinule. Claw minute, only 2 μm long. All setae smooth.

Labrum (Fig. 3h) with posteroventral margin insected medially and having only slight lateral lobes. Mandible (Fig. 3i) 24 μm, blade unilaterally spined. Paragnath not seen. First maxilla with 2 setae (Fig. 3j). Second maxilla (Fig. 3k) 31 μm long, 2-segmented, first segment unarmed, second segment bearing 2 small setae and having elongate digitiform tip. Maxilliped (Fig. 4a) 33 μm long, 3-segmented. First segment with inner lobe. Second segment with inner lobe and 2 small setae. Small third segment with 2 minute spinules. Profile of head region as in Figure 4b.

Legs 1–4 (Fig. 4c–e) with 3-segmented exopods and 1-segmented endopods (latter with suggestion of subdivision). Spine and setal formula as follows:

P_1	coxa	0-0	basis	1-0	exp	I-0;	I-0;	I,3
					enp	3		
P_2	coxa	0-0	basis	1-0	exp	I-0;	I-0;	I,2
					enp	2		
P_{3+4}	coxa	0-0	basis	1-0	exp	I-0;	I-0;	I,2
					enp	1		

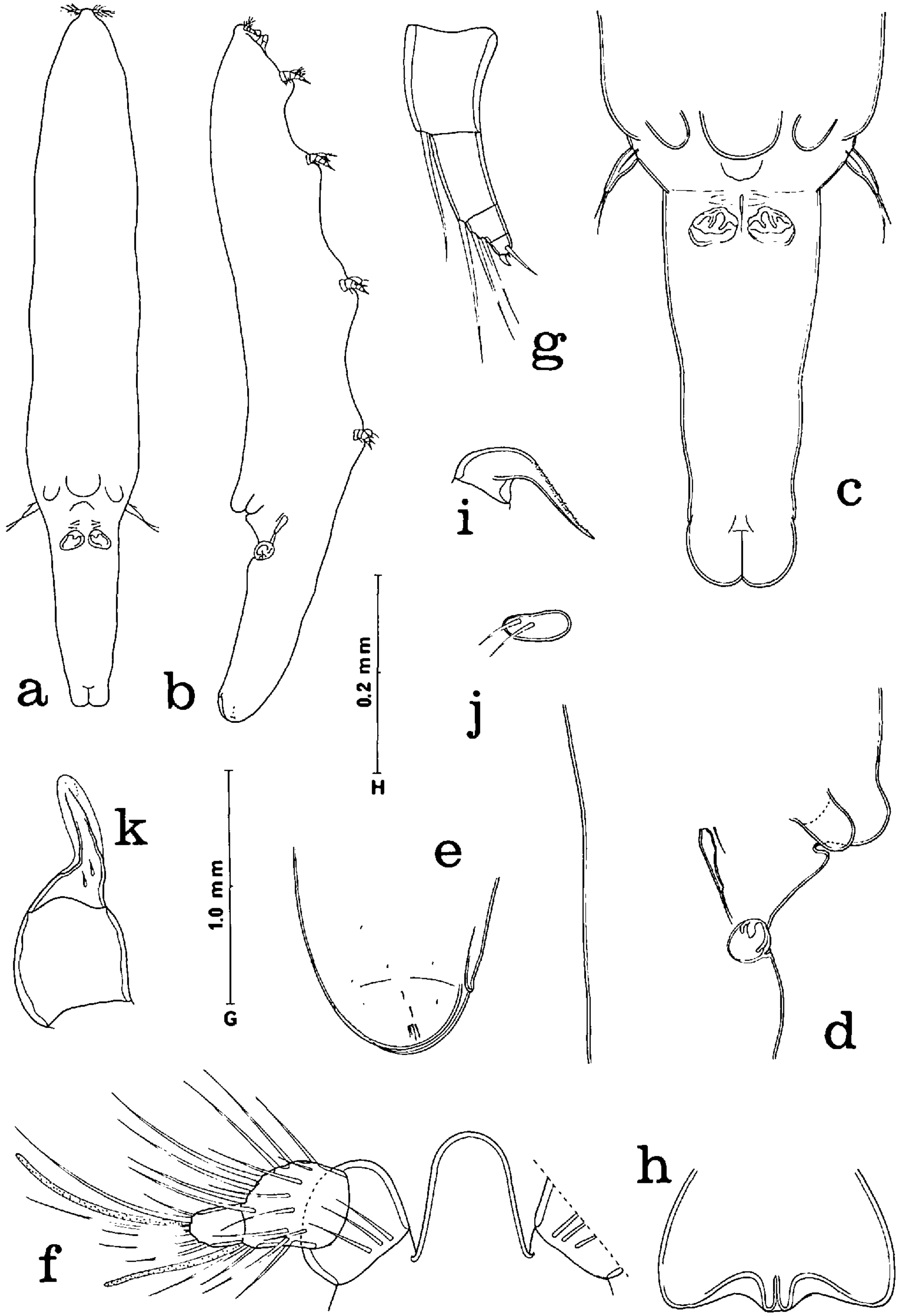


Figure 3. *Xarifia basilica* new species, female: a, dorsal (scale G); b, lateral (G); c, processes and urosome, dorsal (B); d, area of processes and leg 5, lateral (B); e, caudal ramus, lateral (H); f, rostrum and first antenna, dorsal (F); g, second antenna, ventral (F); h, labrum, ventral (F); i, mandible, ventral (F); j, first maxilla, ventral (end view) (F); k, second maxilla (F).

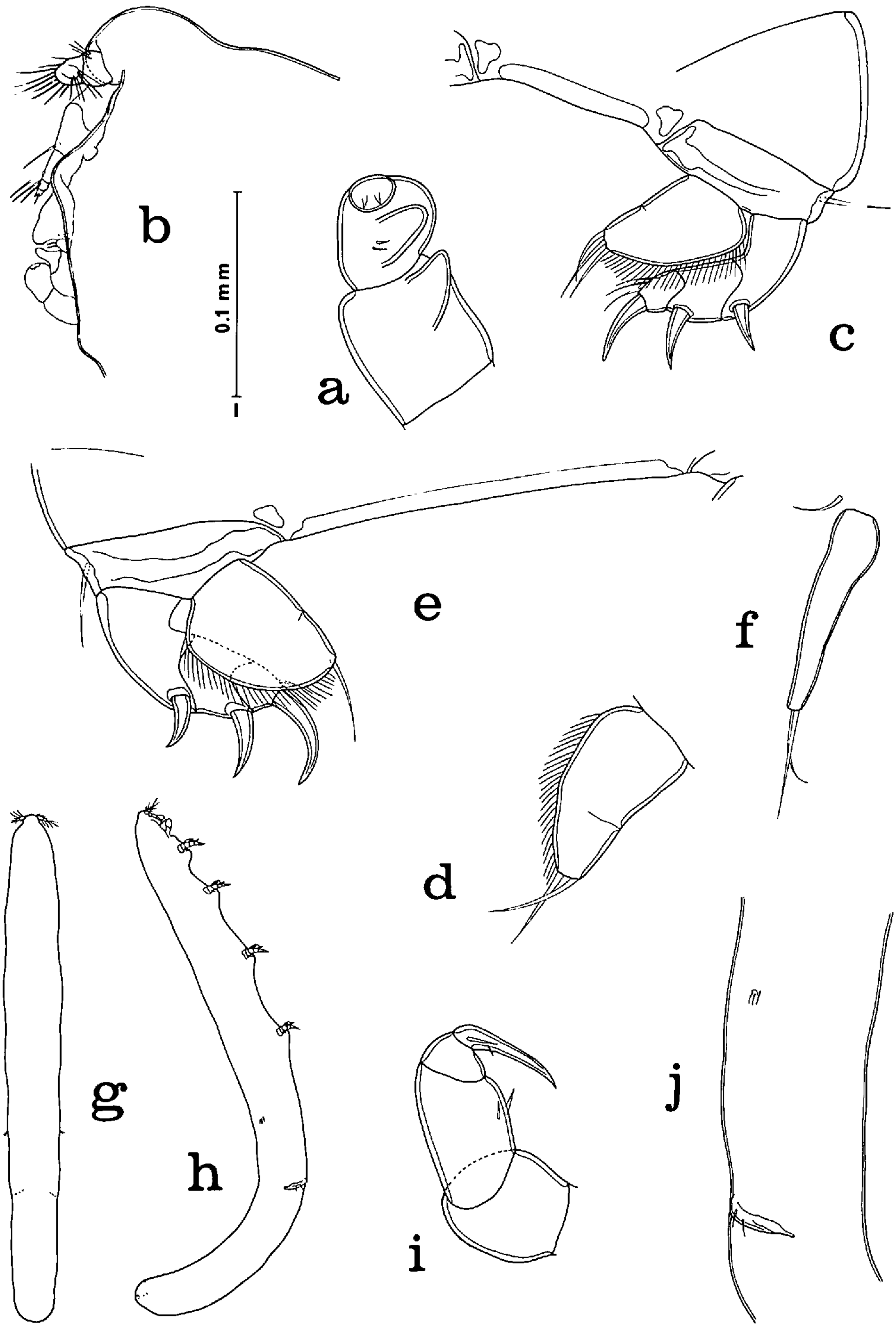


Figure 4. *Xarifia basilica* new species. Female: a, maxilliped, inner (scale F); b, outline of head, lateral (I); c, leg 1 and intercoxal plate, anterior (D); d, endopod of leg 2, posterior (D); e, leg 3 and intercoxal plate, anterior (D); f, leg 5, lateral (C). Male: g, dorsal, somewhat shortened due to curvature of body (A); h, lateral (A); i, maxilliped, posterior (F); j, leg 5 and leg 6, lateral (H).

Endopods of all 4 legs haired along outer margins. Terminal armature of endopods 3, 2, 1, 1.

Leg 5 (Fig. 4f) elongate, 70 μm long, bearing 2 terminal setae, and having adjacent dorsal seta.

Color in living specimens in transmitted light opaque brownish gray, eye red.

Male.—Body (Fig. 4g, h) slender, 9.3 times longer than wide. Length 1.62 mm (1.61–1.64 mm) and greatest width 0.17 mm (0.18–0.19 mm). Caudal ramus like that of female.

Rostrum, first antenna, second antenna, labrum, mandible, first maxilla, and second maxilla as in female. Maxilliped (Fig. 4i) small, 4-segmented. First segment unarmed. Second segment with 2 small setae. Small third segment unarmed. Claw (fourth segment) 18 μm, bearing 2 unequal proximal setae.

Legs 1–4 as in female.

Leg 5 (Fig. 4j) represented only by 3 small setae.

Leg 6 (Fig. 4j) represented by 2 small setae on posteroventral flap on genital segment.

Spermatophore not seen.

Color as in female.

Etymology.—The specific name *basilica,* Latin meaning royal or magnificent, alludes to the stately appearance of the female.

Remarks.—Five species of *Xarifia* have, like *Xarifia basilica,* the formula 3, 2, 1, 1 for the terminal armature of the endopods of legs 1–4. The female of the new species may be distinguished from all of these by its larger size (average length 2.5 mm vs. 1.7 mm or less). Three of the species, *X. levis, X. sectilis,* and *X. dissona,* all new species described below, lack a free segment in leg 5 in the female. The other two species possess a free segment in leg 5, but differ from *X. basilica* in other ways. One species, *X. serrata* Humes, 1962, lacks processes above the fifth legs in the female. *X. basilica* is apparently related to *X. trituberata* Humes and Dojiri, 1982. Both species have three knobs above the fifth legs in the female (though these knobs are more prominent in *X. basilica*), and in both the caudal ramus is fused with the anal segment. *X. trituberata* possesses two characters in the female by which it may be distinguished from *X. basilica*: (1) the free segment in leg 5 being smaller (42 μm long), and (2) its smaller body size, with length 1.50 mm (1.49–1.53 mm).

The female of *X. basilica* is unusually large, its length being exceeded only by *X. mediolobata* Humes and Dojiri, 1982, with an average length of 2.64 mm, and *X. curtata* Humes and Dojiri, 1983, with an average length of 3.12 mm. In spite of its large body *X. basilica* has relatively small antennae, mouthparts, and legs 1–4.

Xarifia brevicauda Humes and Ho, 1968

Host.—*Alveopora* sp.

Locality.—Madagascar.

Features for Recognition.—Length of female 1.27 mm (1.23–1.35 mm) and male 1.51 mm. Ratio of length to width of female about 5.5:1. Female with 3 long equal processes above fifth legs. Genital and postgenital segments fused forming short "tail" about one-sixth of body length. Caudal ramus elongate in female, but minute in male. Second antenna 4-segmented. Legs 1–4 with exopods having outer armature I,I,I and 2-segmented endopods having terminal armature 2, 2, 0, 0. Leg 5 in female with elongate segment, 138 μm. Leg 5 in male represented by slight ridge with 2 small setae. Eggs seriate.

Xarifia breviramea Humes and Dojiri, 1982

Hosts.—*Acropora abrotanoides* (Lamarck), *Acropora "corymbosa"* (Lamarck), *Acropora exigua* (Dana), *Acropora florida* (Dana), *Acropora hyacinthus* (Dana), *Acropora intermedia* (Brook), *Acropora millepora* (Ehrenberg), *Acropora rambleri* (Bassett-Smith), and *Acropora valida* (Dana). [Among the hosts reported by Humes and Dojiri (1982) *Acropora danai* (Milne Edwards and Haime) is a synonym of *Acropora abrotanoides* (Lamarck), *Acropora gravida* (Dana) and *Acropora affinis* (Brook) are synonyms of *Acropora florida* (Dana), and *Acropora squamosa* (Brook) is a synonym of *Acropora millepora* (Ehrenberg) (Pichon, pers. comm.).]

Localities.—Enewetak Atoll, Moluccas (Ceram, Halmahera), New Caledonia.

Features for Recognition.—Length of female 1.74 mm (1.69–1.79 mm) and male 1.74 mm (1.63–1.93 mm). Ratio of length to width in female about 6:1. Female with 3 long equal processes above fifth legs. Caudal ramus in both sexes minute and incompletely demarcated from anal segment. Second antenna 3-segmented. Legs 1–4 with exopods having outer armature I,I,I and 1-segmented endopods (with indication of subdivision) having terminal armature 3, 3, 1, 1. Leg 5 in female with elongate segment, 194 μm. Leg 5 in male represented by 3 small setae. Eggs seriate.

Xarifia bullifera new species
Figures 5a–l, 6a–m

Type Material.—22 ♀♀, 7 ♂♂ from *Acropora formosa* (Dana), in 2 m, Mermaid Cove, Lizard Island, Great Barrier Reef, northeastern Australia, 14°39′50″S, 145°27′00″E, 26 October 1982. Holotype ♀ (USNM 210320), allotype (USNM 210321), and 22 paratypes (17 ♀♀, 5 ♂♂) (USNM 210322) deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C.

Female.—Body (Fig. 5a, b) about 6.7 times longer than wide. Length 1.35 mm (1.29–1.45 mm) and greatest width 0.21 mm (0.20–0.22 mm), based on 10 specimens. External segmentation not developed. Region dorsal to fifth legs with 3 long posteriorly directed processes of about equal length (Fig. 5c). Genital and postgenital segments together about 23 percent of body length. Genital areas located dorsally. Caudal ramus (Fig. 5d) fused with anal segment and bearing 5 small setae (4 terminal and 1 outer subterminal). Surface of body without ornamentation. One female carrying 1 egg 164 × 122 μm (Fig. 5e).

Rostrum (Fig. 5f) rounded. First antenna (Fig. 5f) 37 μm long, 3-segmented. Lengths of segments (measured along posterior side): 6.5 (16.5 μm along anterior side), 12, and 7.5 μm, respectively. Armature: 3, 17 + 1 aesthete, and 7 + 1 aesthete. All setae naked. Second antenna (Fig. 5g) 4-segmented, 38 μm long not including claw. Formula: 1, 1, 2, and I + 1 + 1. Claw minute, only 5 μm long, and adjacent long seta 37 μm.

Labrum (Fig. 5h) with posteroventral margin indented medially and having well-developed lateral lobes. Mandible (Fig. 5i) 29 μm, blade smooth. Paragnath a small lobe. First maxilla (Fig. 5j) with 2 setae. Second maxilla (Fig. 5k) 2-segmented, first segment unarmed, second segment with broad lamellate tip and bearing 1 inner seta. Maxilliped (Fig. 5l) 3-segmented. First segment with outer lobe. Second segment with prominent antero-inner lobe and bearing 2 setae. Small third segment with 2 minute setae.

Legs 1–4 (Fig. 6a–f) with 3-segmented exopods and 1-segmented endopods (though endopods having slight indication of subdivision on inner margin). Spine and setal formula as follows:

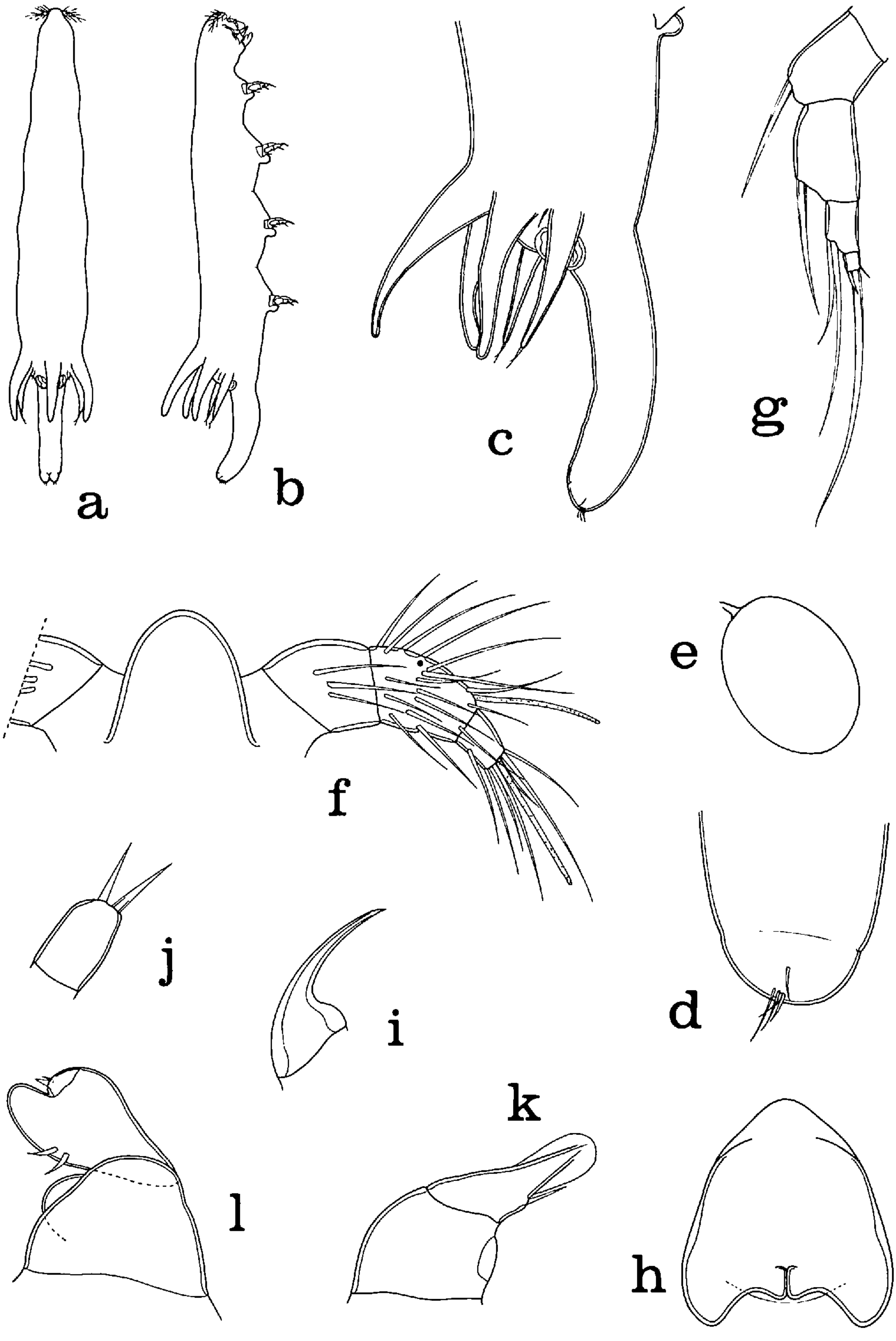


Figure 5. *Xarifia bullifera* new species, female: a, dorsal (scale A); b, lateral (A); c, urosome, lateral (H); d, caudal ramus, lateral (C); e, egg sac, lateral (H); f, rostrum and first antenna, with dot indicating position of aesthete in male, dorsal (F); g, second antenna, ventral (F); h, labrum, ventral (D); i, mandible, ventral (F); j, first maxilla, posterior (F); k, second maxilla, postero-inner (F); l, maxilliped, postero-inner (F).

P_1	coxa	0-0	basis	1-0	exp	I-0;	I-0;	I,3
					enp	3		
P_2	coxa	0-0	basis	1-0	exp	I-0;	I-0;	I,2
					enp	3		
P_{3+4}	coxa	0-0	basis	1-0	exp	I-0;	I-0;	I,2
					enp	1		

First segment of exopods of all 4 legs with outer spine much smaller and less sclerotized than spines on second and third segments (Fig. 6a). Lengths of these spines in leg 1 5.5, 11, and 18.5 μm from proximal to distal. Outer margin of endopods haired. Just behind intercoxal plate in all 4 legs a prominent rounded lobe, shown in leg 1 in Figure 6b, c and in leg 2 in Figure 6e. Legs 3 and 4 similar to leg 2 but endopod with only 1 seta (Fig. 6f). Terminal armature of endopods 3, 3, 1, 1.

Leg 5 (Fig. 6g, h) elongate, 143 μm, tapering distally, bearing 2 terminal setae closely appressed. Small adjacent dorsal seta.

Color in life in transmitted light opaque gray, eye red, eggs dark gray.

Male.—Body (Fig. 6i, j) slender, about 7.8 times longer than wide. Length 1.33 mm (1.22–1.43 mm) and greatest width 0.16 mm (0.14–0.17 mm), based on 7 specimens. Caudal ramus similar to that of female.

Rostrum as in female. First antenna resembling that of female, but 1 aesthete added on second segment (at location shown by dot in Fig. 5f). Second antenna like that of female.

Labrum, mandible, paragnath, first maxilla, and second maxilla like those of female. Maxilliped (Fig. 6k) 4-segmented. First segment unarmed. Second segment with 2 inner setae. Small third segment unarmed. Claw (fourth segment) 57 μm, bearing 2 proximal setae, having 2 low spiniform processes on concave margin, and having minutely bifurcate tip.

Legs 1–4 as in female.

Leg 5 (Fig. 6l) consisting of 3 small setae.

Leg 6 (Fig. 6m) represented by 2 small setae on posteroventral flap on genital segment.

Color as in female.

Etymology.—The specific name *bullifera,* Latin *bulla,* a bubble, and *fero,* to bear or carry, refers to the bubblelike protuberances behind each of legs 1–4.

Remarks.—Twenty species of *Xarifia* have the formula 3, 3, 1, 1 for the terminal armature of the endopods of legs 1–4, as in *Xarifia bullifera.* Nineteen of these species are distinguished from the new species by having a caudal ramus that is distinctly separated from the anal segment. (In *Xarifia obesa* Humes and Ho, 1968, it is partly fused with the anal segment, but still elongate, 70 μm, and tapered.) The twentieth species, *Xarifia exuta* Humes and Dojiri, 1982, has the caudal ramus fused with the anal segment as in the new species. However, *X. exuta* differs from *X. bullifera* in that the female has only a small dorsomedial lobe dorsal to the fifth legs, instead of long processes.

Xarifia bullifera shows two additional characters that, while not unique, serve to distinguish it from most of its congeners with 3, 3, 1, 1. These are: (1) the pronounced rounded lobes behind the intercoxal plates of legs 1–4 (somewhat similar lobes present in *Xarifia sabiuraensis* Misaki, 1978), and (2) the small, less sclerified spine on the first segment of the exopod of legs 1–4 (somewhat similar spine seen in *Xarifia breviramea* Humes and Dojiri, 1982).

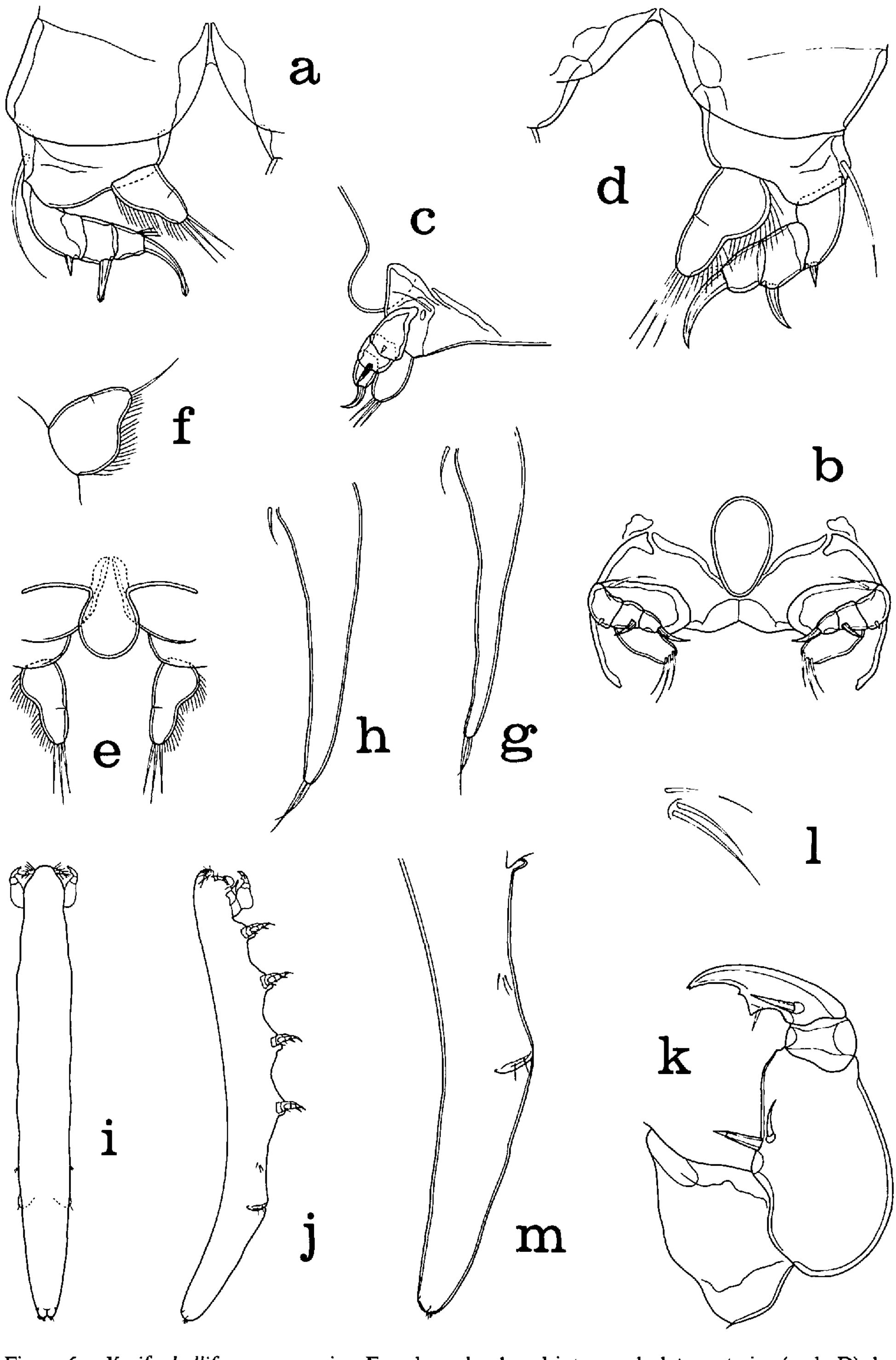


Figure 6. *Xarifia bullifera* new species. Female: a, leg 1 and intercoxal plate, anterior (scale D); b, first pair of legs and median process posterior to intercoxal plate, ventral (C); c, leg 1, lateral (C); d, leg 2 and intercoxal plate, posterior (D); e, endopods of leg 2 and median process posterior to intercoxal

Xarifia clavellata new species
Figures 7a–j, 8a–j

Type Material.—17 ♀♀, 10 ♂♂ from *Gardineroseris planulata* (Dana), in 10–20 m, Big Broadhurst Reef, Great Barrier Reef, northeastern Australia, 18°58′03″S, 147°45′04″E, 1 November 1982. Holotype ♀ (USNM 210393), allotype (USNM 210394), and 21 paratypes (13 ♀♀, 8 ♂♂) (USNM 210395) deposited in the National Museum of Natural History, Washington, D.C.

Female.—Body (Fig. 7a, b) elongate, 6.5 times longer than wide. Length 0.86 mm (0.79–0.94 mm) and greatest width 0.13 mm (0.11–0.14 mm), based on 10 specimens. Region dorsal to fifth legs with 3 long posteriorly directed processes of nearly equal length (Fig. 7c). Genital and postgenital segments together about 18 percent of body length. Caudal ramus (Fig. 7d) elongate, ratio 5:1 (width taken at middle); length 68 μm, width near base 18 μm, width near distal end 9 μm; bearing 1 outer lateral seta and 4 terminal setae, 1 seta much smaller than other 3. Body surface smooth. Egg sac (Fig. 7e) containing 1 oval egg about 165 × 99 μm.

Rostrum (Fig. 7f) narrowly rounded. First antenna (Fig. 7f) 46 μm long, 3-segmented, with aesthetes swollen distally. Lengths of segments (measured along posterior side): 6.5 (14 μm along anterior side), 18, and 13 μm, respectively. Armature: 3, 15, and 9 + 2 aesthetes (2 + 1 aesthete and 7 + 1 aesthete). Second antenna (Fig. 7g) 4-segmented, 60 μm long including claw. Armature: 1, 1, 2, and I + 1. Claw 9 μm.

Labrum (Fig. 7h) with posteroventral margin having median indentation and small lateral lobes. Mandible (Fig. 7i) 24 μm, blade smooth. Paragnath (Fig. 7i) a smooth rounded lobe. First maxilla (Fig. 7i) with 2 setae. Second maxilla (Fig. 7j) 2-segmented, first segment unarmed, second segment with small proximal process, 1 inner seta, and elongate lamellate tip. Maxilliped (Fig. 8a, b) 3-segmented. First segment with long digitiform outer lobe and smaller round inner lobe. Second segment with 2 inner setae and 2 small lobes. Small third segment with 3 minute spines.

Legs 1–4 (Fig. 8c) with 3-segmented exopods and incompletely 2-segmented endopods. Spine and setal formula as follows:

P_{1-4}	coxa	0-0	basis	1-0	exp	I-0;	I-0;	I,2
					enp	0-0;	1	

Basis in all 4 legs with smooth inner edge. Endopods haired along outer side of both segments. Formula for terminal armature of endopods: 1, 1, 1, 1.

Leg 5 (Fig. 8d) elongate, 134 μm long, 26 μm wide proximally and 8 μm wide distally, bearing 2 terminal setae. Small adjacent dorsal seta.

Color in life in transmitted light opaque gray, eye red, eggs dark gray.

Male.—Body (Fig. 8e, f) slender, 8.3 times longer than wide. Length 0.80 mm (0.76–0.84 mm) and greatest width 0.08 mm (0.08–0.09 mm), based on 4 specimens. Caudal ramus (Fig. 8g) much shorter than in female, 21 × 13 μm, ratio 1.16:1.

←

plate, posterior (C); f, endopod of leg 3, anterior (D); g, leg 5, lateral (I); h, leg 5, lateral (I). Male: i, dorsal (A); j, lateral (A); k, maxilliped, inner (C); l, leg 5, lateral (F); m, urosome, with legs 5 and 6, lateral (B).

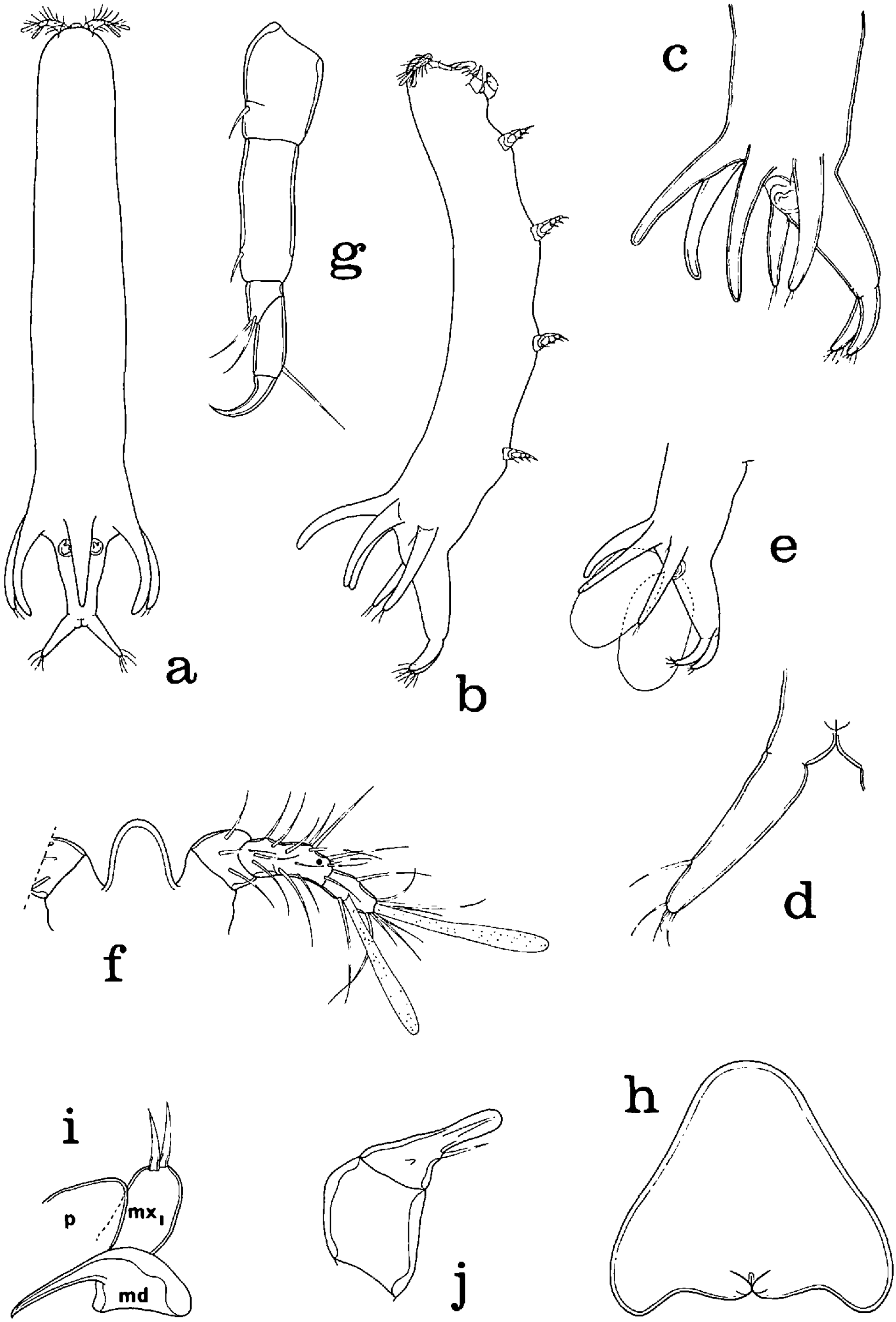


Figure 7. *Xarifia clavellata* new species, female: a, dorsal (scale B); b, lateral (B); c, urosome, lateral (H); d, caudal ramus, dorsal (C); e, egg sacs and urosome, lateral (B); f, rostrum and first antenna, with dot indicating position of aesthete in male, dorsal (D); g, second antenna, dorsal (F); h, labrum, ventral (F); i, mandible, paragnath, and first maxilla, anteroventral (F); j, second maxilla, inner (F).

Rostrum like that of female. First antenna as in female, but 1 aesthete added on second segment (at location indicated by dot in Fig. 7f). Second antenna similar to that of female.

Labrum, mandible, paragnath, first maxilla, and maxilliped as in female. Maxilliped (Fig. 8h) 4-segmented. First segment unarmed. Second segment with 2 inner setae. Small third segment unarmed. Claw (fourth segment) short, 33 μm, with 2 dissimilar proximal setae; near middle of concave margin 2 very unequal spiniform processes; tip of claw trifurcate.

Legs 1–4 as in female.

Leg 5 (Fig. 8i) with minute free segment 5 × 3 μm, bearing 2 setae. With adjacent dorsal seta.

Leg 6 (Fig. 8j) represented by 2 small setae on posteroventral flap on genital segment.

Color as in female.

Etymology.—The specific name *clavellata,* Latin *clavella,* a little club, and the suffix *-atus,* provided with, refers to the clublike swollen aesthetes on the first antenna.

Remarks.—*Xarifia clavellata* may be recognized by its swollen aesthetes on the first antenna. It is further unlike its congeners in having the formula 1, 1, 1, 1 for the terminal armature of the endopods of legs 1–4. The elongate lobe on the first segment of the maxilliped of the female is also diagnostic.

Seven species of *Xarifia* share with *Xarifia clavellata* the following characters: (1) three long processes of nearly equal length dorsal to the fifth legs in the female, (2) exopods of legs 1–4 with I,I,I, (3) endopods of legs 1–4 2-segmented and endopod of leg 3 with 1 seta, and (4) leg 5 in the female elongate. Five of the seven species may be distinguished from the new species by their much larger size, average length of the female 1.9 mm or more (*X. lamellispinosa* Humes and Ho, 1968, *X. echinoporae* Humes and Dojiri, 1982, *X. radians* Humes and Dojiri, 1982, *X. gracilipes* Humes and Dojiri, 1983, and *X. comptula* Humes and Dojiri, 1983). In *X. apertipes* Humes and Dojiri, 1983, the caudal ramus of the female is 3.4:1 and the first antenna is 6-segmented. In *X. fastigiata* Humes and Dojiri, 1982, the caudal ramus of the female is 2.6:1 and leg 5 in the male is represented only by 3 setae.

Xarifia comata Humes, 1962

Previously Known Hosts.—*Pocillopora verrucosa* (Ellis and Solander) and *Pocillopora* sp. cf. *P. verrucosa* (Ellis and Solander).

New Host.—6 ♀♀, 1 ♂ from *Pocillopora eydouxi* Milne Edwards and Haime, in 2 m, southwestern shore of Goenoeng Api, Banda Islands, Moluccas, 04°31′45″S, 129°51′55″E, 4 May 1975.

New Record.—25 ♀♀, 25 ♂♂, and 9 copepodids from *Pocillopora verrucosa* (Ellis and Solander), in 2 m, Big Broadhurst Reef, Great Barrier Reef, northeastern Australia, 18°58′03″S, 147°45′04″E, 1 November 1982.

Localities.—Madagascar, Moluccas (Banda Islands), Great Barrier Reef.

Features for Recognition.—Length of female 1.16 mm (1.09–1.22 mm) and male 1.13 mm (1.09–1.18 mm). Ratio of length to width in female about 6:1. Three long equal processes above fifth legs in female. Caudal ramus not fused with anal segment. Second antenna 4-segmented. Legs 1–4 with exopods having outer armature I,0,I and 2-segmented endopods (with segments indistinctly separated) having terminal armature 2, 2, 1, 1 (not 2, 2, 2, 1 as in original description). Long hairs on inner margin of first exopod segment, on both outer and inner margins

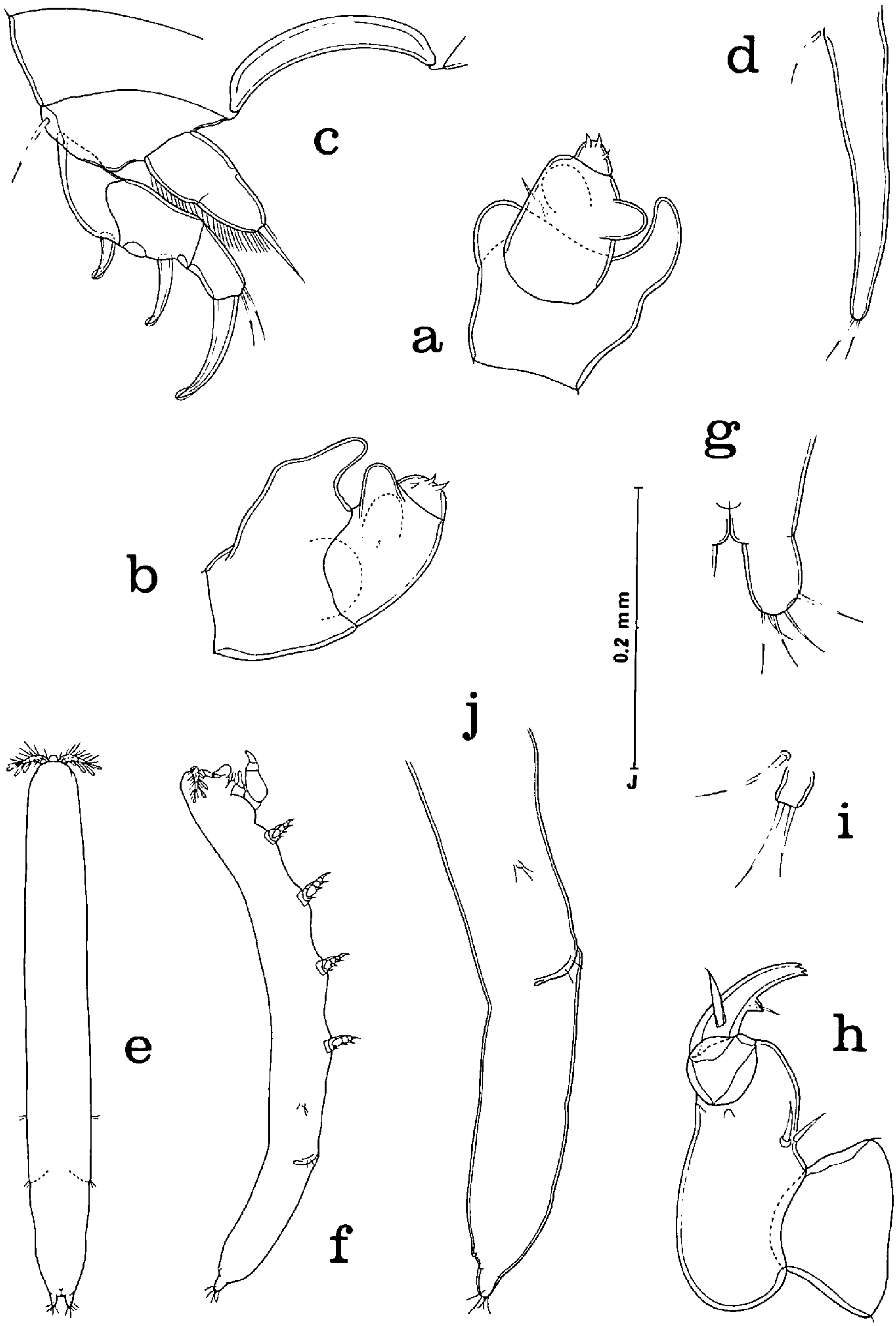


Figure 8. *Xarifia clavellata* new species. Female: a, maxilliped, posterior (scale E); b, maxilliped, postero-outer (E); c, leg 1 and intercoxal plate, posterior (F); d, leg 5, lateral (I). Male: e, dorsal (B); f, lateral (B); g, caudal ramus, dorsal (D); h, maxilliped, inner (D); i, leg 5, lateral (F); j, urosome, with legs 5 and 6, lateral (J).

of first segment of endopods, and on outer margin of second endopod segment. Leg 5 in female with elongate segment, 135 μm. Leg 5 in male represented by 3 small setae. Eggs seriate.

Xarifia comptula Humes and Dojiri, 1983

Host.—Hydnophora exesa (Pallas). [*Hydnophora tenella* Quelch, reported as a host for this species by Humes and Dojiri (1983), is a synonym of *Hydnophora exesa* (Pallas) (Pichon, pers. comm.).]

Localities.—Ceram, Madagascar.

Features for Recognition.—Length of female 2.01 mm (1.86–2.16 mm) and male 2.41 mm (2.22–2.62 mm). Ratio of length to width of female about 4.6:1. Female with 3 long processes above fifth legs, lateral processes recurved and slightly longer than median process. Caudal ramus elongate in both sexes. Second antenna 4-segmented. Labrum sexually dimorphic. Legs 1–4 with exopods having outer armature I,I,I and 2-segmented endopods having terminal armature 3, 3, 1, 1. Leg 5 in female with elongate segment, 322 μm. Leg 5 in male with small segment 23 μm. Eggs in cluster.

Xarifia curtata Humes and Dojiri, 1983

Host.—Hydnophora exesa (Pallas).

Locality.—Ceram.

Features for Recognition.—Length 3.12 mm (2.99–3.19 mm) and male 3.28 mm (2.86–3.55 mm). Ratio of length to width in female about 5.2:1. Female with 3 long nearly equal processes above fifth legs. Genital and postgenital segments together very short, about 6 percent of body length. Prominent anal operculum. Caudal ramus elongate in both sexes. Second antenna 4-segmented. Second segment of second maxilla with bifurcate aspect. Legs 1–4 with exopods having outer armature I,I,I and 2-segmented endopods having terminal armature 3, 3, 0, 1. Leg 5 in female with elongate segment, 259 μm. Leg 5 in male with small segment 13 μm.

Xarifia decorata Humes and Ho, 1968

Hosts.—Stylophora pistillata (Esper) and *Stylophora mordax* (Dana).

New Records.—4 ♀♀, 9 ♂♂ from *Stylophora* sp., Antsamantsara, Nosy Bé, Madagascar, 9 June 1967; 36 ♀♀ from *Stylophora* sp., in 2 m, Pointe Vacao, Mauritius, 5 February 1964.

Localities.—Madagascar, Mauritius.

Features for Recognition.—Length of female 1.49 mm (1.45–1.53 mm) and male 1.27 mm (1.25–1.28 mm). Ratio of length to width in female about 6.8:1. Female with 3 long equal processes above fifth legs. Caudal ramus not fused with anal segment. Second antenna 4-segmented. Legs 1–4 with exopods having outer armature for leg 1 as I,I,I but for legs 2–4 as I,1,I; 2-segmented endopods having terminal armature 3, 3, 1, 1. Leg 5 in female with elongate segment, 150 μm. Leg 5 in male represented by slight ridge and 3 small setae. Eggs seriate. Surface of body with fine setules.

Xarifia diminuta Humes and Ho, 1967

Previously Known Host.—Psammocora contigua (Esper).

New Host.—13 ♀♀, 5 ♂♂ from *Pavona* sp., intertidal to 10 cm, Nosy Iranja, near Nosy Bé, Madagascar, 9 August 1967.

New Records.—16 ♀♀, 7 ♂♂ from *Psammocora* sp. cf. *P. contigua*, in 2 m, north of Isle Maître, near Noumea, New Caledonia, 22°19′30″S, 166°24′35″E, 13 July 1971; 6 ♀♀, 1 ♂ from *Psammocora* sp., in 1.5 m, Black River Bay, Mauritius, 24 January 1964.

Localities.—Madagascar, Mauritius, New Caledonia.

Features for Recognition.—Length of female 0.98 mm (0.78–1.18 mm) and male 1.15 mm (0.94–1.35 mm). Ratio of length to width of female about 5:1. Female with 3 long nearly equal processes above fifth legs. Caudal ramus not fused with anal segment. Second antenna 4-segmented. Legs 1–4 with exopods having outer armature I,I,I and 2-segmented endopods having terminal armature 2, 2, 0, 2. Leg 5 in female with elongate segment, 120 μm. Leg 5 in male represented by 3 small setae. Eggs in cluster.

Xarifia dispar Humes, 1962

Previously Known Hosts.—*Echinopora gemmacea* (Lamarck), *Echinopora lamellosa* (Esper), and *Echinopora* sp. [*Echinopora carduus* Klunzinger, reported as a host for this species by Humes (1962), is a synonym of *Echinopora gemmacea* (Lamarck) (Pichon, pers. comm.).]

New Host.—4 ♀♀, 3 ♂♂, from *Platygyra* sp., in 2 m, Ambariobe, near Nosy Bé, Madagascar, 25 June 1967.

Locality.—Madagascar.

Features for Recognition.—Length of female 1.41 mm (1.27–1.46 mm) and male 1.42 mm (1.36–1.46 mm). Ratio of length to width of female about 6:1. Female with 3 long nearly equal processes above fifth legs. Caudal ramus not fused with anal segment. Second antenna 4-segmented. Legs 1–4 with exopods having outer armature I,I,I and 2-segmented endopods having terminal armature 2, 2, 1, 1. Leg 5 in female with elongate segment, 156 μm. Leg 5 in male minute process 9 μm. Eggs seriate.

Xarifia dissona new species
Figures 9a–m, 10a–e

Type Material.—4 ♀♀ from *Stylophora pistillata* (Esper), in 2 m, Big Broadhurst Reef, Great Barrier Reef, northeastern Australia, 18°58′03″S, 147°45′04″E, 2 November 1982. Holotype (USNM 210354) and 2 paratypes (USNM 210355) deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C.

Female.—Body (Fig. 9a, b) elongate, 7.3 times longer than wide. Length 1.39 mm (1.33–1.45 mm) and greatest width 0.18 mm (0.17–0.20 mm), based on 4 specimens. External segmentation not evident. Region dorsal to fifth legs with 3 long posteriorly directed processes, middle process longer than lateral processes (Fig. 9c). Genital and postgenital segments together about 25 percent of body length. Genital areas located dorsally. Caudal ramus (Fig. 9d) elongate, tapered distally, 65 × 18 μm in greatest dimensions, bearing 5 setae (1 outer lateral and 4 terminal). Ratio 3.6:1. Surface of body unornamented. Egg sac (Fig. 9e) containing single oval egg 169 × 107 μm.

Rostrum (Fig. 9f) broadly subtruncate anteriorly. First antenna (Fig. 9f) 54 μm long, 4-segmented. Lengths of segments (measured along posterior side): 10 (21 μm along anterior side), 21, 6.5 and 5.5 μm, respectively. Armature: 3, 15 + 1 aesthete, 2 + 1 aesthete, and 7 + 1 aesthete. All setae smooth. Second antenna (Fig. 9g) 4-segmented, 60 μm long including claw. Formula: 1, 1, 2, and I + 1. Claw (Fig. 9h) very small, 6 μm long.

Labrum (Fig. 9i) with posteroventral margin notched medially and having only slight lateral lobes. Mandible (Fig. 9j) 22 μm, blade smooth. Paragnath a small

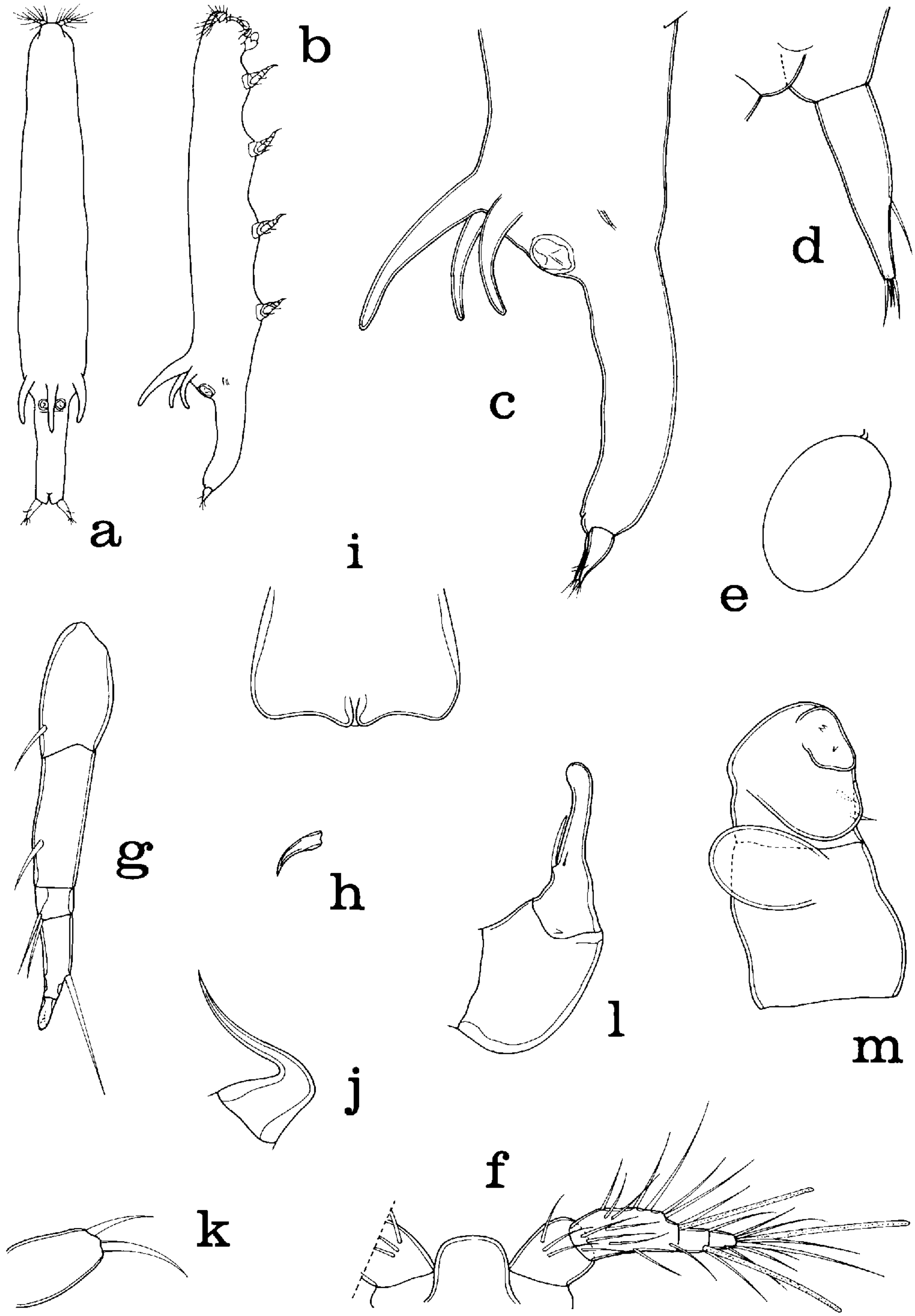


Figure 9. *Xarifia dissona* new species, female: a, dorsal (scale A); b, lateral (A), c, processes and urosome, lateral (H); d, caudal ramus, dorsal (C); e, egg sac, lateral (H); f, rostrum and first antenna, dorsal (D); g, second antenna, dorsal (F); h, claw of second antenna, lateral (E); i, labrum, ventral (I); j, mandible, anterior (F); k, first maxilla, lateral (F); l, second maxilla, anterior (F); m, maxilliped, anterior (F).

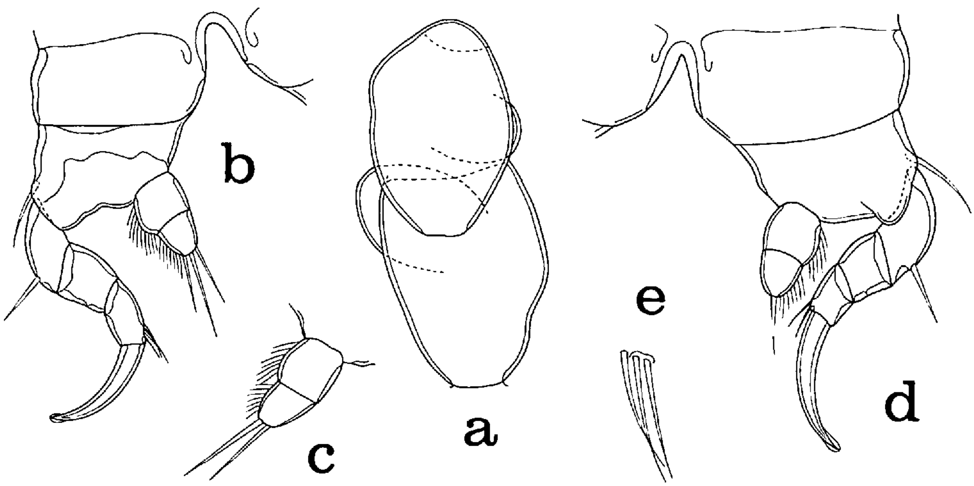


Figure 10. *Xarifia dissona* new species, female: a, maxilliped, posterior (scale F); b, leg 1 and intercoxal plate, anterior (D); c, endopod of leg 2, anterior (D); d, leg 3 and intercoxal plate, anterior (D); e, leg 5, lateral (E).

lobe. First maxilla (Fig. 9k) with 2 setae. Second maxilla (Fig. 9l) 2-segmented, first segment unarmed, second segment elongate with slender digitiform tip; bearing 2 unequal inner setae and minute proximal knob. Maxilliped (Figs. 9m, 10a) 3-segmented, but third segment small and indistinctly set off from second segment. First segment with outer lobe. Second segment with inner lobe and 2 small setae. Third segment with 3 minute spinules.

Legs 1–4 (Figs. 10b–d) with 3-segmented exopods and 2-segmented endopods. Spine and setal formula as follows:

P_1	coxa	0-0	basis	1-0	exp	1-0;	0-0;	I,3
					enp	0-0;	3	
P_2	coxa	0-0	basis	1-0	exp	1-0;	0-0;	I,2
					enp	0-0;	2	
P_{3+4}	coxa	0-0	basis	1-0	exp	1-0;	0-0;	I,2
					enp	0-0;	1	

Exopods with first segment having outer seta instead of spine, second segment lacking armature, and third segment having long terminal spine. Endopods haired along outer margins of both segments and having terminal armature of 3, 2, 1, 1.

Leg 5 (Fig. 10e) without free segment and represented only by 3 smooth setae set closely together.

Color in life in transmitted light opaque gray, intestine dark brown, eye red, eggs gray.

Male.—Unknown.

Etymology.—The specific name *dissona,* Latin meaning different, alludes to the different armature of the three segments of the exopods of legs 1–4.

Remarks.—*Xarifia dissona* differs from all its congeners in the combination of (1) having a seta instead of a spine on the first segment of the exopod of legs 1–4, (2) lacking armature on the second segment of these exopods, and (3) leg 5 of the female being represented only by three setae. Upon superficial examination the new species might be confused with *Xarifia eminula*, described below, but this species has only one median process dorsal to the fifth legs in the female instead of three processes as in the new species.

Only five other species of *Xarifia* have the terminal armature of the endopods of legs 1–4 as 3, 2, 1, 1, as in *X. dissona*. These five species may be distinguished from *X. dissona* as follows: *X. serrata* Humes, 1962, and *X. levis*, described below, lack processes above the fifth legs in the female; *X. trituberata* Humes and Dojiri, 1982, and *X. basilica* new species, described above, have three small knobs above the fifth legs in the female; and *X. sectilis* new species, described below, is larger, the length of the female being 1.73 mm (1.54–1.93 mm), and the second segment of the exopods of legs 1–4 has a small outer spine. Similarities in details suggest a close relationship of *X. sectilis* and *X. dissona*.

Xarifia echinoporae Humes and Dojiri, 1982

Hosts.—*Echinopora horrida* Dana and *Echinopora lamellosa* (Esper).

Localities.—New Caledonia, Moluccas (Halmahera).

Features for Recognition.—Length of female 2.26 mm (1.86–2.39 mm) and male 2.34 mm (2.03–2.56 mm). Ratio of length to width of female about 6:1. Female with 3 long nearly equal processes above fifth legs. Caudal ramus not fused with anal segment. Second antenna 4-segmented. Legs 1–4 with exopods having outer armature I,I,I and 2-segmented endopods having terminal armature 3, 3, 1, 1. Leg 5 in female with elongate segment, 299 μm. Leg 5 in male represented by 3 small setae.

Xarifia eminula new species
Figures 11a–n, 12a–k

Type Material.—5 ♀♀, 6 ♂♂ from *Seriatopora hystrix* Dana, in 3 m, west of Isle Mando, near Noumea, New Caledonia, 22°18′59″S, 166°09′30″E, 26 June 1971. Holotype ♀ (USNM 210371), allotype (USNM 210372), and 5 paratypes (2 ♀♀, 3 ♂♂) (USNM 210373) deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C.

Other Specimens (also from *Seriatopora hystrix*).—1 ♀, 2 ♂♂, in 2 m, west of Isle Maître, near Noumea, New Caledonia, 22°20′05″S, 166°24′05″E, 21 June 1971.

Female.—Body (Fig. 11a, b) elongate, about 8 times longer than wide. Length 1.07 mm (1.05–1.10 mm) and greatest width 0.14 mm (0.13–0.14 mm), based on 5 specimens. External segmentation not evident except for slight indication in urosome. Region dorsal to area normally bearing fifth legs with 1 median erect process of somewhat variable length (Fig. 11c, d). Lateral processes absent, though small sclerotized areas suggesting location. Genital and postgenital segments together about 26 percent of body length. Genital areas located dorsolaterally. Caudal ramus (Fig. 11e, f) 42 × 21 μm in maximum dimensions, tapering distally with tip slightly set off from rest of ramus, ratio 2:1; bearing 4 terminal setae and 1 outer lateral seta. All setae smooth. Surface of body with small setules. Egg sac (Fig. 11g) containing 1 egg measuring 179 × 122 μm.

Rostrum (Fig. 11h) broadly rounded. First antenna (Fig. 11h) 44 μm long, 4-segmented. Lengths of segments (measured along posterior side): 8, 20, 7, and 5 μm, respectively. Armature: 3, 16 + 1 aesthete, 2 + 1 aesthete, and 7 + 1 aesthete. All setae naked. Second antenna (Fig. 11i) 4-segmented, 41 μm long not including claw. Formula: 1, 1, 2, and 2 + I.

Labrum (Fig. 11j) with posteroventral margin indented medially and having 2

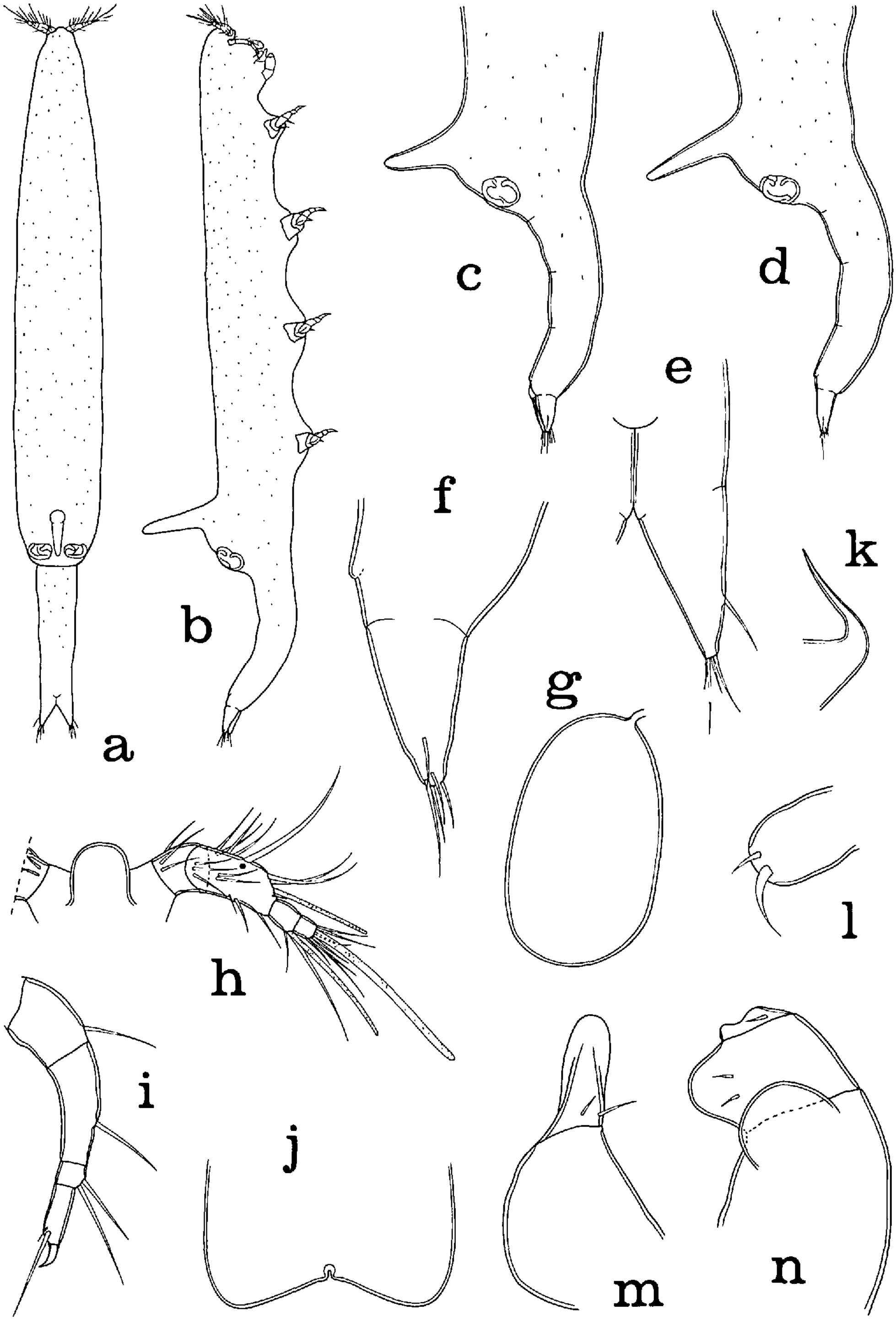


Figure 11. *Xarifia eminula* new species, female: a, dorsal (scale B); b, lateral (B); c, processes and urosome, lateral (H); d, processes and urosome, lateral (H); e, caudal ramus, dorsal (D); f, caudal ramus, lateral (D); g, egg sac, lateral (J): h, rostrum and first antenna, with dot indicating position of aesthete in male, dorsal (D); i, second antenna, anterior (F); j, labrum, ventral (F); k, mandible, ventral (E); l, first maxilla, anterior (F); m, second maxilla, inner (E); n, maxilliped, antero-inner (E).

shallow outer lobes. Mandible (Fig. 11k) with slender smooth blade. Paragnath a small lobe. First maxilla (Fig. 11l) with 2 setae. Second maxilla (Fig. 11m) 2-segmented, first segment unarmed, second segment digitiform with broad lamella and bearing 2 small setae. Maxilliped (Figs. 11n, 12a) 3-segmented. First segment with 1 lobe. Second segment with 1 lobe and 2 setae. Third segment with 1 small seta and 2 small terminal lobes.

Legs 1–4 (Fig. 12b, c) with 3-segmented exopods and 2-segmented (or only partly so) endopods. Spine and setal formula as follows:

P_{1+2}	coxa	0-0	basis	1-0	exp	I-0;	1-0;	I,3
					enp	0-0;	3	
P_{3+4}	coxa	0-0	basis	1-0	exp	I-0;	0-0;	I,2
					enp	0-0;	2	

Second segment of exopod in legs 1 and 2 with minute outer seta (?) about 1.5 μm long; this segment in legs 3 and 4 without seta. Long outer setules on endopods. Terminal armature of endopods 3, 3, 2, 2.

Leg 5 absent.

Color in life in transmitted light opaque gray, eye red, eggs brownish gray.

Male.—Body (Fig. 12d, e) elongate as in female, about 7.8 times longer than wide. Length 1.12 mm (1.11–1.17 mm) and greatest width 0.12 mm (0.11–0.13 mm), based on 6 specimens. Caudal ramus as in female.

Rostrum like that of female. First antenna resembling that of female, but 1 aesthete added on second segment (at location shown by dot in Fig. 11h). Second antenna as in female.

Labrum (Fig. 12f) sexually dimorphic in having 2 minute spines on both lobes. Mandible and paragnath as in female. First maxilla (Fig. 12g) with digitiform lobe in addition to 2 setae. Second maxilla (Fig. 12h) as in female, but having outer spinelike process proximally on second segment. Maxilliped (Fig. 12i) 4-segmented. First segment unarmed. Second segment with 2 inner setae, one attenuate, other aristate. Small third segment unarmed. Claw (fourth segment) short, 41 μm, with 2 setae, one proximal, other on serrate prominence at middle of concave margin; tip of claw trifid.

Legs 1–4 as in female.

Leg 5 (Fig. 12j) consisting only of 3 small setae.

Leg 6 (Fig. 12k) probably represented by posteroventral flap on genital segment; usual 2 setae not seen.

Spermatophore not seen.

Color as in female.

Etymology.—The specific name *eminula,* Latin meaning projecting or standing out, alludes to the erect median process dorsal to the region normally bearing the fifth legs in the female.

Remarks.—*Xarifia eminula* is distinct from all congeners except one in having a median process but no lateral processes dorsal to the area of the fifth legs in the female. *Xarifia mediolobata* Humes and Dojiri, 1983, has only a median process, but here the process has the form of a posteriorly directed lobe which is not held erect. Only one other species, *X. anopla* Humes and Dojiri, 1982, lacks leg 5 in the female; in all others leg 5 has a free segment or is represented by two or three small setae. *X. anopla* differs from the new species, however, in lacking entirely processes above the fifth legs in the female and in having the caudal ramus fused to the anal segment. *X. eminula* is the only species in the genus with legs 1–4 having the formula 3, 3, 2, 2 for the terminal armature of the endopods.

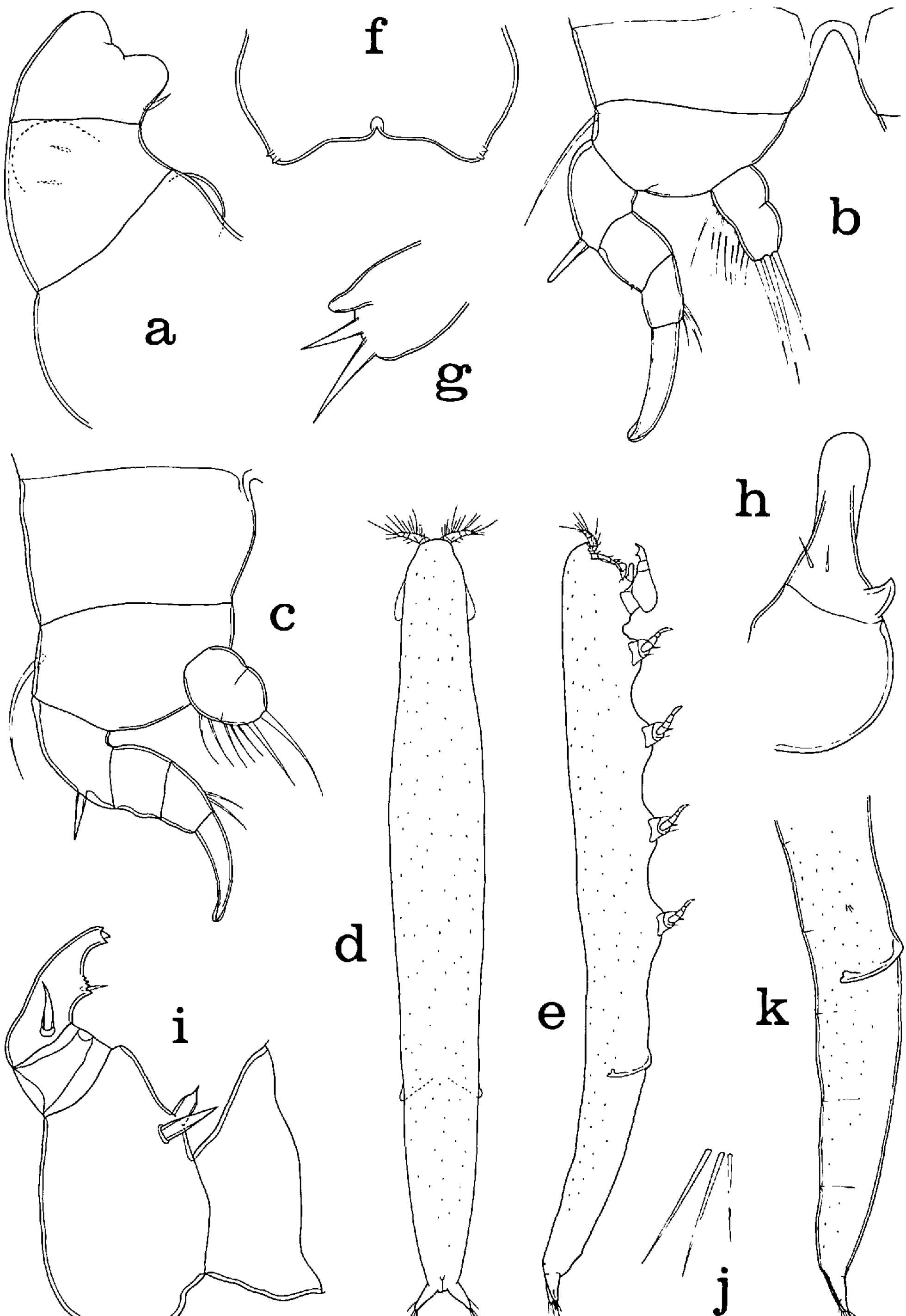


Figure 12. *Xarifia eminula* new species. Female: a, maxilliped, postero-outer (scale E); b, leg 1 and intercoxal plate, anterior (F); c, leg 3, anterior (F). Male: d, dorsal (B); e, lateral (B); f, labrum, ventral (F); g, first maxilla, ventral (E); h, second maxilla, inner (E); i, maxilliped, inner (C); i, leg 5, lateral (E); j, leg 5, lateral (E); k, urosome, with legs 5 and 6, lateral (H).

Xarifia exigua Humes and Ho, 1968

Host.—*Pachyseris speciosa* (Dana).

Locality.—Madagascar.

Features for Recognition.—Length of female 0.75 mm (0.71–0.80 mm) and male 0.80 mm (0.76–0.85 mm). Ratio of length to width of female about 7.5:1. Female with 3 long equal processes above fifth legs. Caudal ramus not fused with anal segment. Second antenna 4-segmented. Legs 1–4 with exopods having outer armature I,I,I and 1-segmented endopods having terminal armature 2, 2, 1, 1. Leg 5 in female with elongate segment, 100 μm. Leg 5 in male with poorly delimited segment.

Xarifia exserens new species
Figures 13a–i, 14a–l

Type Material.—4 ♀♀, 5♂♂ from *Galaxea fascicularis* (Linnaeus), in 3 m, Karang Mie, eastern central Halmahera, Moluccas, 00°20′07″N, 128°25′00″E, 19 May 1975. Holotype ♀ (USNM 210332), allotype (USNM 210333), and 4 paratypes (1 ♀, 3 ♂♂) (USNM 210334) deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C.

Female.—Body (Fig. 13a, b) moderately stout, 6.2 times longer than wide. Length 2.28 mm (2.08–2.50 mm) and greatest width 0.39 mm (0.35–0.44 mm), based on 4 specimens. Region dorsal to fifth legs with 3 short blunt processes (Fig. 13c, d). Genital and postgenital segments together comprising about 16 percent of body length. Caudal ramus (Fig. 13e) 143 μm long, 34 μm wide near base (ratio 4.2:1), and 13 μm wide near tip (ratio 11:1); bearing 1 lateral seta and 4 terminal setae. Egg sac not seen. Body surface densely covered with long setules (Fig. 13a, b).

Rostrum (Fig. 13f) broadly rounded. First antenna (Fig. 13f) 68 μm long and 5-segmented. Lengths of segments (measured along posterior side): 15 (23 μm along anterior side), 22, 8, 8, and 6 μm, respectively. Armature: 3, 16, 3, 2 + 1 aesthete, and 7 + 1 aesthete. Second antenna (Fig. 13g, h) 85 μm including claw and 3-segmented. Second segment with prominent posterodistal bulge. Formula: 1, 1, and 2 + I + 1. Claw 10 μm.

Labrum (Fig. 13i) with posteroventral margin minutely indented medially and having large round lateral lobes. Mandible (Fig. 14a) 28 μm, blade smooth. Paragnath a small smooth lobe. First maxilla (Fig. 14b) with 2 terminal setae and small anterior spiniform process. Second maxilla (Fig. 14c) 2-segmented, first segment with group of 3 minute bosses, second segment with 2 unequal setae and lamellate tip. Maxilliped (Fig. 14d, e) 3-segmented. First segment with prominent lobe. Second segment with 2 small setae. Third segment with 3 spiniform processes.

Legs 1–4 (Fig. 14f, g) with 3-segmented exopods and 2-segmented endopods. Spine and setal formula as follows:

P_{1+2}	coxa	0-0	basis	1-0	exp	I-0;	0-0;	I,2
					enp	0-0;	2	
P_{3+4}	coxa	0-0	basis	1-0	exp	I-0;	0-0;	I,1
					enp	0-0;	1	

Spine on first segment of exopods very small, about 5 μm long. Second segment of exopods without spine or seta. Outer margins of both segments of endopods with long setules. Terminal armature of endopods 2, 2, 1, 1.

Leg 5 (Fig. 13c, d) variable in size and shape, 120 × 81 μm in Figure 13c,

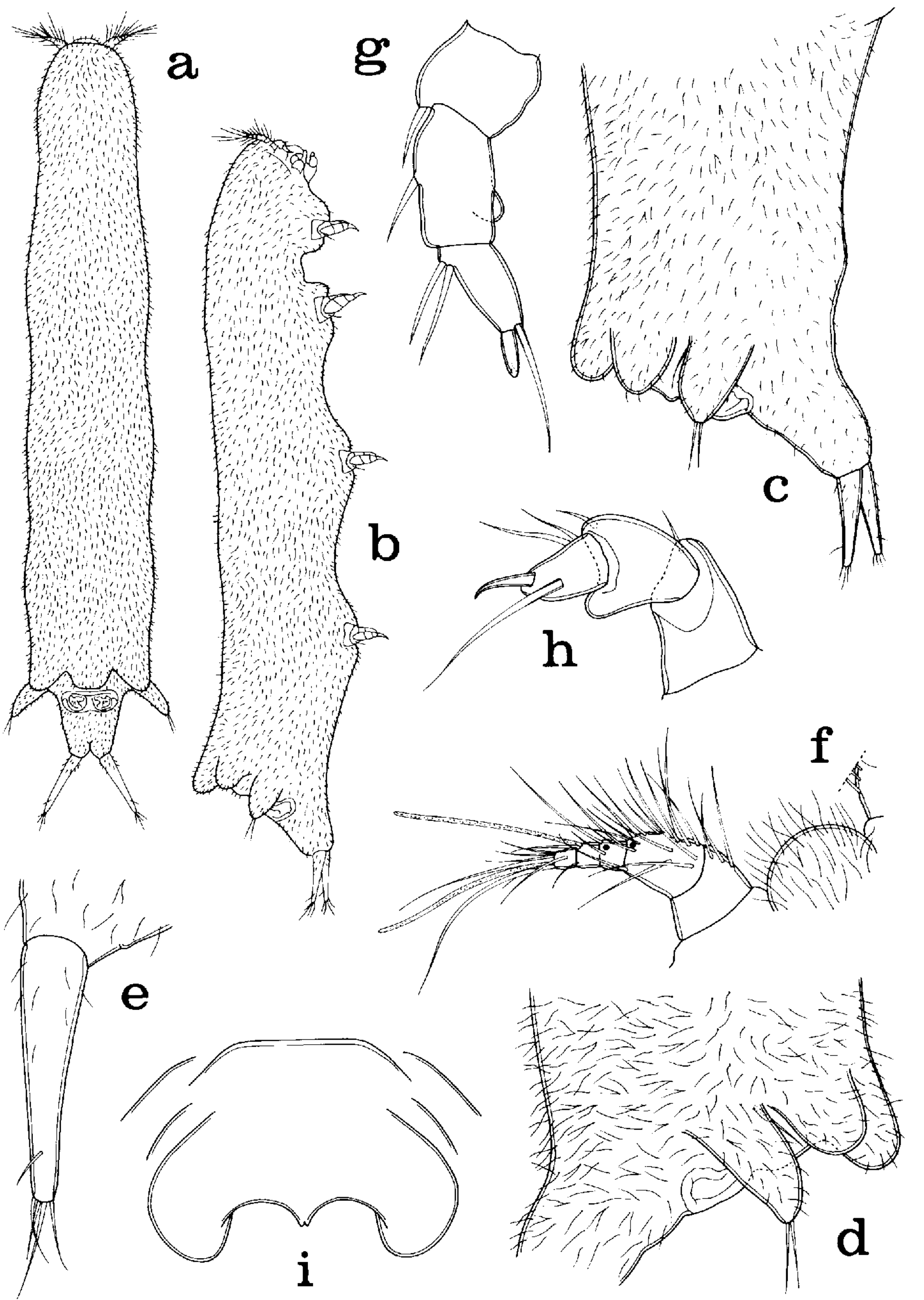


Figure 13. *Xarifia exserens* new species, female: a, dorsal (scale A); b, lateral (A); c, urosome, lateral (B); d, processes and leg 5, lateral (H); e, caudal ramus, lateral (I); f, rostrum and first antenna, with two dots indicating positions of aesthetes added in male, dorsal (C); g, second antenna, dorsal (D); h, second antenna, lateral (D); i, labrum, ventral (D).

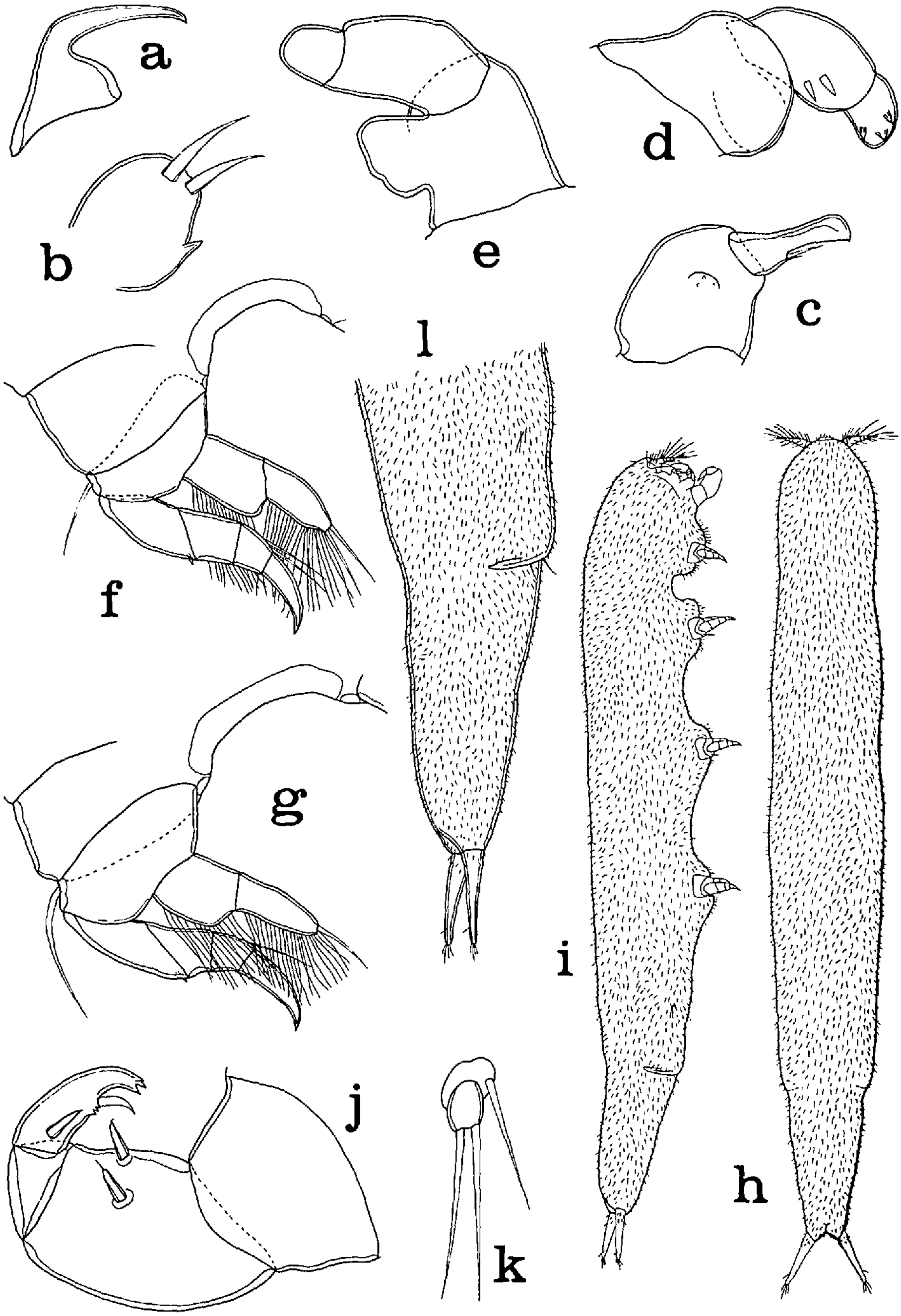


Figure 14. *Xarifia exserens* new species. Female: a, mandible, ventral (scale F); b, first maxilla, ventral (F); c, second maxilla, inner (D); d, maxilliped, inner (D); e, maxilliped, lateral (D); f, leg 1 and intercoxal plate, posterior (C); g, leg 3 and intercoxal plate, anterior (C). Male: h, dorsal (A); i, lateral (A); j, maxilliped, inner (C); k, leg 5, lateral (F); l, urosome, with legs 5 and 6, lateral (B).

138 × 73 μm in Figure 13d. Two terminal setae about 60 μm, and adjacent dorsal seta 50 μm.

Color in life in transmitted light opaque gray, intestine reddish gray, eye red.

Male.—Body (Fig. 14h, i) more slender than in female, 7.3 times longer than wide. Length 2.32 mm (2.02–2.46 mm) and greatest width 0.33 mm (0.29–0.34 mm), based on 5 specimens. Caudal ramus like that of female. Body surface with long setules as in female.

Rostrum like that of female. First antenna similar to that of female but 2 long aesthetes added (at locations shown by dots in Fig. 13f), so that formula is: 3, 16 + 1 aesthete, 3 + 1 aesthete, 2 + 1 aesthete, and 7 + 1 aesthete. Second antenna, labrum, mandible, and paragnath like those in female. First maxilla resembling that of female, but anterior spiniform process a little larger. Second maxilla as in female. Maxilliped (Fig. 14j) 4-segmented. First segment unarmed. Second segment with 2 setae. Small third segment unarmed. Claw (fourth segment) short, 49 μm, bearing 2 setae, its concave margin with 3 minute serrations and its tip trifurcate.

Legs 1–4 as in female.

Leg 5 (Fig. 14k) minute, 8 × 5.5 μm, bearing 2 terminal setae; adjacent dorsal seta.

Leg 6 (Fig. 14l) represented by 2 small setae on posteroventral flap on genital segment.

Spermatophore not seen.

Color as in female.

Etymology.—The specific name *exserens,* Latin *exsero,* to thrust out or protrude, alludes to the bulge on the second segment of the second antenna.

Remarks.—The bulge on the second segment of the second antenna is distinctive of the new species, since no other species in the genus shows such a feature. The formula 2, 2, 1, 1 for the terminal armature of the endopods of legs 1–4 is found in 11 other species of *Xarifia,* but each of these has a 4-segmented second antenna instead of a 3-segmented second antenna as in the new species. Nine of the 11 species have a spine or seta on the second segment of the exopod of legs 1–4 (*Xarifia gerlachi* Humes, 1962, *X. dispar* Humes, 1962, *X. lamellispinosa* Humes and Ho, 1968, *X. exigua* Humes and Ho, 1968, *X. gracilipes* Humes and Dojiri, 1983, and *X. fissilis, X. jugalis, X. acicularis,* and *X. plectrata,* all new species described in this review), instead of an unarmed segment as in *X. exserens. X. reducta* Humes, 1962, has a small knob on the second segment of the exopod in legs 1–4 and lacks a distinct spine or seta, but in this species the endopods of legs 1–4 are 1-segmented instead of being 2-segmented as in *X. exserens.* In *X. comata* Humes, 1962, the second segment of the exopod in legs 2–4 is unarmed, as in the new species, but the 3 processes above the fifth legs in the female are short and blunt.

Xarifia extensa Humes and Dojiri, 1982

Host.—*Montipora* sp.

Locality.—Madagascar.

Features for Recognition.—Body elongate and slender, ratio of length to width of female 15:1. Length of female 2.48 mm (2.26–2.72 mm) and male 1.92 mm (1.86–1.99 mm). Female without processes above fifth legs. Caudal ramus in female weakly articulated with anal segment, in male fused with that segment. Second antenna 4-segmented. Legs 1–4 with exopods having outer armature in leg 1 as I,I,I but in legs 2–4 as I,0,I; 1-segmented endopods having terminal armature 1, 1, 0, 0. Leg 5 in both male and female represented only by 2 setae. Eggs seriate.

Xarifia exuta Humes and Dojiri, 1982

Host.—*Acropora palifera* (Lamarck).

Locality.—Moluccas (Poelau Gomumu, south of Obi).

Features for Recognition.—Length of female 2.28 mm (2.13–2.49 mm) and male 1.37 mm (1.30–1.46 mm). Ratio of length to width of female 7.4:1; ratio in male about 13.3:1. Region above fifth legs in female with small dorsomedial lobe. Caudal ramus fused with anal segment. First and second segments of 4-segmented second antenna unarmed. Legs 1–4 with exopods having outer armature I,I,I and 1-segmented endopods with terminal armature 3, 3, 1, 1. Leg 5 in female with oval segment 47 × 31 μm. Leg 5 in male represented by 3 small setae.

Xarifia fastigiata Humes and Dojiri, 1982

Hosts.—*Acropora rosaria* (Dana) and *Acropora elseyi* (Brook). [*Acropora exilis* (Brook), reported as a host by Humes and Dojiri (1982), is a synonym of *Acropora elseyi* (Brook) (Pichon, pers. comm.).]

Locality.—New Caledonia.

Features for Recognition.—Length of female 1.49 mm (1.46–1.53 mm) and male 1.49 mm (0.43–1.56 mm). Ratio of length to width of female about 6.5:1. Female with 3 long nearly equal processes above fifth legs. Caudal ramus not fused with anal segment. Second antenna 4-segmented. Legs 1–4 with exopods having outer armature I,I,I and 2-segmented endopods with 3, 3, 1, 1. Setae on tips of endopods of legs 3 and 4 unusually stout. Leg 5 in female with elongate segment, 184 μm. Leg 5 in male represented by 3 small setae. Eggs seriate.

Xarifia filata new species
Figures 15a–m, 16a–h

Type Material.—28 ♀♀, 16 ♂♂ from *Gardineroseris planulata* (Dana), in 10–20 m, Big Broadhurst Reef, Great Barrier Reef, northeastern Australia, 18°58′03″S, 147°45′04″E, 1 November 1982. Holotype ♀ (USNM 210374), allotype (USNM 210375), and 37 paratypes (23 ♀♀, 14 ♂♂) (USNM 210376) deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C.

Female.—Body (Fig. 15a, b) elongate, 7.8 times longer than wide. Length 0.92 mm (0.90–0.95 mm) and greatest width 0.13 mm (0.12–0.14 mm), based on 10 specimens. Region dorsal to fifth legs with 3 posteriorly directed processes with terminal filaments, middle process usually about twice as long as lateral processes (Fig. 15c), but in few specimens middle process only about one-third longer (Fig. 15d). Genital and postgenital segments together about 18 percent of body length. Caudal ramus (Fig. 15e) 38 (34–42) × 16.5 (16–17) μm, ratio 2.6:1, with 1 subterminal outer seta and 4 terminal setae. Body surface smooth. Egg sac (Fig. 15f) containing 1 oval egg measuring 169 × 112 μm.

Rostrum (Fig. 15g) rounded. First antenna (Fig. 15g) 45 μm long, 3-segmented. Lengths of segments (measured along posterior side): 8 (16.5 μm along anterior side), 17.5, and 10 μm, respectively. Armature: 3, 13 + 1 aesthete, and 9 + 2 aesthetes (2 + 1 aesthete and 7 + 1 aesthete). Second antenna (Fig. 15h) 4-segmented, 57 μm long including claw. Armature: 1, 1, 2, and I + 1. Claw 12 μm.

Labrum (Fig. 15i) with posteroventral margin having median indentation and small lateral lobes. Mandible (Fig. 15j) 23 μm, with smooth blade. Paragnath a

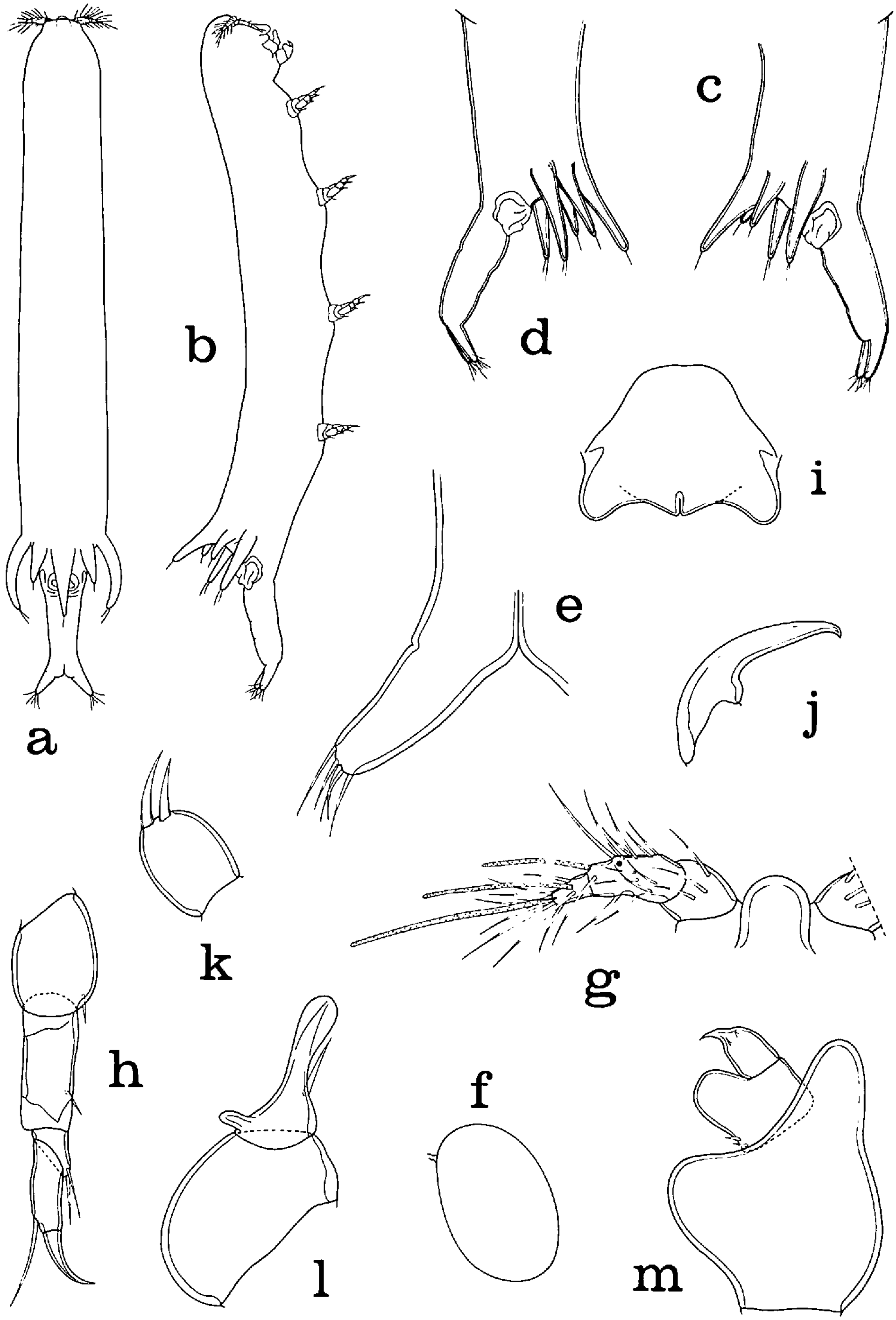


Figure 15. *Xarifia filata* new species, female: a, dorsal (scale B); b, lateral (B); c, processes and urosome, lateral (H); d, processes and urosome, lateral (H); e, caudal ramus, dorsal (D); f, egg sac, lateral (H); g, rostrum and first antenna, with dot indicating position of aesthete in male, dorsal (D); h, second antenna, ventral (F); i, labrum, ventral (D); j, mandible, anterior (E); k, first maxilla, anterior (E); l, second maxilla, anteroventral (E); m, maxilliped, antero-inner (E).

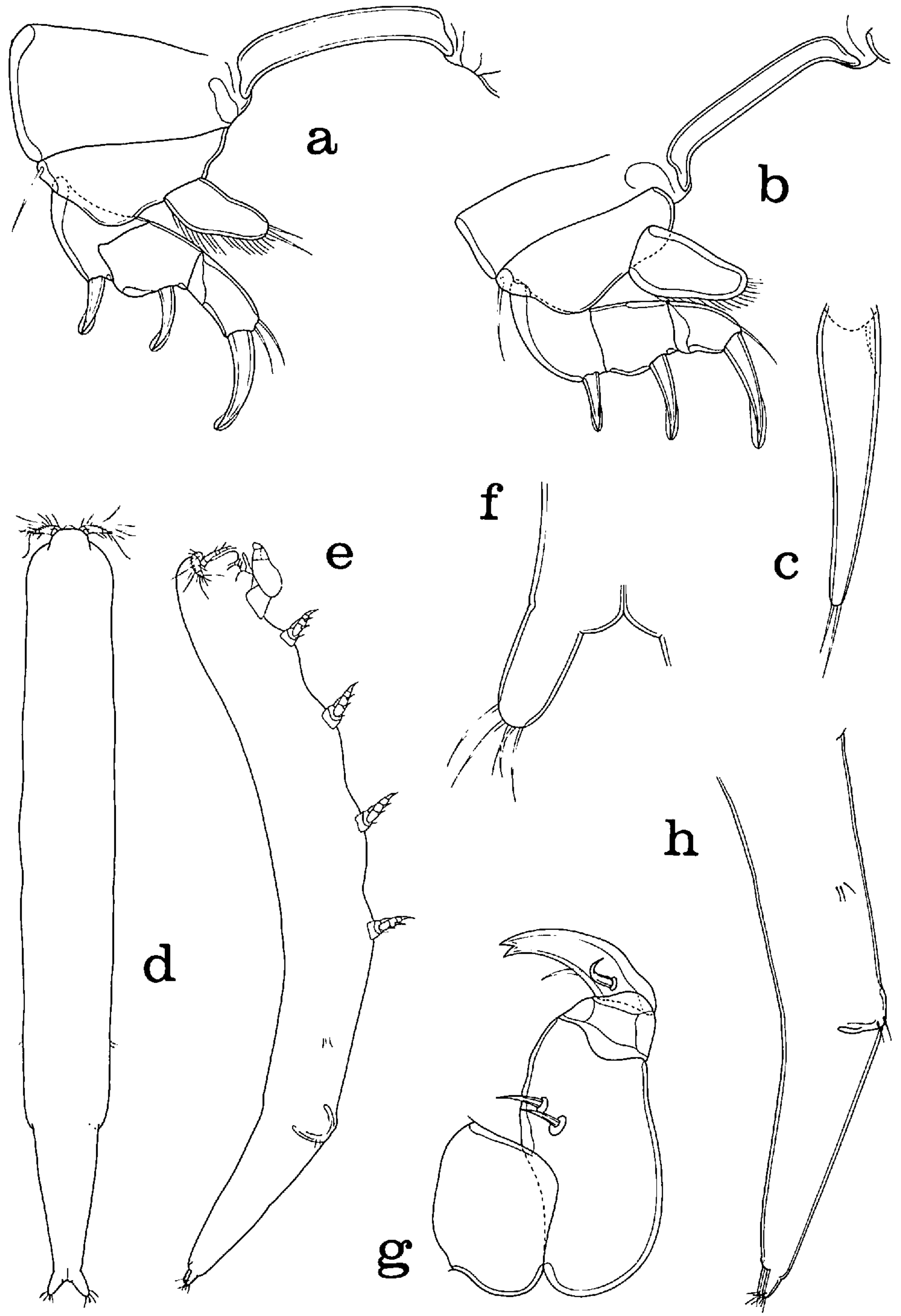


Figure 16. *Xarifia filata* new species. Female: a, leg 1 and intercoxal plate, posterior (scale F); b, leg 3 and intercoxal plate, posterior (F); c, leg 5, lateral (C). Male: d, dorsal (B); e, lateral (B); f, caudal ramus, dorsal (D); g, maxilliped, inner (D); h, urosome, with legs 5 and 6, lateral (H).

small round lobe. First maxilla (Fig. 15k) with 2 setae. Second maxilla (Fig. 15l) 2-segmented, first segment unarmed, second segment elongate with lamellate tip, bearing 1 inner seta and outer proximal thumblike process. Maxilliped (Fig. 15m) 3-segmented. First segment with outer and inner lobes. Second segment with 2 inner setae and lobe. Third segment with spinelike tip and 2 minute spines.

Legs 1–4 (Fig. 16a, b) with 3-segmented exopods and 1-segmented endopods. Spine and setal formula as follows:

P_{1+2}	coxa	0-0	basis	1-0	exp	I-0;	I-0;	I,2
					enp	2		
P_{3+4}	coxa	0-0	basis	1-0	exp	I-0;	I-0;	I,1
					enp	0		

Basis in all 4 legs with smooth inner edge. Endopods with hairs along outer side. Terminal armature of endopods 2, 2, 0, 0.

Leg 5 (Fig. 16c) elongate, 101 μm long, 21 μm wide proximally and 7.5 μm wide distally, bearing 2 terminal setae. Small adjacent dorsal seta.

Color in life in transmitted light opaque gray, eye red, eggs dark gray.

Male.—Body (Fig. 16d, e) slender, 8.4 times longer than wide. Length 1.01 mm (0.94–1.09 mm) and greatest width 0.12 mm (0.11–0.13 mm), based on 10 specimens. Caudal ramus (Fig. 16f) shorter than in female, 28 × 13 μm, ratio 2.15:1.

Rostrum as in female. First antenna similar to that of female, but 1 aesthete added on second segment (at site indicated by dot in Fig. 15g). Second antenna as in female.

Labrum, mandible, paragnath, first maxilla, and second maxilla as in female. Maxilliped (Fig. 16g) 4-segmented. First segment unarmed. Second segment with 2 inner setae. Small third segment unarmed. Claw (fourth segment) short, 41 μm long, with 2 proximal setae and strongly bifurcate tip.

Legs 1–4 like those of female.

Leg 5 (Fig. 16h) consisting of 3 small setae.

Leg 6 (Fig. 16h) represented by 2 small setae on posteroventral flap on genital segment.

Color as in female.

Etymology.—The specific name *filata,* Latin *filum,* a thread, and the suffix *-atus,* provided with, alludes to the threadlike terminal filaments on the three processes above the fifth legs in the female.

Only four other species of *Xarifia* have the formula 2, 2, 0, 0 for the terminal armature of the endopods of legs 1–4. These may be distinguished from the new species as follows: in *Xarifia brevicauda* Humes and Ho, 1968, the endopods of legs 1–4 are 2-segmented and the three processes in the female are long and equal; in *Xarifia scutipes* Humes and Dojiri, 1983, the free segment of leg 5 in the female is large, round, and shield-shaped; in *Xarifia anopla* Humes and Dojiri, 1982, leg 5 is absent and the female lacks processes; and in *Xarifia hadra* Humes and Dojiri, 1983, leg 5 in the female is much longer than the three moderately short equal processes.

Xarifia fimbriata Humes, 1960

Previously Known Host.—*Pocillopora* sp.

New Hosts.—From *Pocillopora damicornis* (Linnaeus): 6 ♀♀, 4 ♂♂, in 3 m, southern end of Poelau Naira, Banda Islands, Moluccas, 04°31′45″S, 129°53′35″E, 8 May 1975; 8 ♀♀, 1 ♂, in 2 m, west of Isle

Mando, near Noumea, New Caledonia, 22°18'59"S, 166°09'30"E, 1 July 1971. From *Pocillopora damicornis* (L.), var. *caespitosa* Dana: 14 ♀♀, 16 ♂♂, in 1 m, Rocher à la Voile, Noumea, New Caledonia, 22°18'24"S, 166°25'50"E, 15 June 1971; 3 ♀♀, in 1.5 m, same locality, 19 June 1971; 5 ♀♀, 3 ♂♂, in 1 m, Rocher à la Voile, 15 June 1971. From *Pocillopora eydouxi* Milne Edwards and Haime: 4 ♀♀, 4 ♂♂, in 3 m, Poelau Marsegoe, western Ceram, 02°59'30"S, 128°03'30"E, 15 May 1975; 1 ♀, in 2 m, southwestern shore of Goenoeng Api, Banda Islands, Moluccas, 4°31'45"S, 129°51'55"E, 4 May 1975.

Localities.—Maldive Islands, New Caledonia, Moluccas (Banda Islands, Ceram).

Features for Recognition.—Length of female 1.40 mm (1.26–1.45 mm) and male 1.42 mm. Ratio of length to width of female about 7:1. Female with 2 long processes above fifth legs. Caudal ramus not fused with anal segment. Second antenna 4-segmented. Legs 1–4 with exopods having outer armature 1,1,I (second segment not unarmed as in original description but having very small seta) (Fig. 17d); 1-segmented endopods with terminal armature 2, 2, 2, 2 (these setae difficult to distinguish from adjacent setules). [Specimens from *Pocillopora damicornis caespitosa* in New Caledonia show only 1 seta on tip of endopod in legs 3 and 4 (Fig. 17d).] Eggs seriate (Fig. 17a–c).

Xarifia finitima new species

Figures 18a–h, 19a–k

Type Material.—14 ♀♀, 29 ♂♂, and 1 copepodid from *Pavona cactus* (Forskål), in 1 m, west of Isle To N'du, near Noumea, New Caledonia, 22°10'42"S, 166°16'30"E, 29 June 1971. Holotype ♀ (USNM 210323), allotype (USNM 210324), and 35 paratypes (10 ♀♀, 25 ♂♂) (USNM 210325) deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C.

Other Specimens.—6 ♀♀, 44 ♂♂ from *Pavona cactus*, in 2 m, eastern end of Isle Ndié, Baie Dumbea, near Noumea, New Caledonia, 22°13'15"S, 166°25'26"E, 6 July 1971; 1 ♀ from *Pavona varians* (Verrill), in 1–31 m, in exposed lagoon, Pte. Lafayette, Mauritius, 2 February 1964.

Female.—Body (Fig. 18a, b) moderately slender, 7.25 times longer than wide. Length 1.00 mm (0.95–1.09 mm) and width 0.15 mm (0.14–0.17 mm), based on 10 specimens. Region dorsal to fifth legs bearing 3 long posteriorly directed processes of nearly equal length (Fig. 18a), but middle process often slightly longer than others (Fig. 18c). Genital and postgenital segments together about 17 percent of body length. Genital areas located dorsally. Caudal ramus (Fig. 18d) 39 × 16.5 μm in greatest dimensions, ratio 2.36:1, not completely separated from anal segment, and bearing 5 setae (1 outer lateral seta and 4 terminal setae). Egg sac 198 × 104 μm containing 2 eggs (Fig. 18e), 255 × 120 μm with 3 eggs (Fig. 18f), or 319 × 125 μm with 4 eggs (Fig. 18g), eggs arranged linearly and each egg 104–125 μm in diameter.

Rostrum (Fig. 18h) broadly rounded. First antenna (Fig. 18h) short, 50 μm, and 3-segmented. Lengths of segments (measured along posterior side): 11 (18 μm along anterior side), 19, and 13 μm, respectively. Armature: 3, 15, and 9 + 2 aesthetes (probably through fusion of 2 segments with 2 + 1 aesthete and 7 + 1 aesthete). Second antenna (Fig. 18i) 53 μm without claw, 4-segmented, formula 1, 1, 1, and 1 + I. Terminal claw 11 μm and characteristically bent (Fig. 18j).

Labrum (Fig. 18k) with posteroventral margin deeply indented medially and having rounded outer lateral lobes. Mandible (Fig. 18l) 33 μm, with smooth blade. Paragnath a minute lobe with few small hairs. First maxilla (Fig. 18m) with 2 setae. Second maxilla (Fig. 18n) 2-segmented, second segment digitiform, distally hyaline, bearing 2 unequal inner setae and having small proximal outer process. Maxilliped (Fig. 19a) 3-segmented. First segment with large outer lobe. Second segment with 2 small setae and inner lobe. Small third segment with 2 setae.

Legs 1–4 (Fig. 19b, c) with 3-segmented exopods and 1-segmented endopods

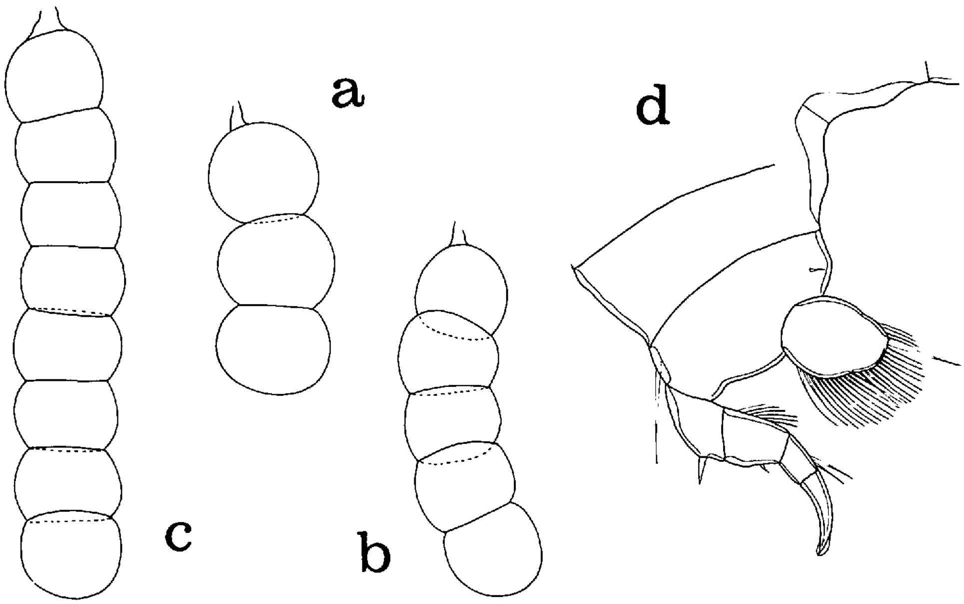


Figure 17. *Xarifia fimbriata* Humes, 1960. Female: a, b, c, egg sacs, lateral (scale B); d, leg 3 and intercoxal plate, anterior (D).

(though separation of segments in endopods very weak in most specimens). Spine and setal formula as follows:

P_1	coxa	0-0	basis	1-0	exp	I-0;	I-0;	I,3
					enp	1		
P_2	coxa	0-0	basis	1-0	exp	I-0;	I-0;	I,3
					enp	2		
P_{3+4}	coxa	0-0	basis	1-0	exp	I-0;	I-0;	I,2
					enp	0		

In all 4 legs inner margin of basis with row of setules, and outer margin of endopods with long setules. Spines on exopods relatively slender. Terminal armature of endopods 1, 2, 0, 0. Abnormal endopods seen in 1 specimen (Fig. 19d).

Leg 5 (Fig. 19e) elongate and slender, 115 × 22 μm (proximal width); distal width 9 μm. Two terminal setae 28 μm and 15 μm. Adjacent dorsal seta minute.

Color in life in transmitted light opaque gray, eye red, eggs greenish.

Male.—Body (Fig. 19f, g) slender, about 8.3 times longer than wide. Length 0.93 mm (0.80–1.00 mm) and width 0.11 mm (0.10–0.12 mm), based on 10 specimens. Caudal ramus (Fig. 19f) smaller than in female, 25 × 15 μm, ratio 1.67:1.

Rostrum as in female. First antenna like that of female but 1 aesthete added (at point indicated by dot in Fig. 18h). Second antenna resembling that of female.

Labrum, mandible, paragnath, first maxilla, and second maxilla like those of female. Maxilliped (Fig. 19h) 4-segmented. First segment expanded and unarmed. Second segment with 2 inner setae. Small third segment unarmed. Claw (fourth segment) (Fig. 19i) short, 36 μm, with 2 inner setae and trifid tip.

Legs 1–4 as in female.

Leg 5 (Fig. 19j) without free segment and consisting of 3 setae.

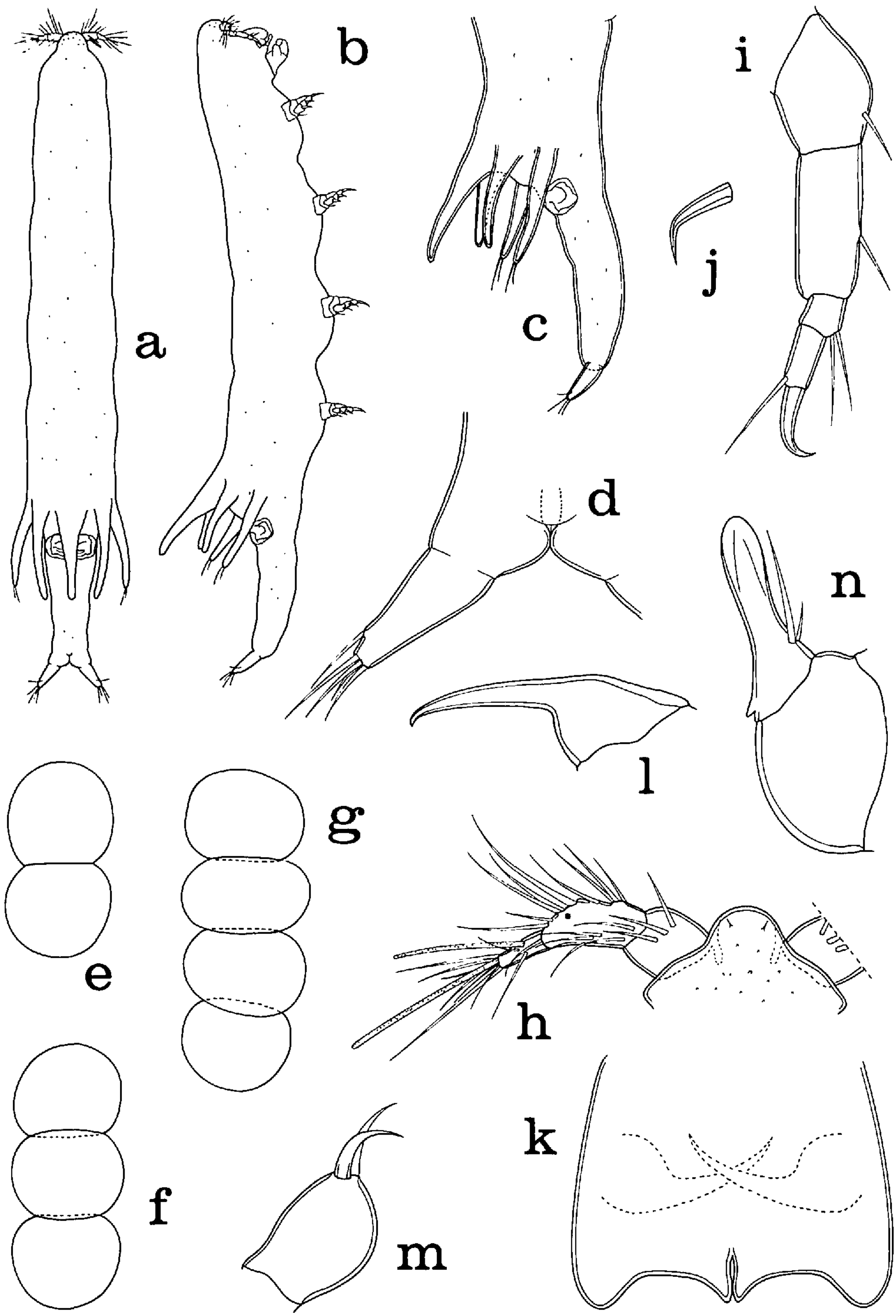


Figure 18. *Xarifia finitima* new species, female: a, dorsal (scale B); b, lateral (B); c, processes and urosome, lateral (H); d, caudal ramus, dorsal (D); e, f, g, egg sacs, lateral (H); h, rostrum and first antenna, with dot indicating position of aesthete in male, dorsal (D); i, second antenna, anterodorsal (F); j, claw of second antenna, flat view (E); k, labrum, with position of mandibles shown by broken lines, ventral (F); l, mandible, ventral (E); m, first maxilla, anterior (E); n, second maxilla, inner (E).

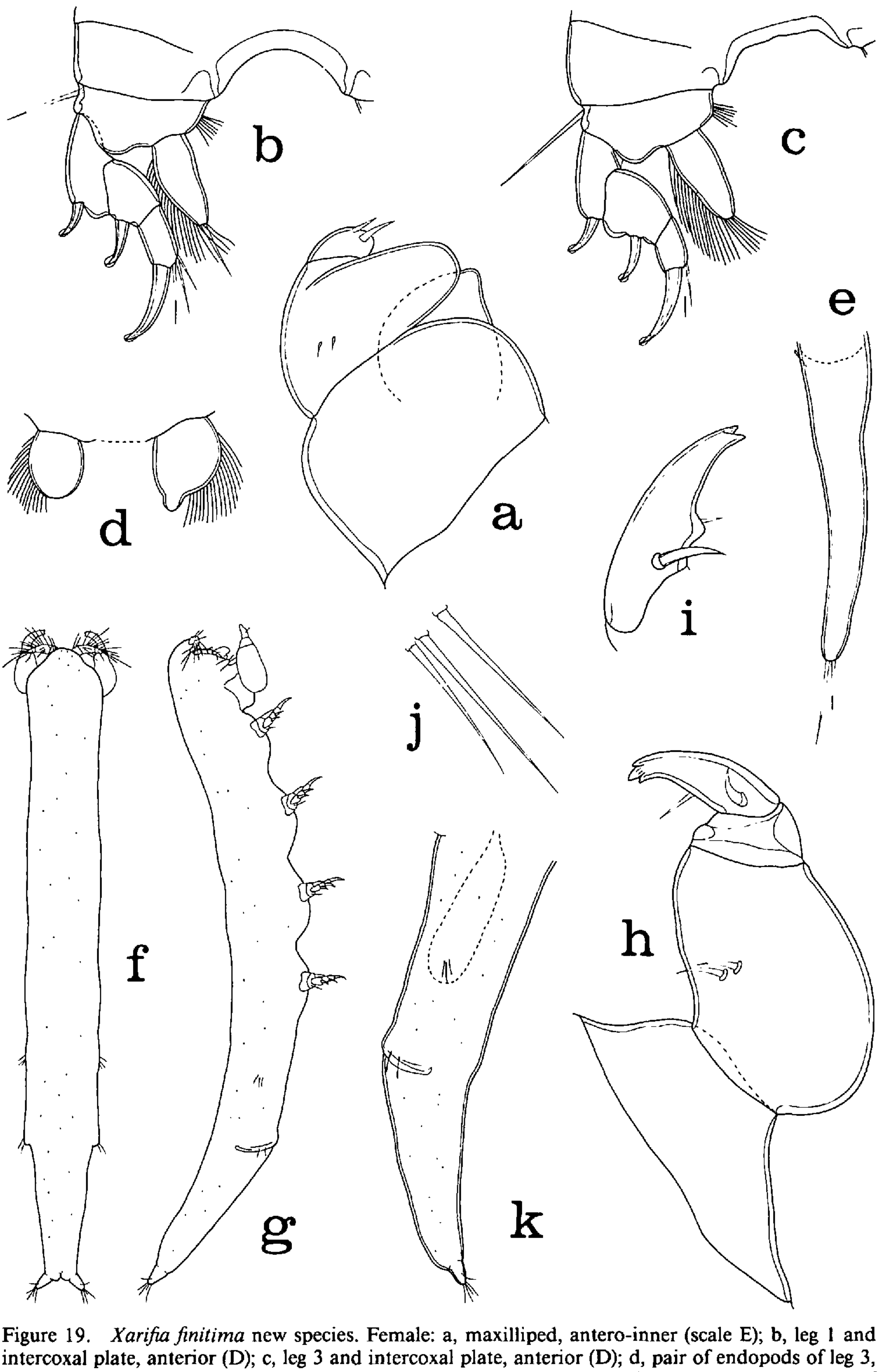


Figure 19. *Xarifia finitima* new species. Female: a, maxilliped, antero-inner (scale E); b, leg 1 and intercoxal plate, anterior (D); c, leg 3 and intercoxal plate, anterior (D); d, pair of endopods of leg 3, anterior (F); e, leg 5, lateral (C). Male: f, dorsal (B); g, lateral (B); h, maxilliped, inner (D); i, claw of maxilliped, inner (D); j, leg 5, lateral (E); k, urosome, with legs 5 and 6, lateral (H).

Leg 6 (Fig. 19k) represented by 2 setae on ventrolateral flap on genital segment.
Spermatophore not seen.
Color as in female.

Etymology.—The specific name *finitima,* Latin meaning adjoining or neighboring, alludes to the several similarities of this species with *Xarifia diminuta* Humes and Ho, 1967.

Remarks.—Two species of *Xarifia* have, as in the new species, the formula 1, 2, 0, 0 for the terminal armature of the endopods of legs 1–4. These species have the following features by which they may be distinguished from *Xarifia finitima*: in *Xarifia syntoma* Humes and Dojiri, 1982, leg 5 in the female is represented only by 2 setae and a minute setule; in *Xarifia gradata* Humes and Dojiri, 1983, the length of the female is 1.30 mm (1.26–1.32 mm) with the length to width ratio 6.7:1, and the endopods of legs 1–4 are clearly 2-segmented.

In some respects *Xarifia finitima* resembles *Xarifia diminuta* Humes and Ho, 1967. However, the following characters of *X. diminuta* differentiate it from the new species: (1) the eggs are in a cluster, rather than being linearly arranged; (2) the first segment of the maxilliped in the female lacks a lobe; (3) the endopods of legs 1–4 are clearly 2-segmented, with a distinct separation of the segments, and with the terminal armature 2, 2, 0, 2; (4) the spines on the exopods of legs 1–4 are stout and robust; and (5) the tip of the claw of the maxilliped of the male is bifid, rather than trifid.

Xarifia fissilis new species
Figures 20a–i, 21a–l, 22a–g

Type Material.—96 ♀♀, 115 ♂♂, and 10 copepodids from *Pocillopora damicornis* (Linnaeus), in 3 m, near old pier, southern end of Bandanaira, Banda Islands, Moluccas, 04°31′45″S, 129°53′35″E, 8 May 1975. Holotype ♀ (USNM 210349), allotype (USNM 210350), and 202 paratypes (91 ♀♀, 111 ♂♂) (USNM 210351) deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C.

Other Specimens.—73 ♀♀, 44 ♂♂ from *Pocillopora damicornis,* in 1.5 m, type locality, 2 May 1975.

Female.—Body (Fig. 20a, b) moderately elongate and slender, slightly arched, ratio of length to width 7.1:1. Length 1.84 mm (1.78–1.93 mm) and greatest width 0.26 mm (0.23–0.29 mm), based on 10 specimens. External segmentation not evident. Region dorsal to fifth legs with 3 long posteriorly directed processes of nearly equal length (Fig. 20c), though occasionally median process shorter than lateral processes (Fig. 20d). Genital and postgenital segments together about 34 percent of body length. Genital areas situated dorsally. Immediately anterior to genital areas a small lobulate process (Fig. 20c, e) directed dorsally. Caudal ramus (Fig. 20f) elongate, 143 × 34 μm, ratio 4.2:1, bearing 1 lateral seta and 4 terminal setae, all smooth. Surface of body with numerous slender setules, some compound, especially ventrally between legs 1–4 (Fig. 20b). Egg sac frequently with 8–12 linear eggs (Fig. 20g) (if with 12 eggs dimensions of sac 800 × 154 μm), but other females carrying only 1 egg on each side (Fig. 20c), size of egg 122 × 109 μm.

Rostrum (Fig. 20h) broadly rounded, indented medially, and bearing numerous long setules. First antenna (Fig. 20i) 62 μm long, 4-segmented. Lengths of segments (measured along posterior side): 14 (27 μm along anterior side), 12, 6, and 11 μm, respectively. Armature: 3, 14 + 1 aesthete, 2 + 1 aesthete, and 7 + 1 aesthete. All setae naked. Second antenna (Fig. 21a) 4-segmented, 88 μm long not including claw. Formula 1, 1, 2, and 1 + I + 2 minute spinules. Claw 14 μm and long seta 22 μm.

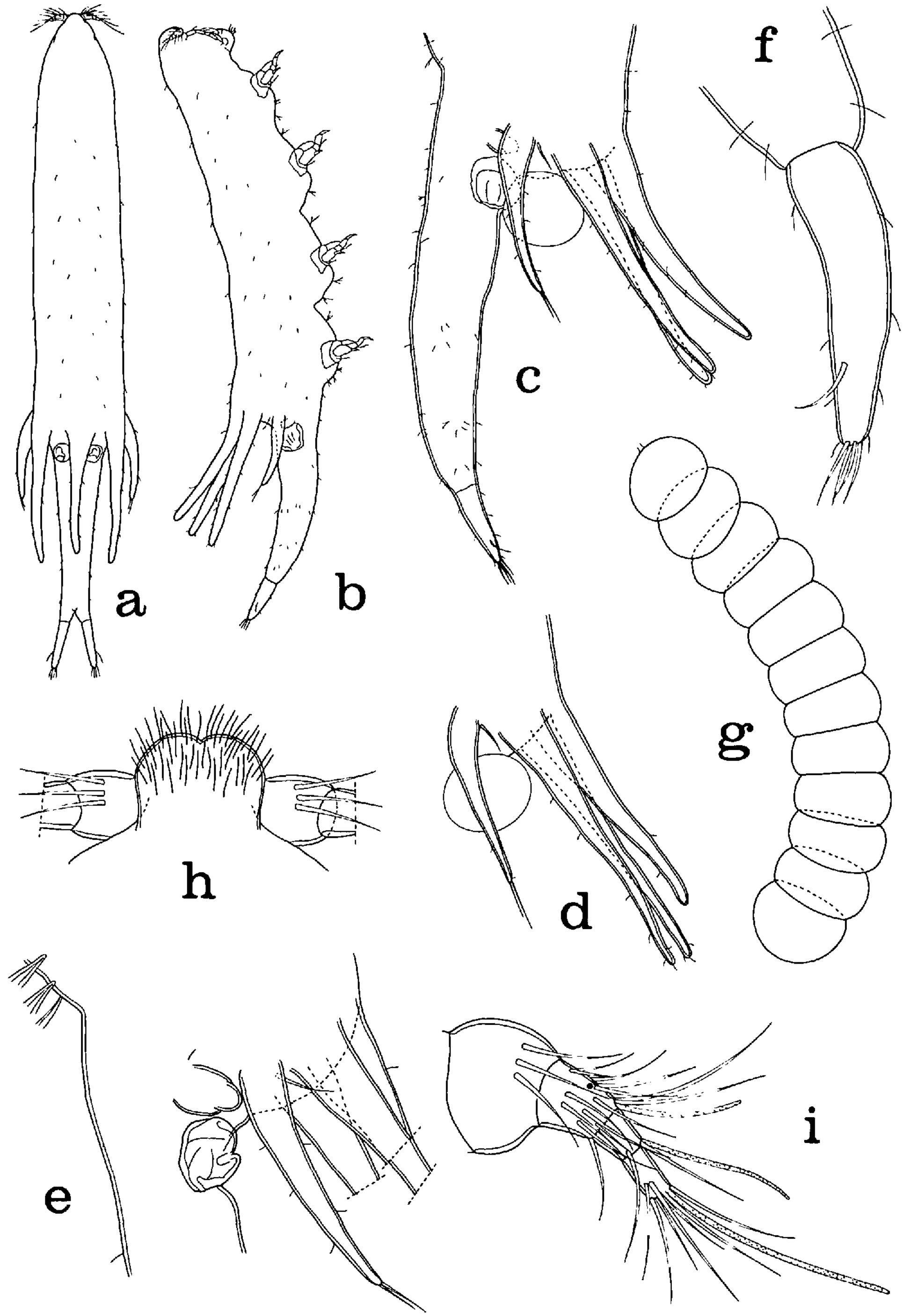


Figure 20. *Xarifia fissilis* new species, female: a, dorsal (scale A); b, lateral (A); c, processes and urosome, lateral (B); d, processes and leg 5, lateral (B); e, genital area with leg 5 and adjacent lobelike process, lateral (H); f, caudal ramus, lateral (I); g, egg sac, lateral (B); h, rostrum, dorsal (C); i, first antenna, with dot indicating position of aesthete in male, anterodorsal (D).

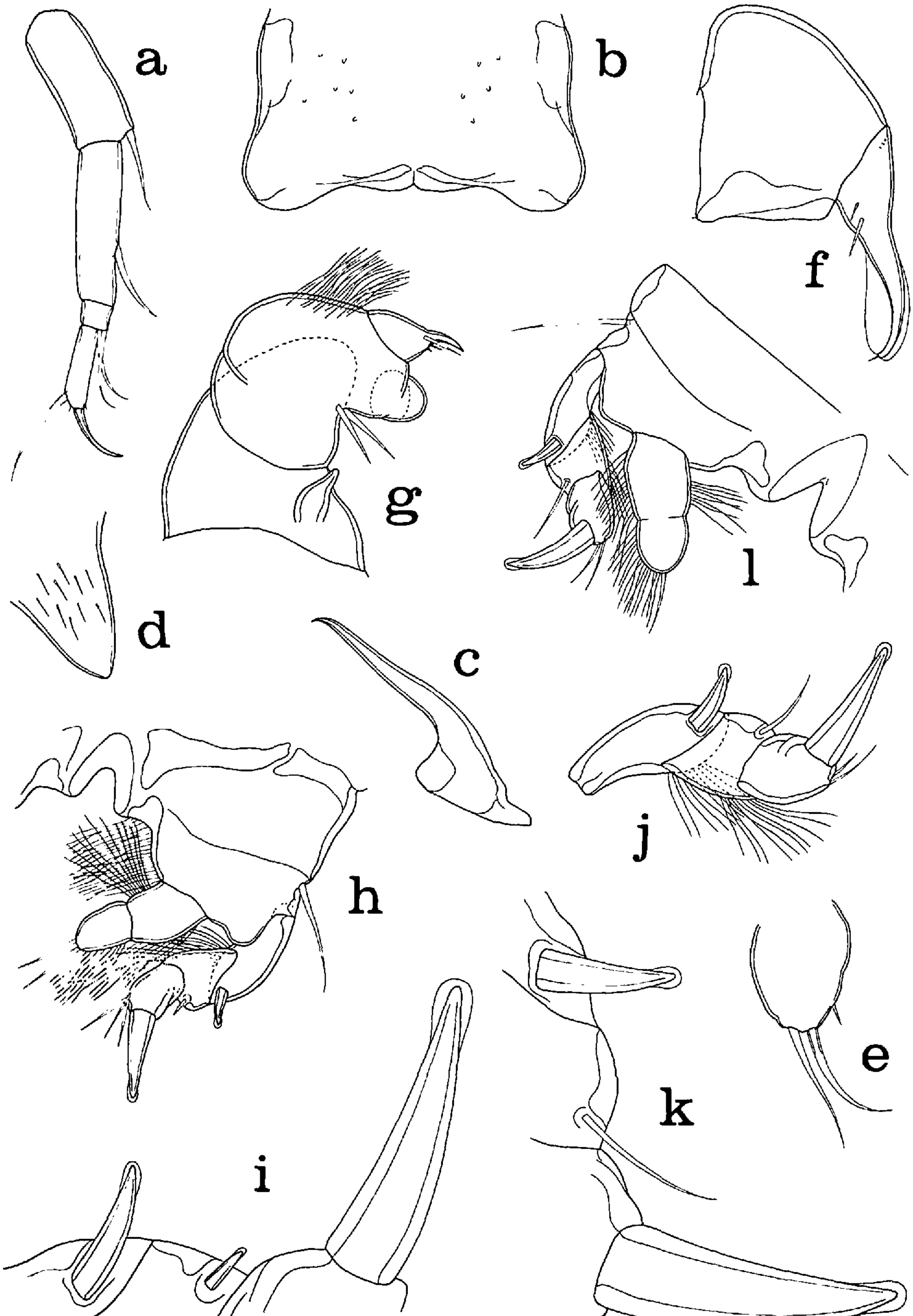


Figure 21. *Xarifia fissilis* new species, female: a, second antenna, anterior (scale D); b, labrum, ventral (D); c, mandible, ventral (F); d, paragnath, anterior (F); e, first maxilla, anterior (F); f, second maxilla, postero-inner (F); g, maxilliped, posterior (D); h, leg 1 and intercoxal plate, anterior (C); i, spines on exopod of leg 1, anterior (E); j, exopod of leg 2, anterior (D); k, spines on exopod of leg 2, anterior (E); l, leg 3 and intercoxal plate, anterior (C).

Labrum (Fig. 21b) weakly indented medially and having small rounded outer lobes. Mandible (Fig. 21c) slender, 44 μm, with recurved tip. Paragnath (Fig. 21d) a pointed lobe bearing setules. First maxilla (Fig. 21e) with 2 long terminal setae and 1 short subterminal seta. Second maxilla (Fig. 21f) 2-segmented, first segment unarmed, second segment elongate digitiform, bilamellate, with 2 proximal inner setae, 1 proximal outer seta, and 1 minute terminal seta. Maxilliped (Fig. 21g) 3-segmented. First segment with small process and disto-anterior lobe. Second segment with 2 inner setae, outer group of long hairlike setules, and inner bifurcate lobe. Small third segment with 3 setae and terminal recurved process.

Legs 1–4 (Fig. 21h–l) with 3-segmented exopods and 2-segmented endopods. Spine and setal formula as follows:

P_1	coxa	0-0	basis	1-0	exp	I-0;	I-0;	I,3
					enp	0-0;	2	
P_2	coxa	0-0	basis	1-0	exp	I-0;	1-0;	I,2
					enp	0-0;	2	
P_{3+4}	coxa	0-0	basis	1-0	exp	I-0;	1-0;	I,2
					enp	0-0;	1	

All legs with inner margin of basis, outer margins of endopod segments, and inner margins of first 2 exopod segments having long setules. Leg 1 with spines on exopod from proximal to distal 12, 5.5, and 31 μm, middle spine very small (Fig. 21i). Legs 2–4 with middle spine replaced by long smooth seta (Fig. 21k). Terminal armature of endopods 2, 2, 1, 1.

Leg 5 (Fig. 20c–e) 240–255 μm long, 2 terminal setae 49 and 55 μm, and adjacent dorsal seta 50 μm.

Color in life in transmitted light opaque gray, intestine gray, eye red.

Male.—Body (Fig. 22a, b) slender and slightly arched, ratio of length to width 7.4:1. Length 1.57 mm (1.47–1.71 mm) and greatest width 0.21 mm (0.20–0.22 mm), based on 10 specimens. Caudal ramus resembling that of female but much shorter, 65 × 26 μm, ratio 2.5:1.

Rostrum as in female. First antenna like that of female, but 1 aesthete added on second segment (at location shown by dot in Fig. 20i). Second antenna as in female.

Labrum (Fig. 22c) similar to that of female, but having outer minute spiniform process on lateral lobes. Mandible and paragnath like those of female. First maxilla (Fig. 22d) resembling that of female, but having prominent process in addition to 3 setae. Second maxilla as in female. Maxilliped (Fig. 22e) 4-segmented. First segment unarmed. Second segment with 2 inner setae. Third segment unarmed. Claw (fourth segment) relatively short, 73 μm, bearing 2 unequal proximal setae and having bifid tip.

Legs 1–4 as in female.

Leg 5 (Fig. 22f) consisting of 3 small setae.

Leg 6 (Fig. 22f) represented by 2 small setae on posteroventral flap on genital segment.

Spermatophore (Fig. 22g) elongate, 418 × 99 μm, ratio 4.2:1.

Color as in female.

Etymology.—The specific name *fissilis,* Latin meaning cleft or split, refers to the medially indented rostrum and to the deeply indented intercoxal plates of legs 1–4.

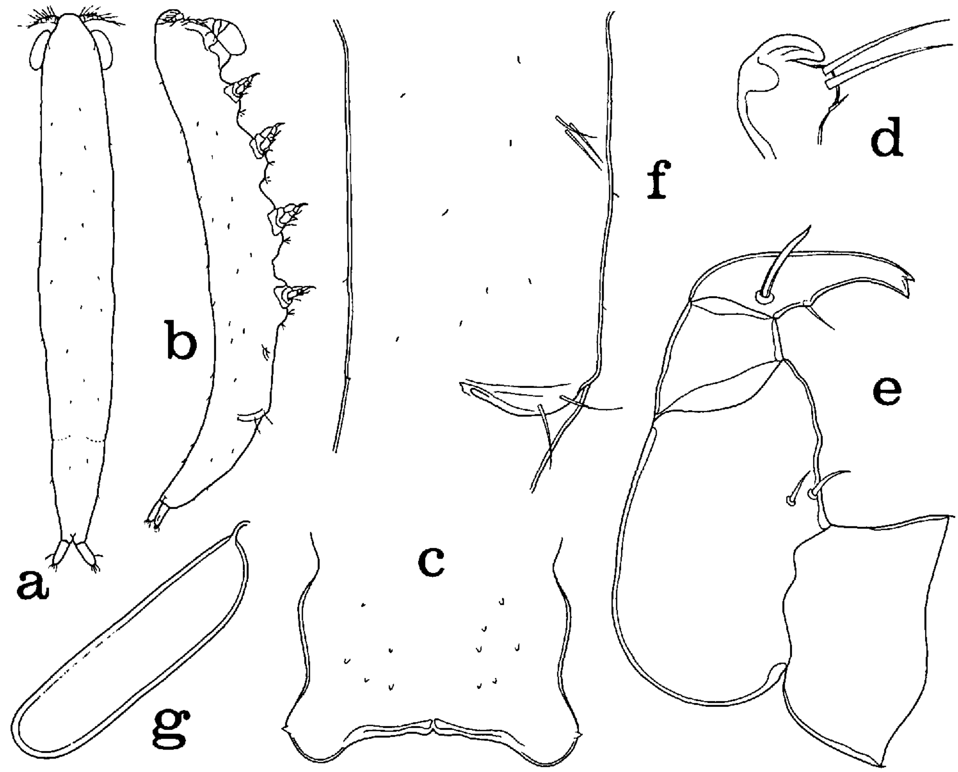


Figure 22. *Xarifia fissilis* new species, male: a, dorsal (scale A); b, lateral (A); c, labrum, ventral (D); d, first maxilla, inner (F); e, maxilliped, inner (C); f, legs 5 and 6, lateral (J); g, spermatophore, attached to female, lateral (B).

Remarks.—Among those species with legs 1–4 having the terminal armature of the endopods 2, 2, 1, 1, as in the new species, only *Xarifia jugalis* new species, described below, has a similar formula for the armature of the exopods of these legs, namely I,I,I in leg 1 and I,1,I in legs 2–4. *X. jugalis* differs from the new species in being smaller, with the length of the female 1.32 mm (1.28–1.36 mm), and in the spines on the first two segments of the exopod of leg 1 being extremely short (2 μm).

The pair of small lobes just anterior to the genital areas in the female is a feature not found in other species in the genus.

Xarifia formosa new species
Figures 23a–m, 24a–l, 25a–d

Type Material.—181 ♀♀, 101 ♂♂ from *Psammocora digitata* Milne Edwards and Haime, in 4 m, west of Isle Mando, near Noumea, New Caledonia, 22°18′59″S, 166°09′30″E, 1 July 1971. Holotype ♀ (USNM 210380), allotype (USNM 210381), and 273 paratypes (176 ♀♀, 97 ♂♂) (USNM 210382) deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C.

Other Specimens (all from *Psammocora digitata*).—10 ♀♀, 7 ♂♂, in 3 m, reef between Isle Ndié and Mt. Kumuru, Baie Dumbea, near Noumea, New Caledonia, 22°13′40″S, 166°24′18″E, 9 July 1971; 70 ♀♀, 24 ♂♂, in 4 m, south of Parry Island, Enewetak Atoll, Marshall Islands, 9 July 1969.

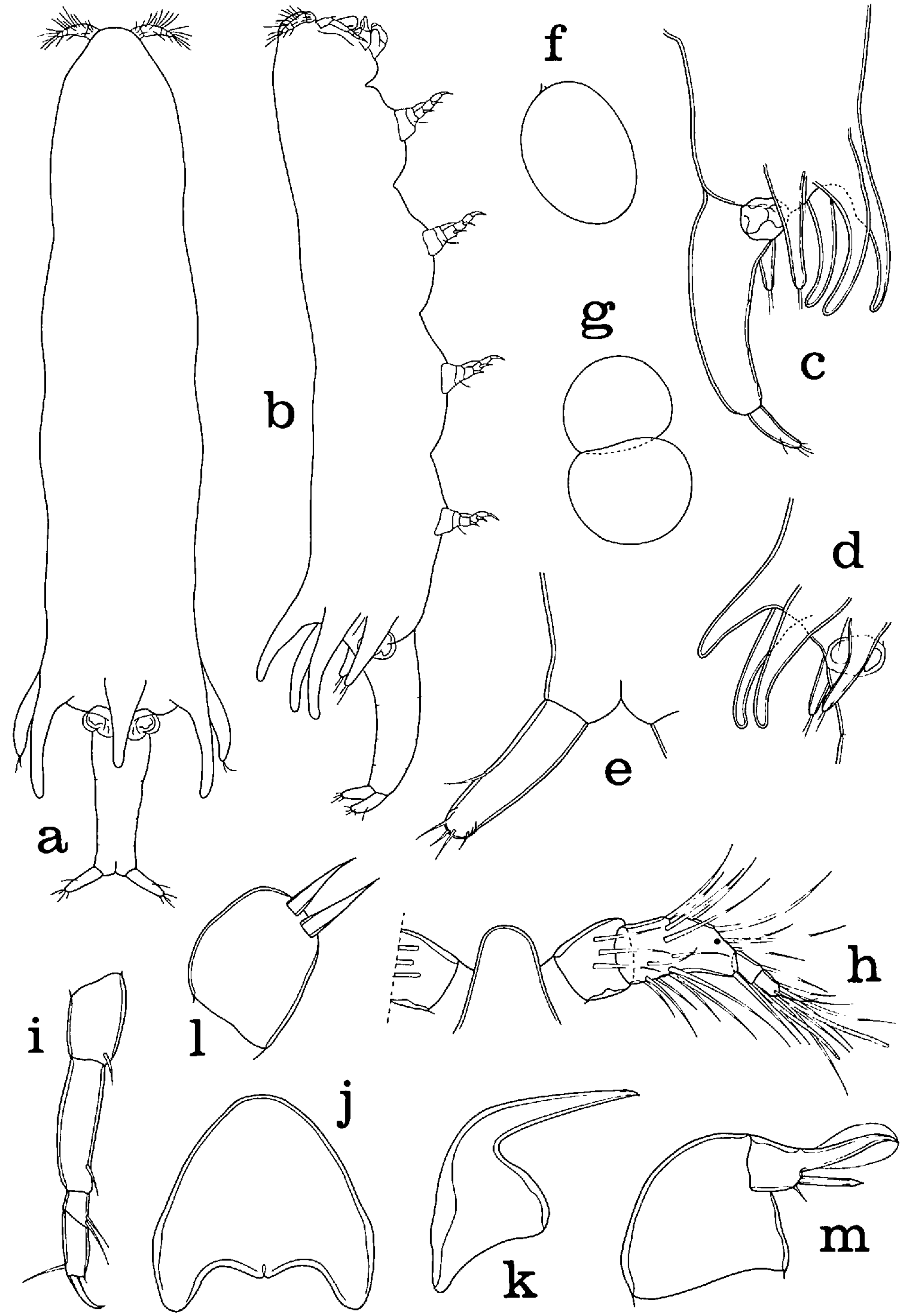


Figure 23. *Xarifia formosa* new species, female: a, dorsal (scale B); b, lateral (B); c, processes and urosome, lateral (H); d, processes and leg 5, lateral (H); e, caudal ramus, dorsal (C); f, g, egg sacs, lateral (H); h, rostrum and first antenna, with dot indicating position of aesthete in male, dorsal (D); i, second antenna, anterior (D); j, labrum, ventral (D); k, mandible, ventral (K); l, first maxilla, anterior (E); m, second maxilla, anterior (F).

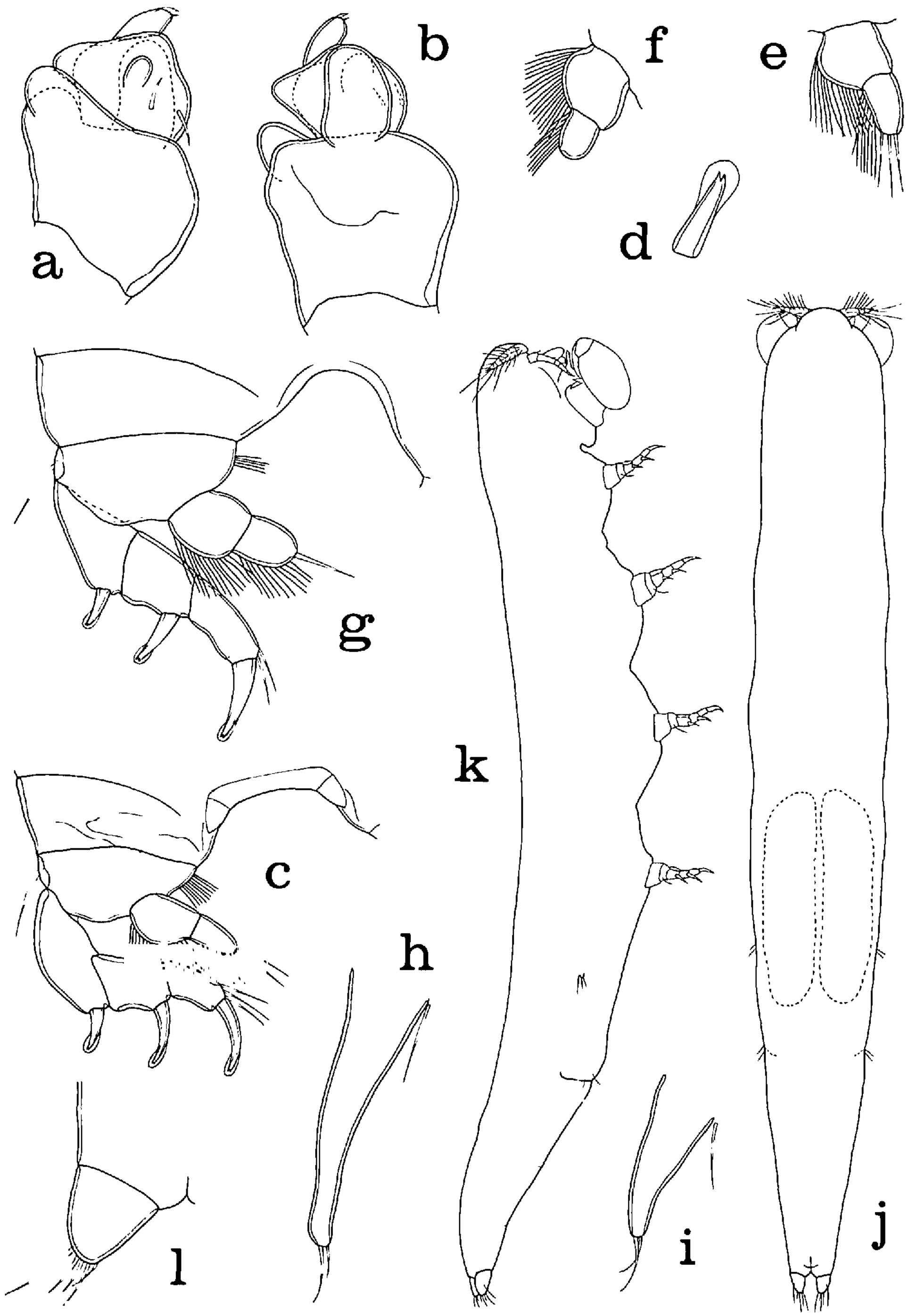


Figure 24. *Xarifia formosa* new species. Female: a, maxilliped, antero-inner (scale F); b, maxilliped, postero-outer (F); c, leg 1 and intercoxal plate, anterior (D); d, spine on first segment of exopod of leg 1, anterior (E); e, endopod of leg 2, posterior (D); f, endopod of leg 3, posterior (D); g, leg 4 and intercoxal plate, posterior (D); h, leg 5, lateral (I); i, leg 5, lateral (I). Male: j, dorsal (B); k, lateral (B); l, caudal ramus, ventral (D).

Female.—Body (Fig. 23a, b) moderately stout, about 5.2 times longer than wide. Length 1.15 mm (1.10–1.19 mm) and greatest width 0.19 mm (0.18–0.21 mm), based on 10 specimens. Region dorsal to fifth legs bearing 3 long posteriorly directed processes (Fig. 23c), middle process often shorter (Fig. 23d) than other 2 processes. Genital and postgenital segments together about 21 percent of body length. Genital areas situated dorsolaterally. Caudal ramus (Fig. 23e) elongate, 55 × 18 μm, ratio 3:1, bearing 5 setae (1 outer lateral seta and 4 terminal setae). Egg sac with 1 egg, 146 × 106 μm (Fig. 23f), or with 2 eggs (Fig. 23g), sac 198 × 127 μm, eggs 101 × 127 μm and 96 × 115 μm.

Rostrum (Fig. 23h) rounded. First antenna (Fig. 23h) short, 56 μm, and 4-segmented. Lengths of segments (measured along posterior side): 11 (20 μm along anterior side), 27, 7, and 6 μm, respectively. Armature: 3, 18, 2 + 1 aesthete, and 7 + 1 aesthete. Second antenna (Fig. 23i) 77 μm without claw, 4-segmented, formula 1, 1, 2, and 1 + I + 1. Terminal claw 8 μm.

Labrum (Fig. 23j) with posteroventral margin indented medially and having rounded outer lateral lobes. Mandible (Fig. 23k) 33 μm, blade smooth. Paragnath a small lobe. First maxilla (Fig. 23l) with 2 setae. Second maxilla (Fig. 23m) 2-segmented, second segment bearing 2 very unequal setae and having long terminal extension with broad hyaline sides. Maxilliped (Fig. 24a, b) 3-segmented. First segment with 2 lobes, 1 antero-inner and 1 postero-outer. Second segment also having 2 lobes, 1 antero-outer and 1 outer, and bearing 2 setae. Small third segment with 2 minute setae.

Legs 1–4 (Fig. 24c, e–g) with 3-segmented exopods and 2-segmented endopods. Spine and setal formula as follows:

P_1	coxa	0-0	basis	1-0	exp	I-0;	I-0;	I,3
					enp	0-0;	2	
P_2	coxa	0-0	basis	1-0	exp	I-0;	I-0;	I,3
					enp	0-0;	3	
P_3	coxa	0-0	basis	1-0	exp	I-0;	I-0;	I,3
					enp	0-0;	0	
P_4	coxa	0-0	basis	1-0	exp	I-0;	I-0;	I,2
					enp	0-0;	1	

Outer spines on exopods of all 4 legs with minutely bifurcate tips surrounded by lamella (Fig. 24d). Both segments of endopods with outer marginal setules; first segment swollen outwardly. Terminal armature of endopods 2, 3, 0, 1.

Leg 5 (Figs. 23c, 24h) shorter than adjacent lateral process, elongate, 122 μm, but in some specimens shorter 112 μm (Fig. 24i). Two terminal setae 29 μm and 18 μm. Adjacent dorsal seta 39 μm.

Color in life in transmitted light opaque gray, intestine reddish brown, eye red, eggs gray.

Male.—Body (Fig. 24j, k) longer than that of female, about 7 times longer than wide. Length 1.32 mm (1.24–1.41 mm) and greatest width 0.18 mm (0.17–0.19 mm), based on 10 specimens. Caudal ramus (Fig. 24l) short, 22 × 20 μm, ratio about 1:1, with setae as in female.

Rostrum as in female. First antenna similar to that of female but 1 aesthete added on second segment (at point indicated by dot in Fig. 23h). Three aesthetes longer than in female, longest 120 μm (30 μm in female), about 2 times length of first antenna. Second antenna as in female.

Labrum, mandible, paragnath, first maxilla, and second maxilla like those in

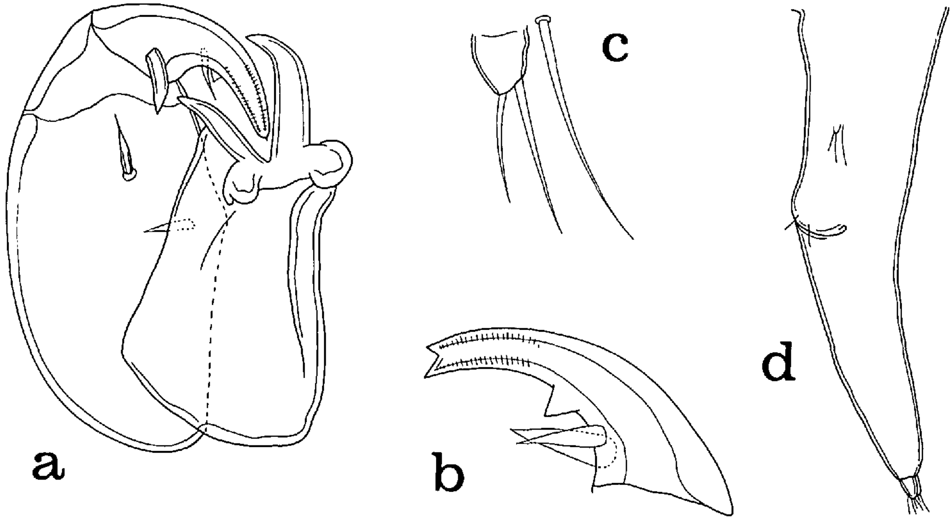


Figure 25. *Xarifia formosa* new species, male: a, maxilliped, inner (scale D); b, claw of maxilliped, outer flat view (F); c, leg 5, lateral (F); d, urosome, with legs 5 and 6, lateral (B).

female. Maxilliped (Fig. 25a) 4-segmented. First segment with 2 prominent anteriorly directed spinelike processes. Second segment with 2 inner setae. Small third segment unarmed. Claw (fourth segment) (Fig. 25b) short, 44 μm, with 2 proximal setae, triangular process on concave surface, and bifurcate tip. Distal third of claw with fine striations.

Legs 1–4 as in female.

Leg 5 (Fig. 25c) with minute free segment 9×8 μm. Two terminal setae 22 μm and 33 μm. Adjacent dorsal seta 40 μm.

Leg 6 (Fig. 25d) represented by 2 setae about 13 μm on posteroventral flap on region of genital segment.

Extruded spermatophore not seen.

Color as in female.

Etymology.—The specific name *formosa,* Latin meaning well formed or handsome, alludes to the well-proportioned body.

Remarks.—*Xarifia formosa* may be distinguished from all congeners except *Xarifia imitans* new species, described below, by its formula of 2, 3, 0, 1 for the terminal armature of the endopods of legs 1–4.

Although the two new species *X. formosa* and *X. imitans* seem to be closely related, there are salient differences between them. The differences are noted in the "Remarks" following the description of *X. imitans.*

Xarifia gerlachi Humes, 1962

Hosts.—*Acropora* "*corymbosa*" (Lamarck), *Acropora cytherea* (Dana), *Acropora florida* (Dana), *Acropora hyacinthus* (Dana), *Acropora* sp., and *Acropora* sp. cf. *A. teres* (Verrill). [*Acropora gravida* (Dana) and *Acropora affinis* (Brook), reported as hosts by Humes and Dojiri (1982), are synonyms of *Acropora florida* (Dana) (Pichon, pers. comm.).]

Localities.—Madagascar, New Caledonia.

Features for Recognition.—Length of female 2.04 mm (1.86–2.40 mm) and male

0.89 mm (0.82–0.96 mm). Ratio of length to width in female about 5:1. Female with 3 short processes (knobs) above fifth legs, middle process shorter than lateral processes. Caudal ramus fused with anal segment. Second antenna 4-segmented, but third and fourth segments indistinctly separated. Legs 1–4 with exopods having outer armature I,I,I and 1-segmented endopods having terminal armature 2, 2, 1, 1. Leg 5 in female with moderately long segment, 55 μm. Leg 5 in male represented by 3 small setae. Eggs in cluster.

Xarifia gibberula new species
Figures 26a–g, 27a–i, 28a–d

Type Material.—24 ♀♀, 10 ♂♂ from *Pocillopora verrucosa* (Ellis and Solander), in 3 m, Bowl Reef, Great Barrier Reef, northeastern Australia, 18°30′00″S, 147°34′00″E, 2 November 1982. Holotype ♀ (USNM 210420), allotype (USNM 210421), and 26 paratypes (19 ♀♀, 7 ♂♂) (USNM 210422) deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C.

Female.—Body (Fig. 26a, b) moderately stout, 5.9 times longer than wide. Length 1.30 mm (1.23–1.38 mm) and greatest width 0.26 mm (0.24–0.28 mm), based on 10 specimens. Greatest dorsoventral thickness of prosome 0.30 mm (0.29–0.31 mm). External segmentation not evident. Region dorsal to fifth pair of legs with 3 long nearly equal processes and 2 small lobes (Fig. 26c). Genital areas located dorsolaterally. Pronounced middorsal protuberance posterior to level of genital areas (on first postgenital segment ?) followed by slight swelling more posteriorly (Fig. 26c). Caudal ramus (Fig. 26d) short, 35 × 25 μm, ratio 1.4:1. With outer lateral seta and 3 terminal setae (innermost very small). Distal end of ramus partly set off from main part of ramus. Egg sac (Fig. 26e) 297 × 286 μm, containing cluster of 6 eggs with diameter of each egg 114–148 μm. Body surface generally smooth but anal segment and caudal rami dorsally with minute papillae (sensilla ?).

Rostrum (Fig. 26f) broadly rounded. First antenna (Fig. 26f) 36 μm long, 3-segmented. Armature: 3, 15 + 1 aesthete, and 4 + 2 aesthetes. Lengths of segments (measured along posterior margin): 7 (18 μm along anterior margin), 13, and 4 μm, respectively. Aesthetes long, 75 μm. Second antenna (Fig. 26g) 54 μm long including claw, and 3-segmented. Armature: 1, 1, 2, and 2 + I + 1. Claw 16 μm.

Labrum (Fig. 27a) with posteroventral margin not indented medially and having small lateral lobes. Mandible (Fig. 27b) 30 μm, blade bispinulate. Paragnath a small smooth lobe. First maxilla (Fig. 27c) with 2 setae. Second maxilla (Fig. 27d) 2-segmented, first segment unarmed, second segment with 1 small inner seta, 2 small obscure knobs, and rounded hyaline tip. Maxilliped (Fig. 27e) 3-segmented. First segment unarmed. Second segment with 2 small inner setae. Small third segment with minute spiniform tip.

Legs 1–4 (Fig. 27f–h) with 3-segmented exopods and 1-segmented endopods. Spine and setal formula as follows:

P_{1+2}	coxa	0-0	basis	1-0	exp	I-0;	1-0;	I,2
					enp	3		
P_{3+4}	coxa	0-0	basis	1-0	exp	I-0;	1-0;	I,1
					enp	1		

In all 4 legs inner margin of basis smooth. First and third segments of exopods bearing long recurved spines, but second segment having slender seta. Endopods ovoid (Fig. 27g). Formula for terminal armature of endopods 3, 3, 1, 1.

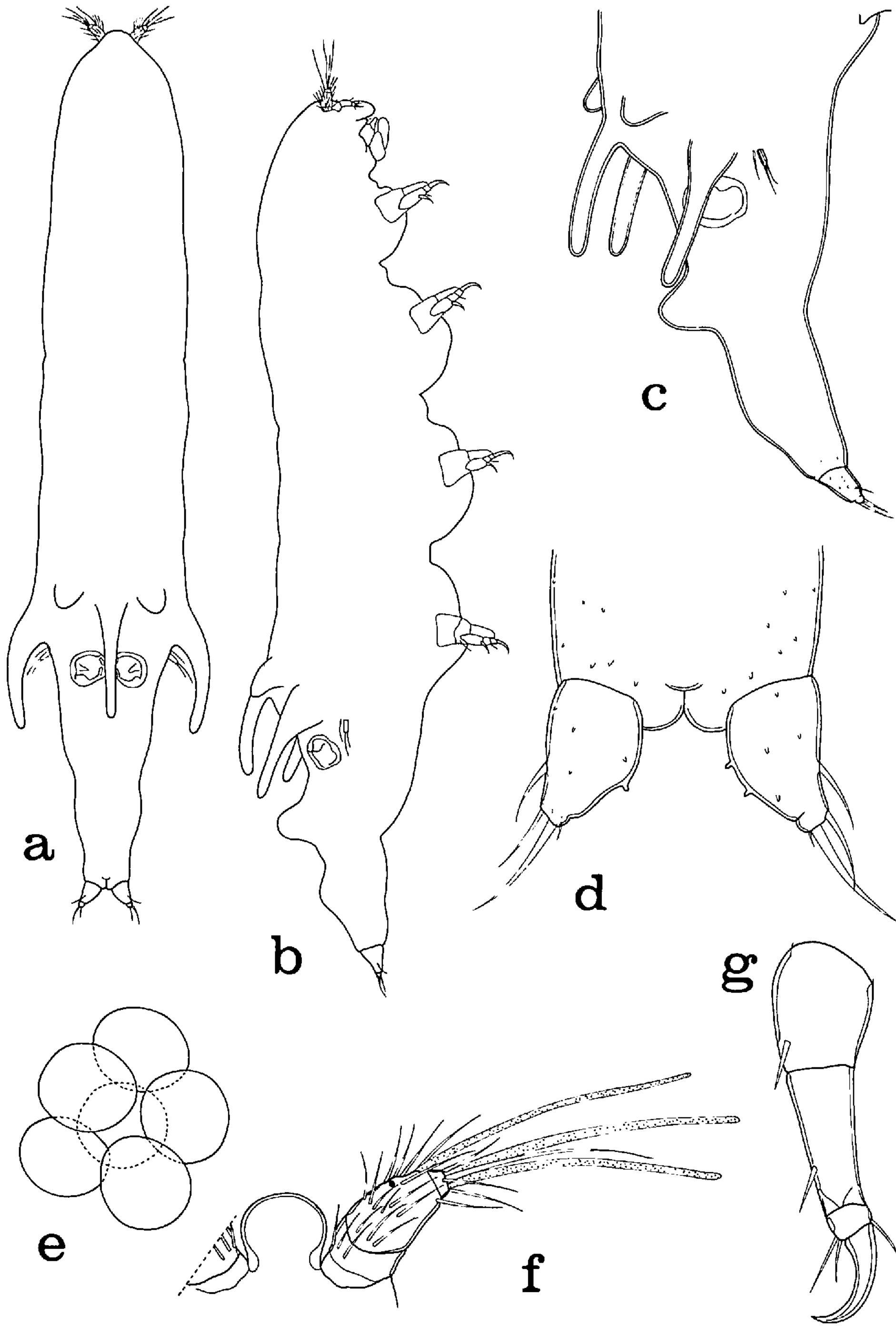


Figure 26. *Xarifia gibberula* new species, female: a, dorsal (scale B); b, lateral (B); c, processes and urosome, lateral (H); d, caudal rami, dorsal (D); e, egg sac, lateral (B); f, rostrum and first antenna, with dot indicating position of aesthete in male, dorsal (D); g, second antenna, dorsal (F).

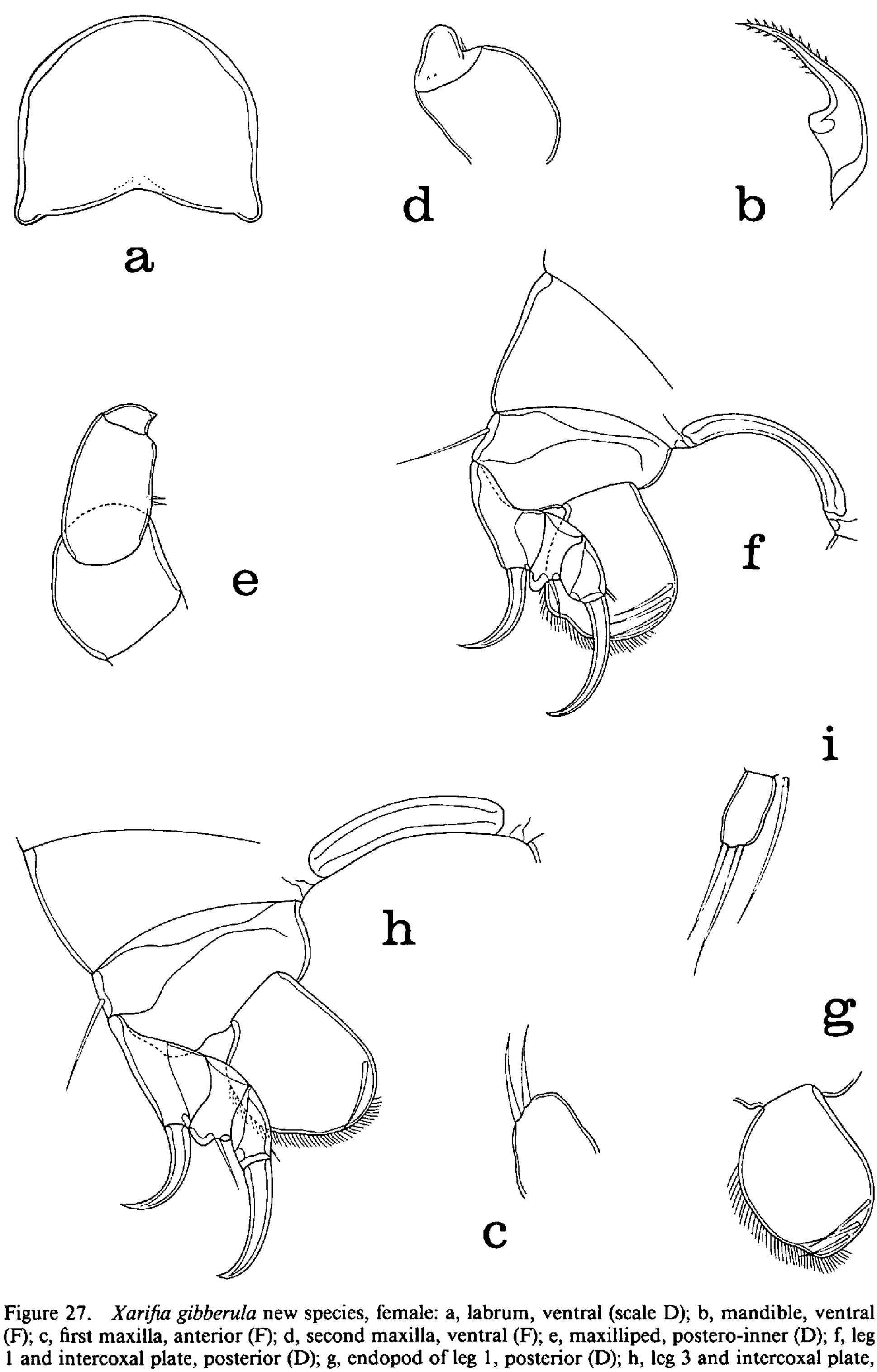


Figure 27. *Xarifia gibberula* new species, female: a, labrum, ventral (scale D); b, mandible, ventral (F); c, first maxilla, anterior (F); d, second maxilla, ventral (F); e, maxilliped, postero-inner (D); f, leg 1 and intercoxal plate, posterior (D); g, endopod of leg 1, posterior (D); h, leg 3 and intercoxal plate, posterior (D); i, leg 5, lateral (D).

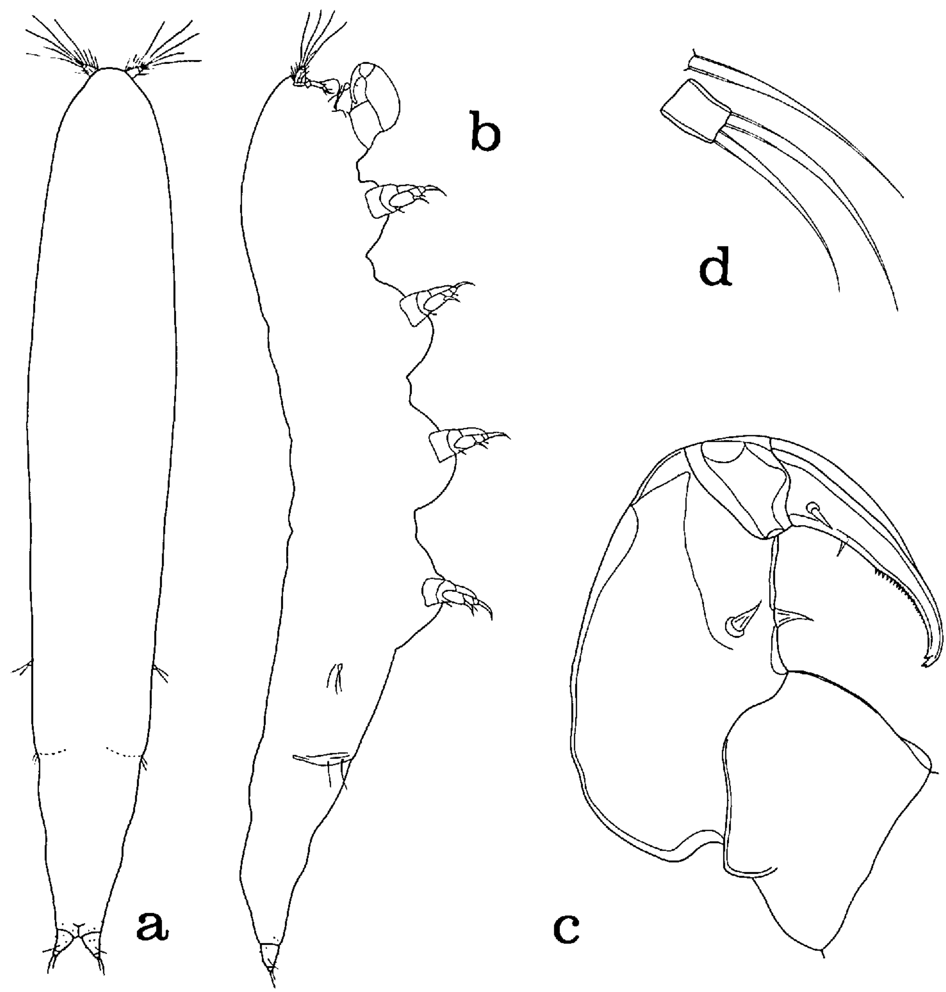


Figure 28. *Xarifia gibberula* new species, male: a, dorsal (scale B), b, lateral (B); c, maxilliped, inner (D); d, leg 5, lateral (F).

Leg 5 (Fig. 27i) with small free segments 18 × 8 μm, ratio 2.25:1, bearing 2 terminal setae. With adjacent dorsal seta.

Color of living specimens in transmitted light opaque gray, eye red, eggs dull orange.

Male.—Body (Fig. 28a, b) more slender than female, 6.1 times longer than wide. Length 1.26 mm (1.23–1.32 mm) and greatest width 0.18 mm (0.17–0.19 mm), based on 9 specimens. Caudal ramus similar to that of female.

Rostrum as in female. First antenna resembling that of female, but 1 aesthete added on second segment (at location shown by dot in Fig. 26f). Aesthetes longer in relation to length of appendage than in female, 112 μm (antenna 38 μm). Second antenna as in female.

Labrum, mandible, paragnath, and first maxilla like those of female. Second maxilla similar to that of female but 2 small knobs on second segment more prominent. Maxilliped (Fig. 28c) 4-segmented. First and third segments unarmed. Second segment with 2 inner setae. Claw (fourth segment) 60 μm long and bearing 2 small proximal setae; distal concave margin of claw with row of spinules; proximal outer margin with membrane; tip of claw minutely trifurcate.

Legs 1–4 as in female.

Leg 5 (Fig. 28d) with minute free segment 8 × 5.5 μm, ratio 1.45:1.

Leg 6 (Fig. 28b) represented by 2 slender setae on posteroventral flap on genital segment.

Spermatophore not seen.

Color resembling that of female.

Etymology.—The specific name *gibberula*, Latin *gibber*, humped, and the diminutive suffix *-ulus*, alludes to the middorsal hump on the urosome of the female.

Remarks.—*Xarifia gibberula* may be recognized by the middorsal protuberance on the urosome of the female. No other member of the genus shows this feature.

Xarifia gracilipes Humes and Dojiri, 1983

Host.—*Euphyllia glabrescens* (Chamisso and Eysenhardt).

Locality.—Moluccas (Poelau Gomumu, south of Obi).

Features for Recognition.—Length of female 2.09 mm (1.86–2.16 mm) and male 1.85 mm (1.59–2.16 mm). Ratio of length to width in female about 6.3:1. Female with 3 long processes above fifth legs, middle process slightly shorter than lateral processes. Caudal ramus elongate in both sexes. Second antenna 4-segmented. Legs 1–4 with exopods having outer armature I,I,I and 2-segmented endopods having terminal armature 2, 2, 1, 1. Rami of all 4 legs elongate and slender. Leg 5 in female with elongate segment, 345 μm. Leg 5 in male with small segment, 10–12 μm. Eggs in cluster.

Xarifia gradata Humes and Dojiri, 1983

Host.—*Physogyra* sp.

Locality.—Madagascar.

Features for Recognition.—Length of female 1.30 mm (1.26–1.33 mm) and male 1.20 mm. Ratio of length to width of female about 6.7:1. Female with 3 long processes above fifth legs, middle process slightly shorter than lateral processes. Caudal ramus elongate in both sexes. Second antenna 4-segmented. Legs 1–4 with exopods having outer armature I,I,I and 2-segmented endopods having terminal armature 2, 1, 1, 1. Leg 5 in female with elongate segment, 124 μm. Leg 5 in male consisting of 3 small setae.

Xarifia guttulifera Humes and Dojiri, 1982

Host.—*Acropora palifera* (Lamarck) forma *alpha* (Brook).

Locality.—New Caledonia.

Features for Recognition.—Length of female 2.44 mm (2.42–2.46 mm) and male 1.51 mm (1.43–1.59 mm). Ratio of length to width of female 9.2:1. Female with 3 short drop-shaped processes above fifth legs. Caudal ramus fused with anal segment. First and second segments of 4-segmented second antenna unarmed. Legs 1–4 with exopods having outer armature I,I,I and 1-segmented endopods having terminal armature 3, 3, 0, 0. Leg 5 in female with elongate oval segment, 41–42 μm, of variable form. Leg 5 in male represented by 3 small setae.

Xarifia hadra Humes and Dojiri, 1983

Host.—*Goniopora tenuidens* (Quelch) and *Goniopora pedunculata* Quoy and Gaimard.

Locality.—Moluccas (Halmahera).

Features for Recognition.—Length of female 1.69 mm (1.66–1.79 mm) and male 1.77 mm (1.66–1.86 mm). Ratio of length to width of female about 4.5:1. Female with 3 long nearly equal processes above fifth legs. Caudal ramus elongate in both sexes. Urosome abbreviated. Second antenna 4-segmented. Legs 1–4 with exopods having outer armature I,I,I and 1-segmented endopods having terminal armature 2, 2, 0, 0. Leg 5 in female elongate, 345 μm, longer than processes. Leg 5 in male represented by 3 small setae. Eggs in cluster.

Xarifia hamata Humes and Ho, 1968

Host.—*Turbinaria* sp. (near *T. elegans* Bernard).

Locality.—Madagascar.

Features for Recognition.—Length of female 1.38 mm (1.29–1.42 mm) and male 1.28 mm (1.15–1.56 mm). Ratio of length to width of female about 6.3:1. Female with 3 long nearly equal processes above fifth legs. Caudal ramus small and not clearly delimited from anal segment. Second antenna 4-segmented. Legs 1–4 with exopods having outer armature I,1,I and 2-segmented endopods of these legs having terminal armature 2, (1,I), I, I. Terminal segment of endopod of leg 2 with seta and clawlike spine. Leg 5 in female with moderately long segment, 58 μm. Leg 5 in male represented by 3 small setae. Eggs in cluster.

Xarifia heteromeles Humes and Dojiri, 1982

Previously Known Host.—*Montipora* sp. cf. *M. undata* Bernard.

New Host.—53 ♀♀, 28 ♂♂ from *Montipora composita* Crossland, in 2 m, Mermaid Cove, Lizard Island, Great Barrier Reef, northeastern Australia, 14°39′50″S, 145°27′00″E, 27 October 1982.

Localities.—Ceram, Great Barrier Reef (Lizard Island).

Features for Recognition.—Length of female 0.96 mm (0.94–0.98 mm) and male 0.96 mm (0.90–1.00 mm). Ratio of length to width of female about 7.6:1. Female with 3 long nearly equal processes above fifth legs. Caudal ramus elongate in female, but fused with anal segment in male. Second antenna 3-segmented. Legs 1–4 with exopods having outer armature I,I,I and 1-segmented endopods with terminal armature 1, 1, 0, 0, but endopod of leg 1 in male having 2 setae. Leg 5 in female with long segment, 68 μm. Leg 5 in male represented by 2 small setae.

Xarifia imitans new species
Figures 29a–j, 30a–d

Type Material.—560 ♀♀, 417 ♂♂ from *Psammocora digitata* Milne Edwards and Haime, in 4 m, west of Isle Mando, near Noumea, New Caledonia, 22°18′59″S, 166°09′30″E, 1 July 1971. Holotype ♀ (USNM 210377), allotype (USNM 210378), and 968 paratypes (555 ♀♀, 413 ♂♂) (USNM 210379) deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C.

Other Specimens.—From *Psammocora digitata*: 18 ♀♀, 9 ♂♂ in 3 m, reef between Isle Ndie and Mt. Kumuru, Baie Dumbea, near Noumea, New Caledonia, 22°13′40″S, 166°24′18″E, 9 July 1971; 21 ♂♂

in 4 m, south of Parry Island, Enewetak Atoll, Marshall Islands, 9 July 1969. From *Psammocora contigua* (Esper): 19 ♀♀, 5 ♂♂ in 2 m, 1 km south of Isle Noumba, Baie Dumbea, near Noumea, New Caledonia, 22°12′16″S, 166°24′52″E, 9 July 1971.

Female.—Body (Fig. 29a, b) moderately slender, about 6.6 times longer than wide. Length 0.97 mm (0.94–1.01 mm) and greatest width 0.16 mm (0.14–0.018 mm), based on 10 specimens. Region dorsal to fifth legs having 3 long posteriorly directed processes (Fig. 19c), middle process usually a little shorter than lateral processes. Genital and postgenital segments together about 18 percent of body length. Genital areas located dorsally. Sides of genital segment with small sclerotized lobe (Fig. 29c, d). Caudal ramus (Fig. 29e) 33 × 19 μm, ratio 1.74:1, bearing 1 outer lateral seta and 4 terminal setae. Egg sac (seen on only 1 female) containing single egg 135 × 99 μm (Fig. 29c).

Rostrum (Fig. 29f) rounded. First antenna (Fig. 29f) short, 48 μm, and 4-segmented. Lengths of segments (measured along posterior side): 7 (20 μm along anterior side), 21, 6, and 7 μm, respectively. Armature: 3, 15, 2 + 1 aesthete, and 7 + 1 aesthete. Second antenna 69 μm, claw 10 μm, resembling that of *Xarifia formosa.*

Labrum, mandible, paragnath, first maxilla, and second maxilla like those of *X. formosa.* Maxilliped (Fig. 29g, h) 3-segmented. First segment with large outer lobe. Second segment with outer lobe and 2 inner setae, 1 seta slender and other seta very stout. Small third segment bearing short terminal seta.

Legs 1–5 as in *X. formosa,* with same spine and setal formula.

Color as in *X. formosa* new species, described above.

Male.—Body (Fig. 29i, j) slender, 9.2 times longer than wide. Length 1.05 mm (0.96–1.12 mm) and greatest width 0.12 mm (0.11–0.13 mm), based on 10 specimens. Caudal ramus (Fig. 30a) short, 20 × 19 μm, ratio about 1:1, with setae as in female.

Rostrum as in female. First antenna similar to that of female but 1 aesthete added on second segment (at location indicated by dot in Fig. 29f); 3 aesthetes longer than those in female, as in *X. formosa.* Second antenna, labrum, mandible, paragnath, first maxilla, and second maxilla like those in *X. formosa.* Maxilliped (Fig. 30b) 4-segmented. First segment with 2 anterior processes, 1 spiniform, other broad and bladelike with obliquely truncate tip. Second segment with 2 inner setae. Small third segment unarmed. Claw (fourth segment) 58 μm, longer than in *X. formosa,* having slight swelling on concave margin, and with 2 proximal setae and bifurcate tip.

Legs 1–4 as in *X. formosa.*

Leg 5 (Fig. 30c) with minute free segment 5 × 6 μm and usual 3 setae.

Leg 6 (Fig. 30c) resembling that of *X. formosa.*

Extruded spermatophore not seen. Spermatophore within body of male elongate (Fig. 30d).

Color as in *X. formosa.*

Etymology.—The specific name *imitans,* Latin meaning imitating or resembling, refers to the many similarities of this species with *Xarifia formosa.*

Remarks.—Casual observation of a collection of *Xarifia* from *Psammocora digitata* failed to reveal the presence of two species rather than one. It was only after measurements of the body were made and dissections studied that distinctions between *X. formosa* and *X. imitans* became apparent. With such differences in mind it was possible to separate specimens of these two species that had been cleared in lactic acid.

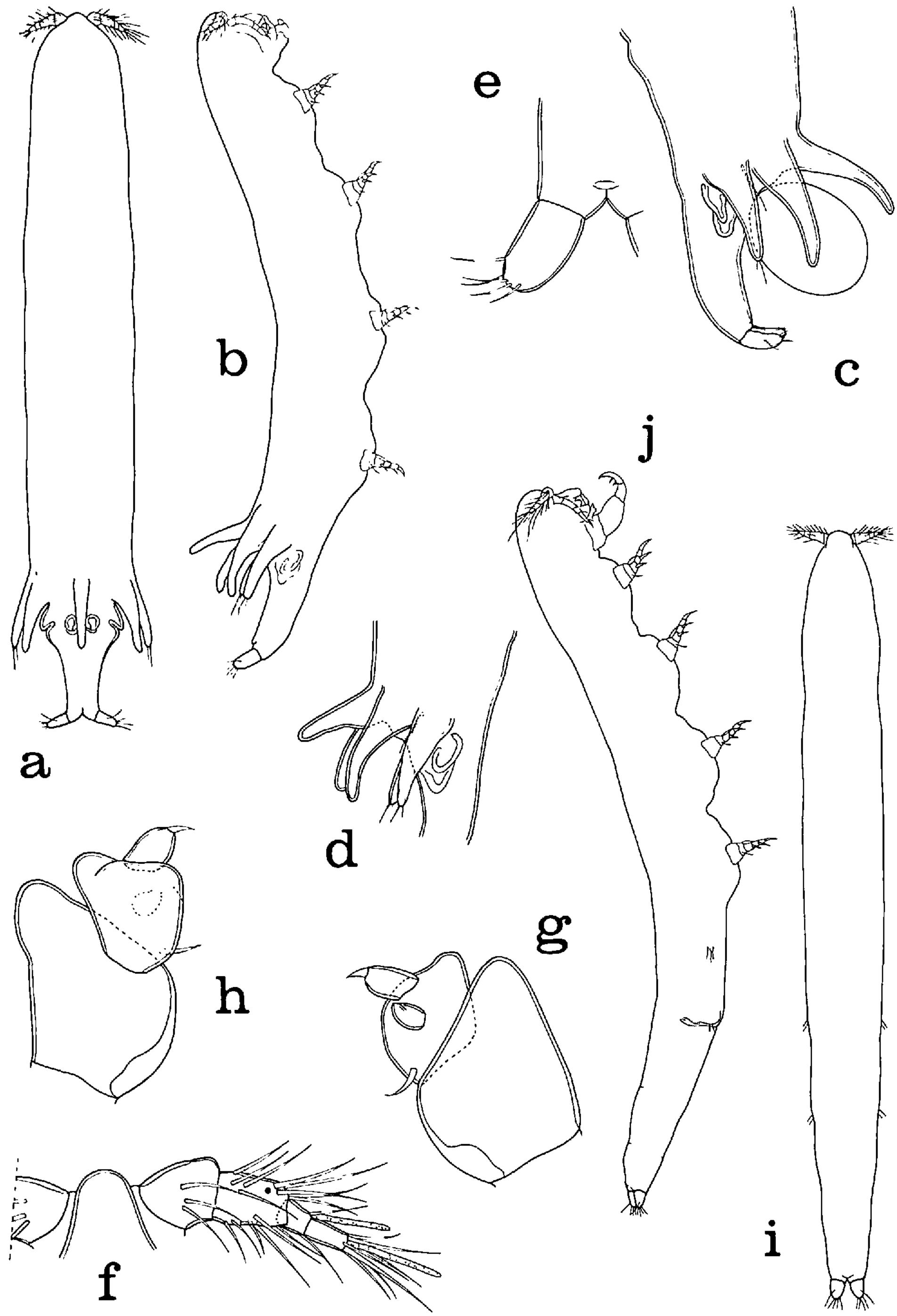


Figure 29. *Xarifia imitans* new species. Female: a, dorsal (scale B); b, lateral (B); c, processes and urosome, lateral (H); d, processes and leg 5, lateral (H); e, caudal ramus, dorsal (C); f, rostrum and first antenna, with dot indicating position of aesthete in male, dorsal (D); g, maxilliped, antero-inner (F); h, maxilliped, postero-outer (F). Male: i, dorsal (B); j, lateral (B).

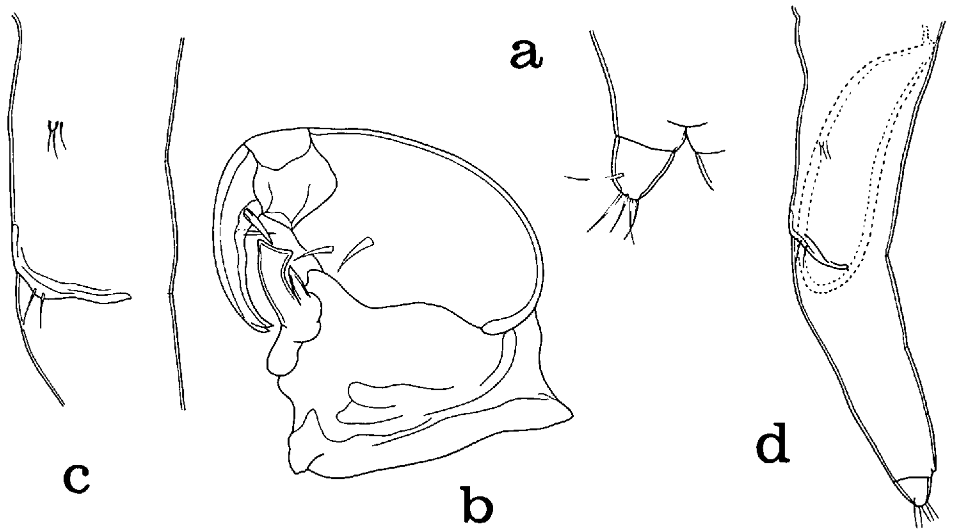


Figure 30. *Xarifia imitans* new species, male: a, caudal ramus, dorsal (scale C); b, maxilliped, inner (C); c, legs 5 and 6, lateral (J); d, urosome, lateral (H).

The salient differences between *X. imitans* and *X. formosa* are shown in Table 1. Like *X. formosa* the new species may be distinguished from all congeners by the formula 2, 3, 0, 1 for the terminal armature of the endopods of legs 1–4.

The two species of *Xarifia* from *Psammocora digitata* described here are remarkably similar in certain respects. They have similar body form, mouthparts (except maxillipeds), legs 1–4, and leg 5. They thus are apparently closely related, and perhaps have evolved together in this coral host.

Xarifia imparilis new species
Figures 31a–m, 32a–o

Type Material.—38 ♀♀, 21 ♂♂ from 1 colony (diameter 16 cm) of *Pocillopora damicornis* (Linnaeus), var. *caespitosa* Dana, in 1 m, Rocher à la Voile, Noumea, New Caledonia, 22°18′24″S, 166°25′50″E, 15 June 1971. Holotype ♀ (USNM 210341), allotype (USNM 210342), and 51 paratypes (33 ♀♀, 18 ♂♂) (USNM 210343) deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C.

Other Specimens.—From *Pocillopora damicornis,* var. *caespitosa*: 12 ♀♀, 4 ♂♂ in 1.5 m, Rocher à la Voile, Noumea, New Caledonia, 19 June 1971; 1 ♂ in 1 m, same locality, 15 June 1971. From *Pocillopora eydouxi* Milne Edwards and Haime: 1 ♀ in 3 m, west of Enewetak Island, Enewetak Atoll, Marshall Islands, 17 July 1969. From *Pocillopora verrucosa* (Ellis and Solander): 1 ♀, 2 ♂♂ in 2 m, Big Broadhurst Reef, Great Barrier Reef, northeastern Australia, 18°58′03″S, 147°45′04″E, 1 November 1982.

Female.—Body (Fig. 31a, b) moderately stout, about 5.35 times longer than wide. Length 1.47 mm (1.36–1.57 mm) and greatest width 0.29 mm (0.26–0.32 mm), based on 10 specimens. Greatest dorsoventral thickness 0.33 mm. Region dorsal to fifth legs with 3 posteriorly directed processes, middle process much shorter than lateral processes (Fig. 31c–e). Shape of middle process usually as in Figure 31c, but in few females shorter as in Figure 31d. Sclerotization around genital opening including prominent dorsoventral bar (Fig. 31e). Genital and postgenital segments together comprising 29.5 percent of body length. Caudal ramus (Fig.

Table 1. Distinctions between *Xarifia imitans* and *Xarifia formosa*

	Xarifia imitans	*Xarifia formosa*
Female		
Length of body	0.97 mm (0.94–1.01 mm), ratio 6.6:1	1.15 mm (1.10–1.19 mm), ratio 5.2:1
Caudal ramus	33 × 19 μm, 1.74:1	55 × 18 μm, 3:1
First and second segments of maxilliped	each with only 1 lobe	each with 2 lobes
Genital segment	with small sclerotized lateral lobes	without such lobes
Male		
Length of body	1.05 mm (0.96–1.12 mm), ratio 9.2:1	1.32 mm (1.24–1.41 mm), ratio 7:1
Two processes on first segment of maxilliped	1 spiniform, other blade-like with obliquely truncate tip	both spiniform
Claw of maxilliped	58 μm, with slight swelling on concave margin	44 μm, with triangular process on concave margin

31f) 57 × 31 μm, including terminal appendix 10 μm long; caudal ramus not completely set off from anal segment. Ratio 1.8:1. Bearing 3 naked setae, 1 lateral, 1 subterminal 11 μm, and 1 terminal 27 μm. Egg sac (Fig. 31g) 340 × 220 μm, containing usually 6 eggs (3–7) with diameter about 127 μm.

Rostrum (Fig. 31h) broadly rounded. First antenna (Fig. 31i) short, 48 μm, 3-segmented (though separation of second and third segments not always clear). Lengths of segments (measured along posterior side): 10, 20, and 5 μm, respectively. Armature: 3, 15 + 1 aesthete, and 7 + 1 aesthete. Second antenna (Fig. 31j) 3-segmented, 69 μm long without claw. Armature: 1, 1, and 1 + I + 2. Claw (Fig. 31k) 28 μm.

Labrum (Fig. 31l) with slightly concave posteroventral margin without median indentation, and lateral lobes weakly developed. Mandible (Fig. 31m) 34 μm, bilaterally spinulate. Paragnath a small lobe. First maxilla (Fig. 32a) with 2 unequal setae. Second maxilla (Fig. 32b) lobate, probably 2-segmented, with 2 minute spinules distally on first segment. Maxilliped (Fig. 32c) 3-segmented, first segment unarmed, second segment with 2 setae, and small third segment with 1 small seta and 1 lobelike process.

Legs 1–4 (Fig. 32d, f) with 3-segmented exopods and 1-segmented endopods. Spine and setal formula as follows:

P_{1+2}	coxa	0-0	basis	1-0	exp	I-0;	1-0;	I,1
					enp	3		
P_{3+4}	coxa	0-0	basis	1-0	exp	I-0;	1-0;	I,1
					enp	1		

Shape of intercoxal plate different in leg 1 (Fig. 32d) than in succeeding legs (Fig. 32e). Exopods very similar in all legs. Seta on second segment of exopods very small, 6 μm long. Terminal armature of endopods 3, 3, 1, 1. Endopod of leg 3 usually with 1 seta, but in 1 female this pair of legs with 2 setae on right endopod and 1 seta on left endopod (Fig. 32f).

Leg 5 (Fig. 32g–i) elongate, somewhat variable in form. Dimensions in Figure 32g about 44 × 15 μm, ratio 3:1, with 2 terminal setae 29 μm and 23 μm.

Color in life in transmitted light opaque gray, eye red, egg sacs gray.

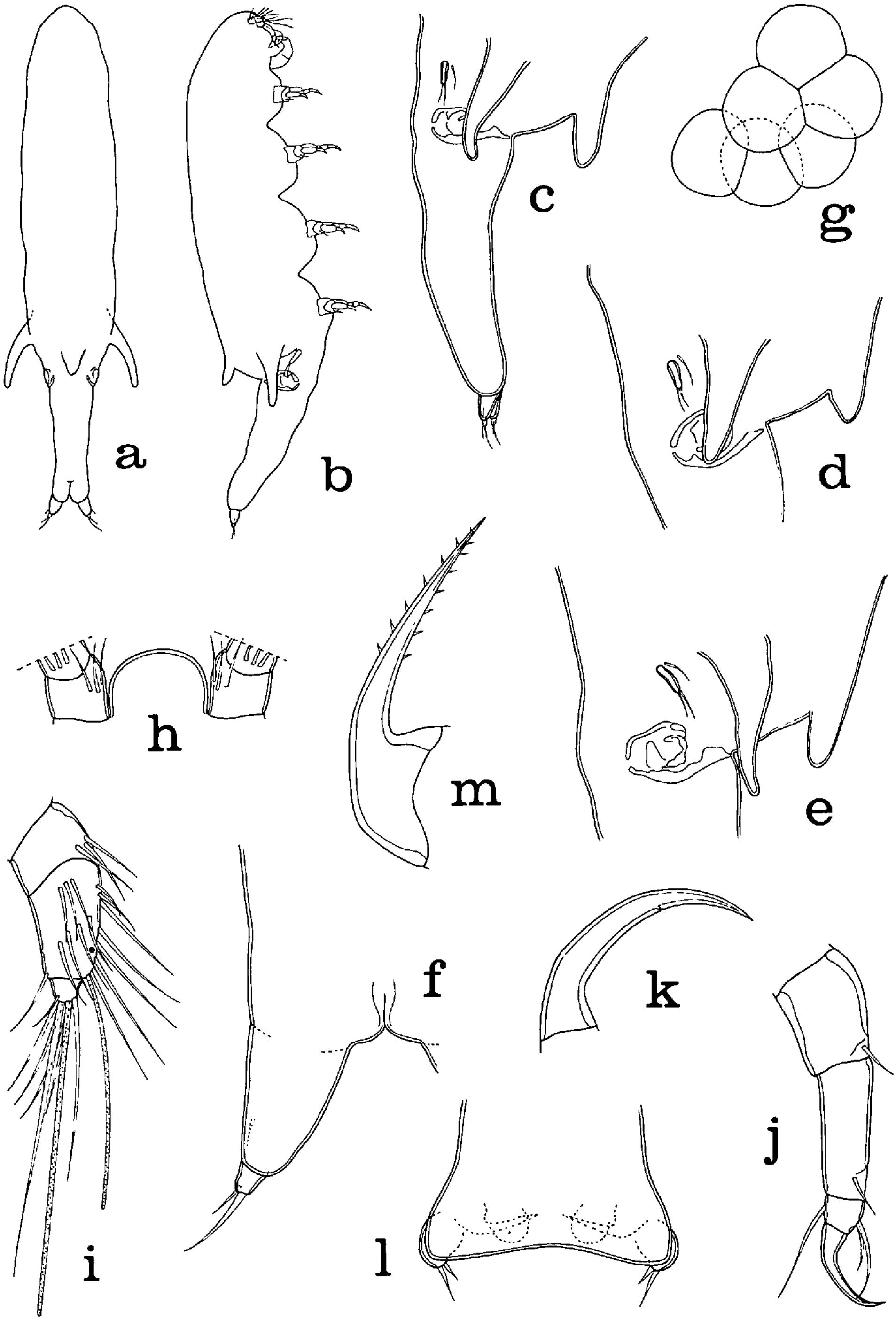


Figure 31. *Xarifia imparilis* new species, female: a, dorsal (scale A); b, lateral (A); c, processes and urosome, lateral (B); d, processes and leg 5, lateral (H); e, processes and leg 5, lateral (H); f, caudal ramus, dorsal (C); g, egg sac, lateral (B); h, rostrum, dorsal (C); i, first antenna, with dot indicating position of aesthete in male, dorsal (D); j, second antenna, anterior (D); k, claw of second antenna, anterior (E); l, labrum, with position of mandibles, paragnaths, and first maxillae indicated by broken lines, ventral (C); m, mandible, ventral (E).

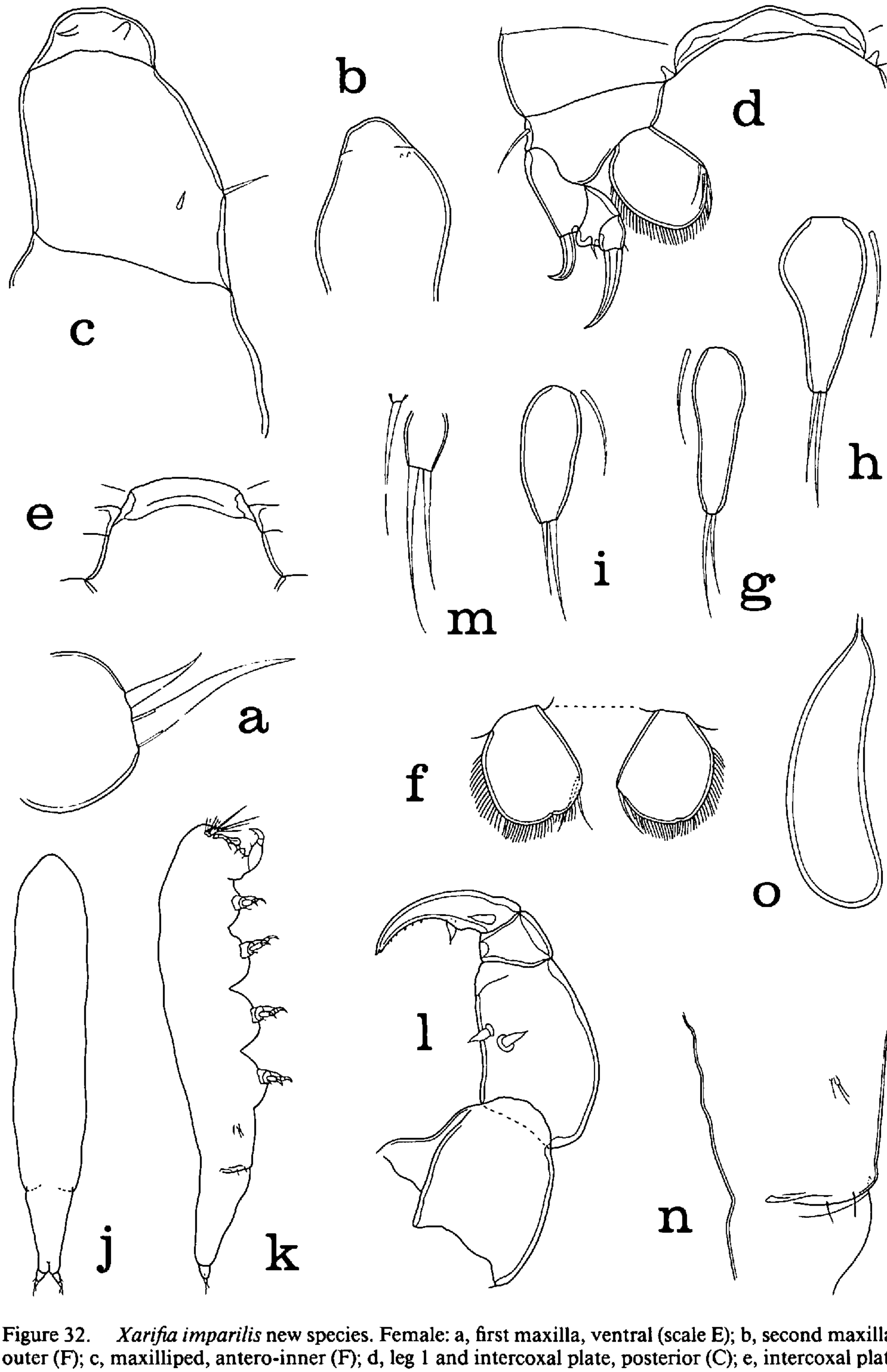


Figure 32. *Xarifia imparilis* new species. Female: a, first maxilla, ventral (scale E); b, second maxilla, outer (F); c, maxilliped, antero-inner (F); d, leg 1 and intercoxal plate, posterior (C); e, intercoxal plate of leg 2, posterior (C); f, pair of endopods of leg 3, anterior (C); g, leg 5, lateral (D); h, leg 5, lateral (D); i, leg 5, lateral (D). Male: j, dorsal (A); k, lateral (A); l, maxilliped, inner (C); m, leg 5, lateral (F); n, legs 5 and 6, lateral (H); o, spermatophore, attached to female, lateral (H).

Male.—Body (Fig. 32j, k) not as stout as in female, about 5.9 times longer than wide. Length 1.34 mm (1.29–1.38 mm) and greatest width 0.22 mm (0.20–0.23 mm), based on 10 specimens. Caudal ramus similar to that of female but slightly shorter, 48 μm long.

Rostrum like that of female. First antenna resembling that of female but 1 aesthete added on second segment (at point indicated by dot in Fig. 31i). Second antenna as in female.

Labrum, mandible, paragnath, first maxilla, and second maxilla like those of female. Maxilliped (Fig. 32l) 4-segmented. First segment unarmed. Second segment with 2 stout hyaline inner setae. Small third segment unarmed. Claw (fourth segment) 56 μm long, bearing 2 proximal hyaline setae; concave margin with slight swelling proximally and row of minute denticles distally.

Legs 1–4 as in female.

Leg 5 (Fig. 32m) with small segment 10 × 7 μm bearing 2 terminal setae 23 μm and 18 μm; dorsal seta, 21 μm, arising on a minute pedicel.

Leg 6 (Fig. 32n) consisting of 2 setae on posteroventral flap on genital segment.

Spermatophore (Fig. 32o) elongate, 286 × 83 μm without neck, ratio 3.4:1.

Color as in female.

Etymology.—The specific name *imparilis,* Latin meaning unequal or unlike, alludes to the middle process on the region dorsal to the fifth legs in the female being very unlike the two lateral processes and to the very small seta instead of a spine on the second segment of the exopod of legs 1–4.

Remarks.—*Xarifia imparilis* belongs to the group of more than 20 species of *Xarifia* having the formula 3, 3, 1, 1 for the terminal armature of the endopods of legs 1–4. Eight of these species (*X. breviramea* Humes and Dojiri, 1982, *X. maldivensis* Humes, 1962, *X. obesa* Humes and Ho, 1968, and five new species described in this review, *X. gibberula, X. quinaria, X. tenta, X. umbonata,* and *X. varilabrata*) have, as in the new species, a 3-segmented second antenna and 1-segmented endopods in legs 1–4. In the females of these, however, the processes dorsal to the fifth legs are arranged as: 2 processes, 3 long processes of nearly equal length, or 3 processes plus 2 knobs, thus distinguishing them from *X. imparilis.*

Xarifia infrequens Humes, 1962

Previously Known Hosts.—*Acropora "corymbosa"* (Lamarck) and *Acropora cytherea* (Dana).

New Hosts.—7 ♀♀, 5 ♂♂ from *Acropora hyacinthus* (Dana), in 2 m, Mermaid Cove, Lizard Island, Great Barrier Reef, northeastern Australia, 14°39′50″S, 145°27′00″E, 26 October 1982; 1 ♀ from *Acropora formosa* (Dana), in 2 m, same locality, 26 October 1982.

Localities.—Madagascar, Great Barrier Reef (Lizard Island).

Note.—The egg sac in a female from *Acropora hyacinthus* at Lizard Island contained two elongate eggs linearly arranged and both approximately 187 × 94 μm.

Features for Recognition.—Length of female 1.54 and male 1.27 mm. Ratio of length to width of female about 10:1. Female with 3 long processes above fifth legs, middle process about twice as long as other two processes. Caudal ramus elongate in both sexes. Second antenna 4-segmented, but third and fourth segments indistinctly separated. Legs 1–4 with exopods having outer armature I,0,I and 1-segmented endopods having terminal armature 0, 0, 0, 0. Leg 5 in female moderately long, 47 μm. Leg 5 in male represented by 2 small setae.

Xarifia jugalis new species
Figures 33a–n, 34a–j, 35a–c

Type Material.—40 ♀♀, 111 ♂♂ from 1 colony (diameter 16 cm) of *Pocillopora damicornis* (Linnaeus), var. *caespitosa* Dana, in 1 m, Rocher à la Voile, Noumea, New Caledonia, 22°18′24″S, 166°25′50″E, 25 June 1971. Holotype ♀ (USNM 210326), allotype (USNM 210327), and 144 paratypes (36 ♀♀, 108 ♂♂) (USNM 210328) deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C.

Other Specimens.—From *Pocillopora damicornis*, var. *caespitosa*: 2 ♀♀ in 1.5 m, Rocher à la Voile, Noumea, New Caledonia, 19 June 1971; 1 ♀, 1 ♂ in 1 m, same locality, 15 June 1971. From *Pocillopora damicornis* (Linnaeus): 17 ♀♀, 9 ♂♂ in 3 m, Karang Mie, eastern central Halmahera, Moluccas, 00°20′07″N, 128°25′00″E, 19 May 1975. From *Pocillopora eydouxi* Milne Edwards and Haime: 7 ♀♀, 6 ♂♂ in 3 m, Karang Mie, Halmahera, 19 May 1975.

Female.—Body (Fig. 33a, b) somewhat slender, about 5.6 times longer than wide. Length 1.32 mm (1.28–1.36 mm) and greatest width 0.24 mm (0.22–0.25 mm), based on 10 specimens. Greatest dorsoventral thickness 0.27 mm. Region dorsal to fifth legs with 3 long posteriorly directed processes of nearly equal length (Fig. 33c–e). Genital and postgenital segments together comprising about 28 percent of body length. Caudal ramus (Fig. 33f) 60 × 26 μm in greatest dimensions, ratio 2.3:1, bearing 5 smooth setae, 1 lateral and 4 terminal, and ornamented with several setules. Egg sac (Fig. 33g–i) with 1–5 linearly arranged eggs. Dimensions in Figure 33g 308 × 143 μm, in Figure 33h 363 × 157 μm, and in Figure 33i 430 × 148 μm. Only 2 females seen with single egg in egg sac on both sides. Usually females with 4 or 5 eggs.

Rostrum (Fig. 33j) broadly rounded with slight median indentation and bearing numerous slender setules. First antenna (Fig. 33k) short, 51 μm, 3-segmented (though second segment showing partial subdivision). Lengths of segments (measured along posterior side): 11, 17, and 14 μm, respectively. Armature: 3, 18, and 9 + 2 aesthetes (fusion of 2 segments having 2 + 1 aesthete and 7 + 1 aesthete). Second antenna (Fig. 33l) 4-segmented, 74 μm long without claw. Armature: 1, 1, 2, and 1 + I + 1. Claw 18 μm.

Labrum (Fig. 33m) with posteroventral margin having slight median indentation and well-developed rounded lateral lobes bearing small outer knob. Mandible (Fig. 33n) 27 μm long, slender and smooth. First maxilla (Fig. 34a) with 2 setae. Second maxilla (Fig. 34b) 2-segmented, first segment unarmed, digitiform second segment with 2 inner setae and lamellate tip. Maxilliped (Fig. 34c, d) 3-segmented, first segment with inner lobe, second segment with lobe and bearing 2 inner setae and having compound setules on outer margin, small third segment having terminal seta and 2 adjacent setiform processes.

Legs 1–4 (Fig. 34e–g) with 3-segmented exopods and 2-segmented endopods. Spine and setal formula as follows:

P_1	coxa	0-0	basis	1-0	exp	I-0;	I-0;	I,2
					enp	0-0;	2	
P_2	coxa	0-0	basis	1-0	exp	I-0;	1-0;	I,2
					enp	0-0;	2	
P_{3+4}	coxa	0-0	basis	1-0	exp	I-0;	1-0;	I,2
					enp	0-0;	1	

Intercoxal plate in all 4 legs V-shaped as in Figure 34e. Exopod of leg 1 with minute outer spine 2 μm long on second segment (Fig. 34e); this segment in legs 2–4 bearing long slender smooth seta (Fig. 34f, g). Long hairlike setules on inner

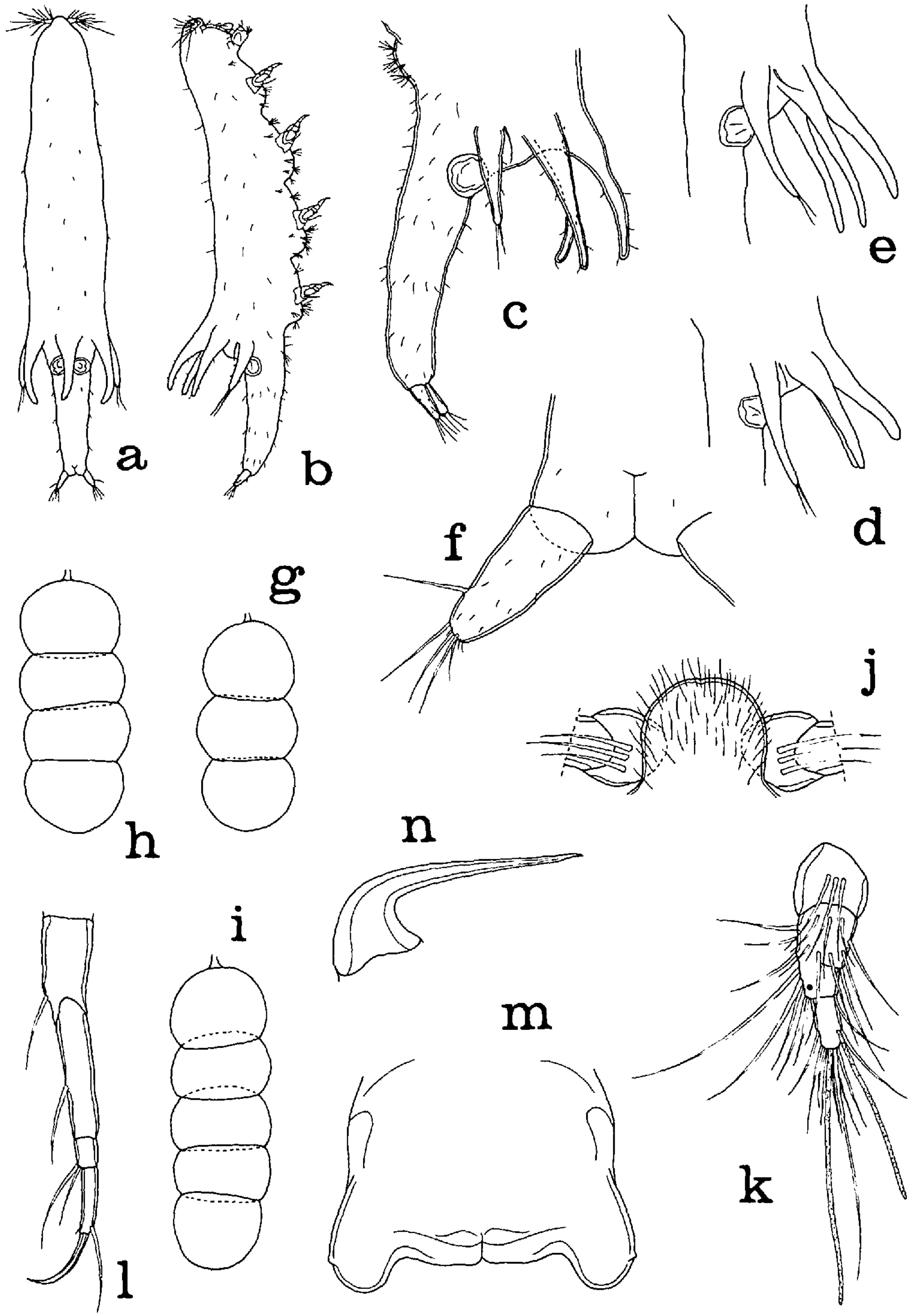


Figure 33. *Xarifia jugalis* new species, female: a, dorsal (scale A); b, lateral (A); c, processes and urosome, lateral (B); d, e, processes and leg 5, lateral (B); f, caudal ramus, dorsal (C); g, h, i, egg sacs, lateral (B); j, rostrum, dorsal (D); k, first antenna, with dot indicating position of aesthete in male, anterodorsal (D); l, second antenna, anterior (D); m, labrum, ventral (D); n, mandible, ventral (E).

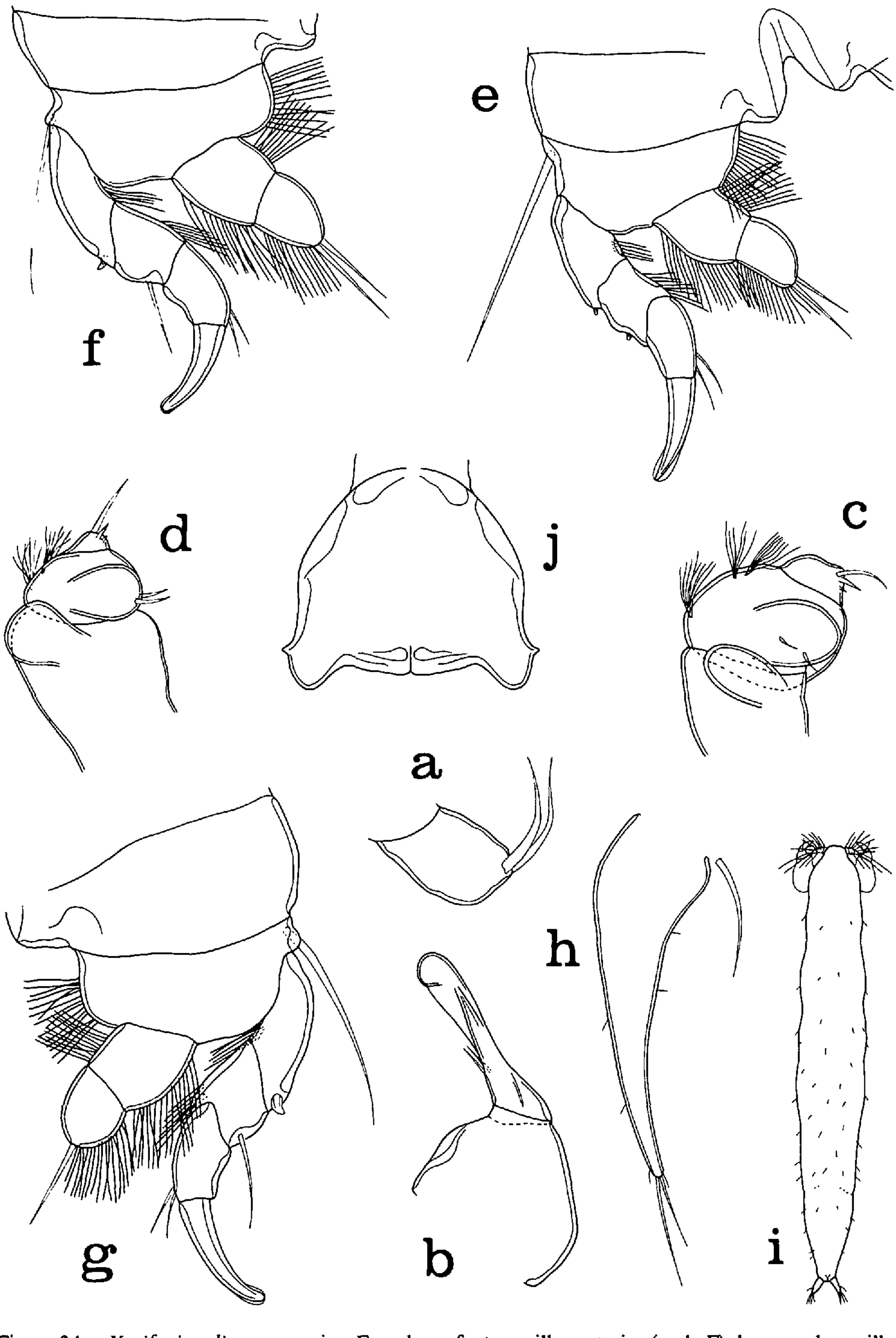


Figure 34. *Xarifia jugalis* new species. Female: a, first maxilla, anterior (scale F); b, second maxilla, posterior (F); c, maxilliped, inner (D); d, maxilliped, anterior (D); e, leg 1 and intercoxal plate, anterior (D); f, leg 2, posterior (D); g, leg 3, anterior (D); h, leg 5, lateral (I). Male: i, dorsal (A); j, labrum, ventral (D).

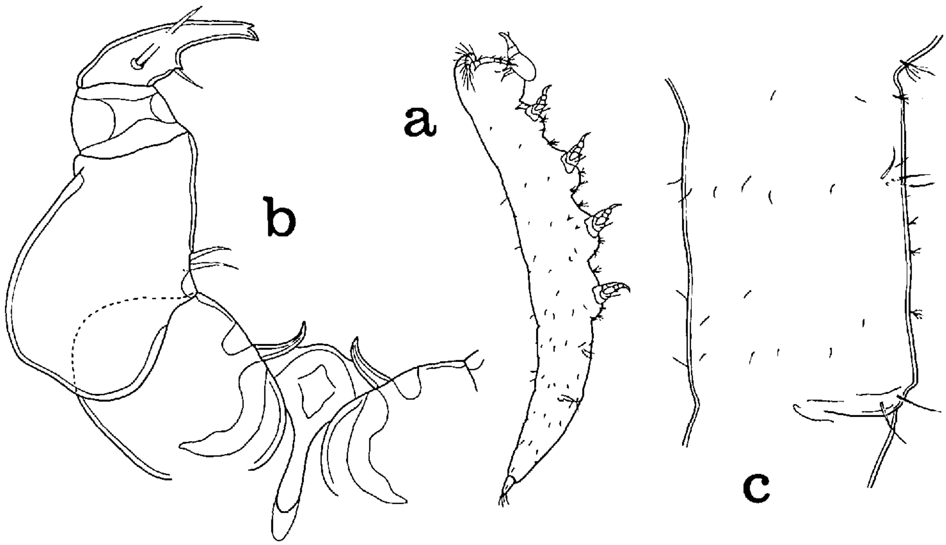


Figure 35. *Xarifia jugalis* new species, male: a, lateral (scale A); b, maxilliped and intermaxillipedal area, anteroventral (C); c, legs 5 and 6, lateral (J).

side of first and second segments of exopod. Endopods in legs 1–4 with first segment having both outer and inner long setules and second segment having outer setules only; terminal armature of endopods 2, 2, 1, 1.

Leg 5 (Fig. 34h) 178 × 48 μm, ratio 3.63:1, tapering distally, 64 percent of length of lateral process. Two terminal setae 47 μm and 31 μm. Dorsal seta about 50 μm.

Color in life in transmitted light opaque gray, eye red, eggs gray.

Male.—Body (Figs. 34i, 35a) more slender than in female, arched ventrally, about 6.54 times longer than wide. Length 1.29 mm (1.26–1.32 mm) and greatest width 0.18 mm (0.17–0.19 mm), based on 10 specimens. Greatest dorsoventral thickness 0.22 mm. Caudal ramus similar to that of female but slightly shorter, ratio 2.2:1.

Rostrum as in female. First antenna resembling that of female but 1 aesthete added on second segment (at point indicated by dot in Fig. 33k). Second antenna like that of female.

Labrum (Fig. 34j) similar to that of female but outer knobs on lateral lobes somewhat more prominent. Mandible, paragnath, first maxilla, and second maxilla resembling those of female. Maxilliped (Fig. 35b) 4-segmented. First segment with prominent inner recurved spine. Second segment swollen with 2 inner setae. Small third segment unarmed. Claw (fourth segment) relatively short, 60 μm, bearing 2 proximal setae, spiniform process on concave margin, and having bifid tip. Paddle-shaped sclerite joining bases of maxillipeds.

Legs 1–4 as in female.

Leg 5 (Fig. 35c) consisting only of 3 setae.

Leg 6 (Fig. 35c) represented by 2 setae on posteroventral flap on genital segment.

Spermatophore not seen.

Color as in female.

Etymology.—The specific name *jugalis,* Latin meaning yoked together, alludes to the appearance of the maxillipeds in the male as if yoked together by a sclerite.

Remarks.—Among the several species of *Xarifia* in which the endopods of legs 1–4 have the terminal armature 2, 2, 1, 1, as in *Xarifia jugalis,* only one species, *Xarifia fissilis* new species, described above, has the formula I, 1, 1, 1 for the second segment of the exopods in legs 1–4, as in *X. jugalis. Xarifia fissilis* may be distinguished from the new species, however, by its greater length (female 1.84 mm), longer caudal ramus (female 143 × 34 μm, ratio 4.2:1), longer 3 processes above the fifth legs in the female, a lobulate process anterior to the genital area in the female, and the absence of an inner spine on the first segment of the male maxilliped.

Xarifia decorata Humes and Ho, 1968, also has the formula I, 1, 1, 1 for the second segment of the exopod in legs 1–4, as in *X. jugalis,* but in *X. decorata* the formula for the terminal armature of the endopod in legs 1–4 is 3, 3, 1, 1 and the claw of the maxilliped in the male is dentate along its concave edge.

Xarifia lacerans new species
Figures 36a–k, 37a–k

Type Material.—18 ♀♀, 11 ♂♂ from *Turbinaria danae* Bernard, in 3 m, southwestern shore of Goenoeng Api, Banda Islands, Moluccas, 04°31′45″S, 129°51′55″E, 2 May 1975. Holotype ♀ (USNM 210359), allotype (USNM 210360), and 22 paratypes (13 ♀♀, 9 ♂♂) (USNM 210361) deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C.

Female.—Body (Fig. 36a, b) moderately slender, about 7.4 times longer than wide. Urosome very short. Length 1.08 mm (1.05–1.12 mm) and greatest width 0.14 mm (0.13–0.15 mm), based on 10 specimens. External segmentation not clearly evident. Region dorsal to fifth legs with 3 posteriorly directed processes (Fig. 36c), middle process nearly double length of lateral processes. Genital and postgenital segments together about 9 percent of body length. Genital areas situated dorsolaterally. Caudal ramus (Fig. 36d) elongate, 44 × 17 μm (length taken along shorter side), ratio 2.59:1, bearing 5 short terminal setae, 1 subterminal seta, and 1 small dorsal seta. Surface of body with scattered long setules. Egg sac with 1 egg 200 × 91 μm (Fig. 36e) or 2 eggs, each 148 × 114 μm (Fig. 36f).

Rostrum (Fig. 36g) triangular with rounded tip. First antenna (Fig. 36g) 39 μm long, 5-segmented. Lengths of segments (measured along their posterior side): 5, 9, 4.5, 5, and 5.5 μm, respectively. Armature: 3, 20, 5, 2 + 1 aesthete, and 7 + 1 aesthete. All setae smooth. Second antenna (Fig. 36h) 4-segmented, 50 μm long not including terminal setae. Formula: 1, 1, 2, and 2 + 1 setule. Long terminal seta 15 μm and adjacent short seta (claw ?) 6 μm.

Labrum (Fig. 36i) with trilobed posteroventral margin. Mandible (Fig. 36j) arcuate with terminally a blunt process and recurved hook. Paragnath a small lobe with long hairs. First maxilla (Fig. 36k) with 2 setae and small spiniform process. Second maxilla (Fig. 37a) 2-segmented, first segment unarmed, second segment bipartite, proximal part with 2 setae, distal part lamellate with 1 small seta. Maxilliped (Fig. 37b) 3-segmented. First segment unarmed. Second segment with 2 inner setae. Third segment with 2 setae and terminal spiniform process.

Legs 1–4 (Fig. 37c, d) with 3-segmented exopods and 1-segmented endopods. Spine and setal formula as follows:

P_{1+2}	coxa	0-0	basis	1-0	exp	I-0;	1-0;	I,3
					enp	1		
P_{3+4}	coxa	0-0	basis	1-0	exp	I-0;	1-0;	I,2
					enp	I		

First segment of exopod in all 4 legs with large recurved spiniform process near insertion of outer spine. Second segment of exopods with minute outer seta instead

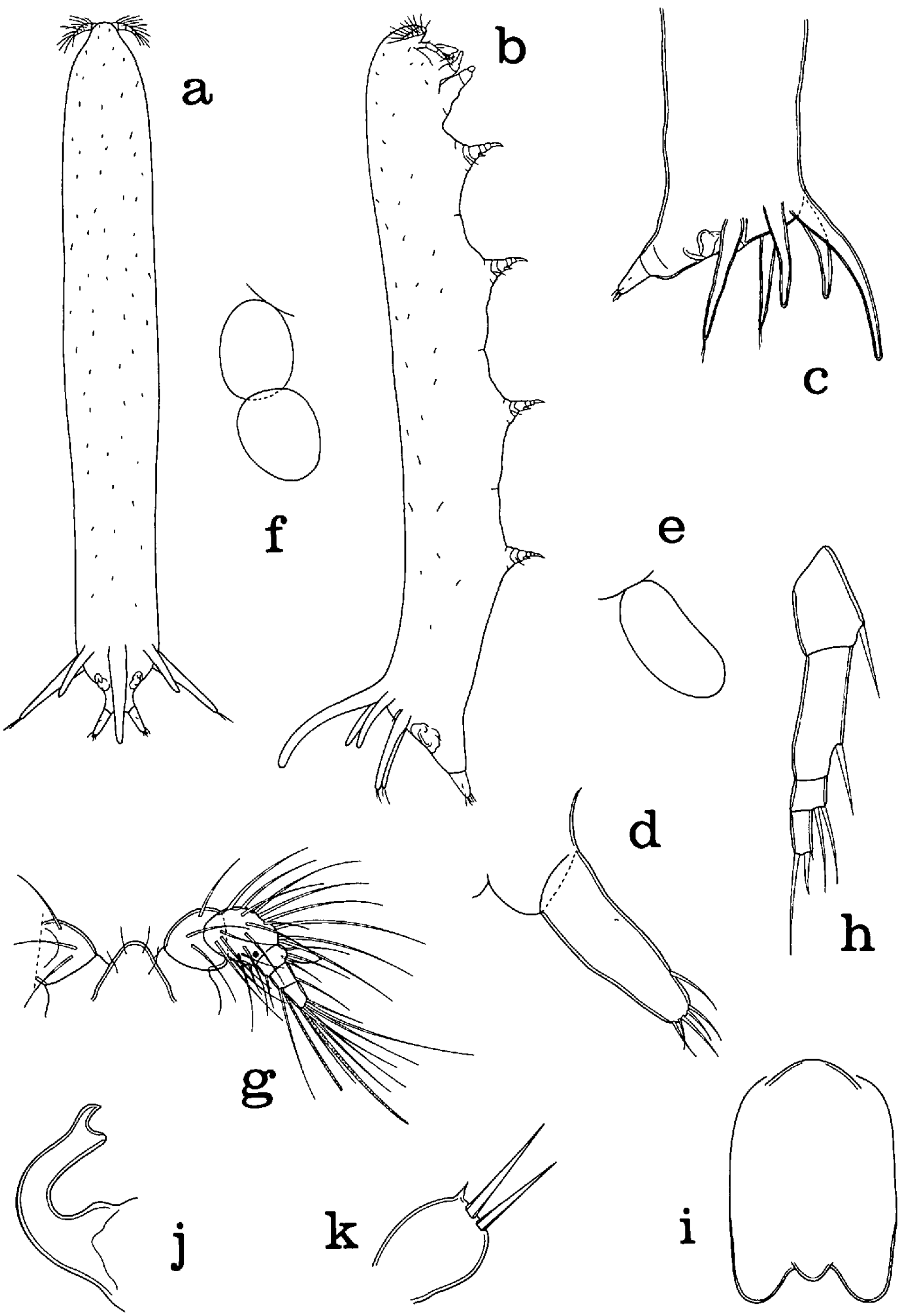


Figure 36. *Xarifia lacerans* new species, female: a, dorsal (scale B); b, lateral (B); c, processes and urosome, lateral (H); d, caudal ramus, ventral (D); e, f, egg sacs, lateral (B); g, rostrum and first antenna, with dot indicating position of aesthete in male, dorsal (D); h, second antenna, ventral (F); i, labrum, ventral (D); j, mandible, anterior (E); k, first maxilla, ventral (E).

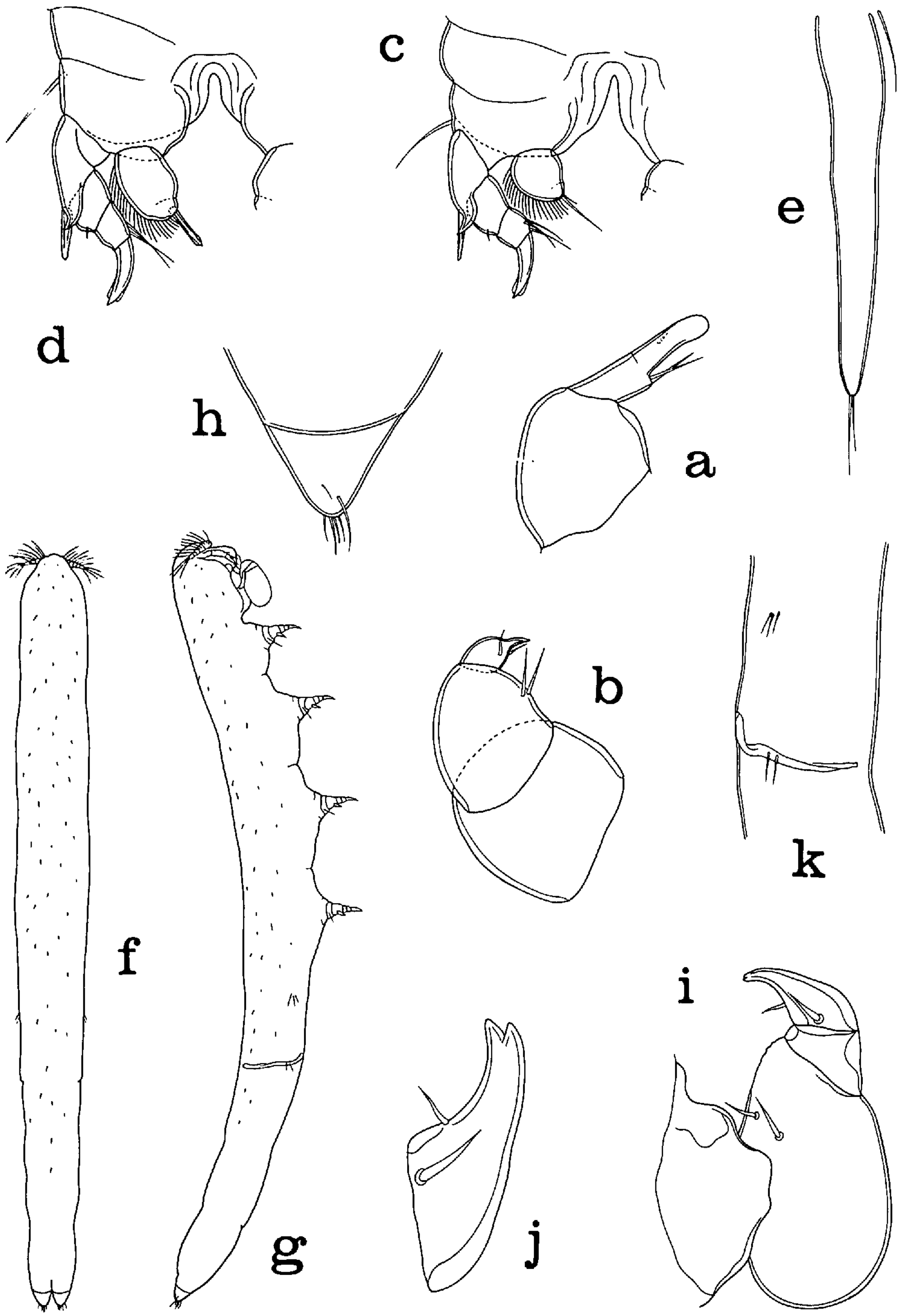


Figure 37. *Xarifia lacerans* new species. Female: a, second maxilla, postero-outer (scale F); b, maxilliped, antero-inner (F); c, leg 1 and intercoxal plate, anterior (D); d, leg 3 and intercoxal plate, anterior (D); e, leg 5, lateral (C). Male: f, dorsal (B); g, lateral (B); h, caudal ramus, lateral (D); i, maxilliped, inner (D); j, claw of maxilliped, inner (E); k, legs 5 and 6, lateral (J).

of spine. Endopods with outer marginal hairs. Terminal armature of endopods 1, 1, I, I, spines being slightly recurved.

Leg 5 (Fig. 37e) elongate, tapered, 130 μm long, with 2 slender terminal setae.

Color in life in transmitted light opaque gray, intestine slightly orange-red, eye red, egg sacs reddish gray.

Male.—Body (Fig. 37f, g) slender, about 10 times longer than wide. Length 1.13 mm (1.06–1.19 mm) and greatest width 0.11 mm (0.10–0.12 mm), based on 9 specimens. Caudal ramus (Fig. 37h) short, about 22 μm long, with setae as in female.

Rostrum like that of female. First antenna similar to that of female but 1 aesthete added on second segment (at point indicated by dot in Fig. 36g). Second antenna resembling that of female.

Labrum, mandible, paragnath, first maxilla, and second maxilla like those of female. Maxilliped (Fig. 37i) 4-segmented. First segment unarmed. Elongate second segment with 2 inner setae. Small third segment unarmed. Claw (fourth segment) short, 27 μm (Fig. 37j), with 2 proximal setae and having bifid tip.

Legs 1–4 as in female.

Leg 5 (Fig. 37k) without free segment and represented only by 3 small setae.

Leg 6 (Fig. 37k) represented by 2 setae on posteroventral flap on genital segment.

Color as in female.

Etymology.—The specific name *lacerans,* Latin meaning tearing to pieces or lacerating, alludes to the structure of the mandible and its supposed function in rasping or tearing.

Remarks.—Two species of *Xarifia, X. hamata* Humes and Ho, 1968, and *X. uncinata* new species, described below, have terminal hooklike spines on the endopods of certain legs, but on legs 2–4 rather than only on legs 3 and 4 as in *Xarifia lacerans.* The formula 1, 1, I, I for the terminal armature of the endopods of legs 1–4 sets the new species apart from all congeners.

Three species are now known that, unlike other species of *Xarifia,* have hooklike spines on certain endopods of the legs. These are *X. hamata, X. uncinata,* and *X. lacerans.* All live with corals of the genus *Turbinaria.*

Xarifia lamellispinosa Humes and Ho, 1968

Host.—*Pachyseris speciosa* (Dana).

New Record.—6 ♂♂ from *Pachyseris speciosa,* in about 12 m, Mauritius, 20°22′S, 57°21′E, 4 February 1964.

Localities.—Madagascar, Mauritius.

Features for Recognition.—Length of female 1.90 mm (1.84–2.00 mm) and male 1.83 mm (1.76–1.87 mm). Ratio of length to width of female about 7:1. Female with 3 long processes above fifth legs, middle process slightly shorter than other two. Caudal ramus in female distinct, but in male more weakly set off from anal segment. Second antenna 4-segmented. Legs 1–4 with exopods having outer armature I,I,I and 2-segmented endopods with terminal armature 2, 2, 1, 1. Leg 5 in female with elongate segment, 110 μm. Leg 5 in male with very small segment, 12 μm. Eggs in cluster.

Xarifia levis new species
Figures 38a–n, 39a–m

Type Material.—6 ♀♀, 18 ♂♂ from *Seriatopora hystrix* Dana, in 1 m, west of Isle N'Gou, near Noumea, New Caledonia, 22°13′44″S, 166°23′01″E, 3 August 1971. Holotype ♀ (USNM 210423), allotype

(USNM 210424), and 16 paratypes (2 ♀♀, 14 ♂♂) (USNM 210425) deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C.

Other Specimens.—6 ♀♀, 5 ♂♂ from *Seriatopora hystrix,* in 18 m, south of Bandanaira, Banda Islands, Moluccas, 04°32'12"S, 129°53'40"E, 2 May 1975; 1 ♀ from *Seriatopora hystrix,* in 3 m, west of Isle Mando, near Noumea, New Caledonia, 22°18'59"S, 166°09'30"E, 26 June 1971.

Female.—Body (Fig. 38a, b) about 7.7 times longer than wide. Length 1.08 mm (1.02–1.13 mm) and greatest width 0.15 mm (0.14–0.16 mm), based on 10 specimens. External segmentation absent. Region dorsal to fifth legs rounded and smooth, without processes or knobs (Fig. 38c, d). Genital and postgenital segments together about 18 percent of body length. Genital areas situated dorsally. Caudal ramus (Fig. 38e) tapered, 42 μm long and 18 μm wide at base, ratio 2.33:1, with 5 smooth setae (4 terminal and 1 outer lateral) and 2 small outer marginal spinules. Surface of body smooth. Egg sac (Fig. 38f) with 1 egg 156 × 101 μm.

Rostrum (Fig. 38g) broadly rounded. First antenna (Fig. 38g) 62 μm long, 4-segmented (but separation between third and fourth segments sometimes weak). Lengths of segments (measured along posterior side): 11, 25, 9, and 8 μm, respectively. Armature: 3, 16 + 1 aesthete, 2 + 1 aesthete, and 7 + 1 aesthete. All setae smooth. Second antenna (Fig. 38h) 4-segmented, 66 μm long not including terminal setae. Formula: 1, 1, 2, and I + 2. Claw (Fig. 38i) 7 μm and adjacent long seta 28 μm.

Labrum (Fig. 38j) weakly indented medially and having slight lateral lobes, both with minute spiniform process. Mandible (Fig. 38k) smooth and slender. Paragnath a small lobe. First maxilla (Fig. 38l) with 2 setae, one stouter than other. Second maxilla (Fig. 38m) 2-segmented, first segment unarmed, second segment digitiform with 2 small obscure proximal setae. Maxilliped (Fig. 38n) 3-segmented. First segment unarmed. Second segment with inner lobe and 2 small setae. Small third segment with 2 minute spines.

Legs 1–4 (Fig. 39a–d) with 3-segmented exopods and 2-segmented endopods. Spine and setal formula as follows:

P_1	coxa	0-0	basis	1-0	exp	I-0;	1-0;	I,3
					enp	0-0;	3	
P_2	coxa	0-0	basis	1-0	exp	I-0;	1-0;	I,2
					enp	0-0;	2	
P_{3+4}	coxa	0-0	basis	1-0	exp	I-0;	1-0;	I,2
					enp	0-0;	1	

Inner margin of basis in all 4 legs with single hairlike setule. Exopods with first segment having setiform spine, second segment with minute seta (only 3.3 μm long in leg 1 and 5.5 μm in leg 2), and third segment with large spine having bilamellate tip. Outer margins of both segments of endopods with long setules. Terminal armature of endopods 3, 2, 1, 1.

Leg 5 (Fig. 39e) lacking free segment and represented only by 3 small setae.

Color in life in transmitted light slightly tan, eye red, eggs orange-red.

Male.—Body (Fig. 39f, g) more slender than in female, about 9.5 times longer than wide. Length 0.90 mm (0.83–0.98 mm) and greatest width 0.11 mm (0.09–0.13 mm), based on 10 specimens. Caudal ramus as in female.

Rostrum like that of female. First antenna as in female but 1 aesthete added on second segment (at location indicated by dot in Fig. 38g). Second antenna like that of female.

Labrum, mandible, and paragnath as in female. First maxilla (Fig. 39h) with spinous process in addition to 2 setae. Second maxilla (Fig. 39i) with dentiform

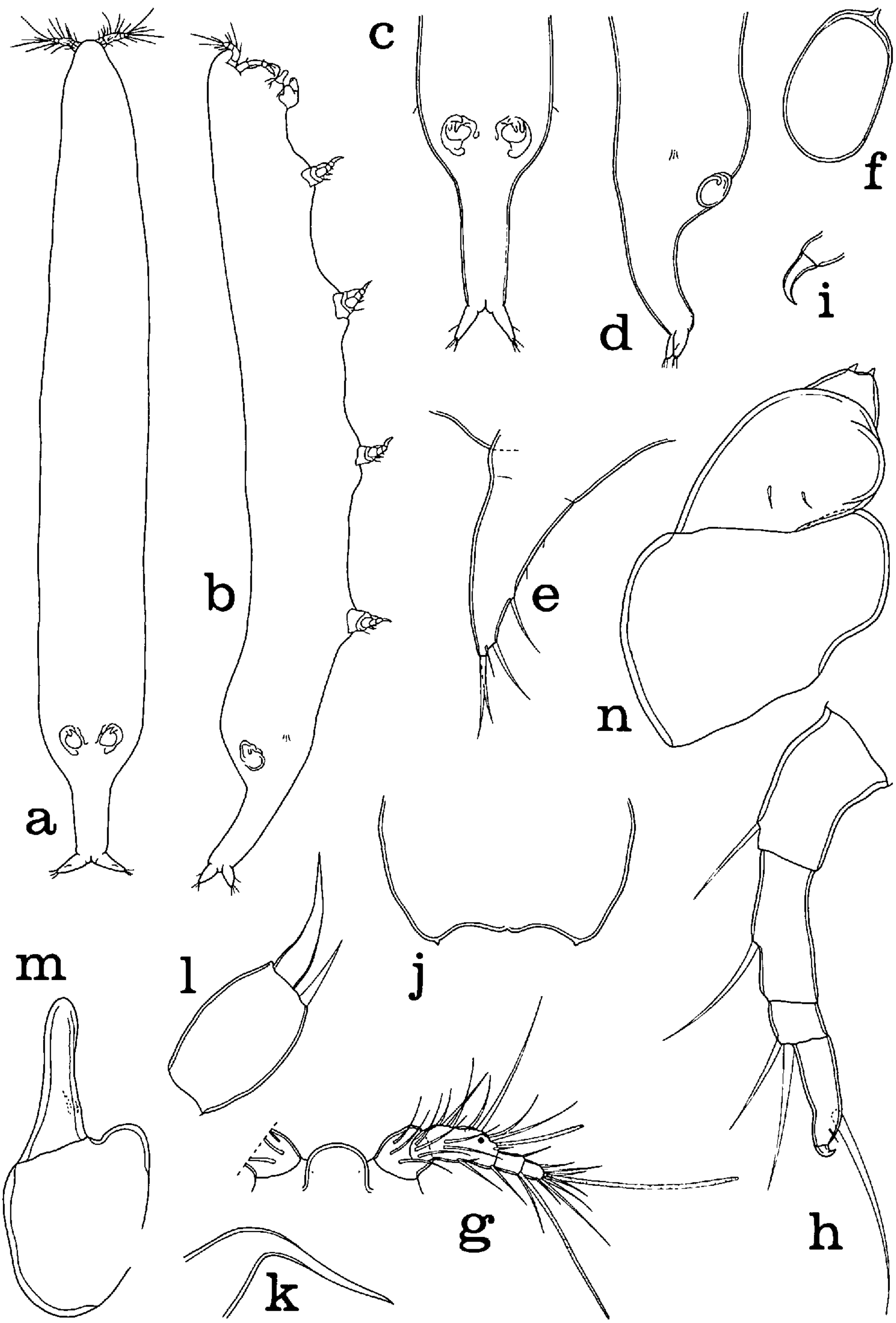


Figure 38. *Xarifia levis* new species, female: a, dorsal (scale B); b, lateral (B); c, urosome, dorsal (H); d, urosome, lateral (H); e, caudal ramus, ventral (D); f, egg sac, lateral (B); g, rostrum and first antenna, with dot indicating position of aesthete in male, dorsal (C); h, second antenna, posterior (F); i, claw of second antenna, flat view (E); j, labrum, ventral (D); k, mandible, ventral (E); l, first maxilla, anteroventral (E); m, second maxilla, antero-outer (E); n, maxilliped, inner (E).

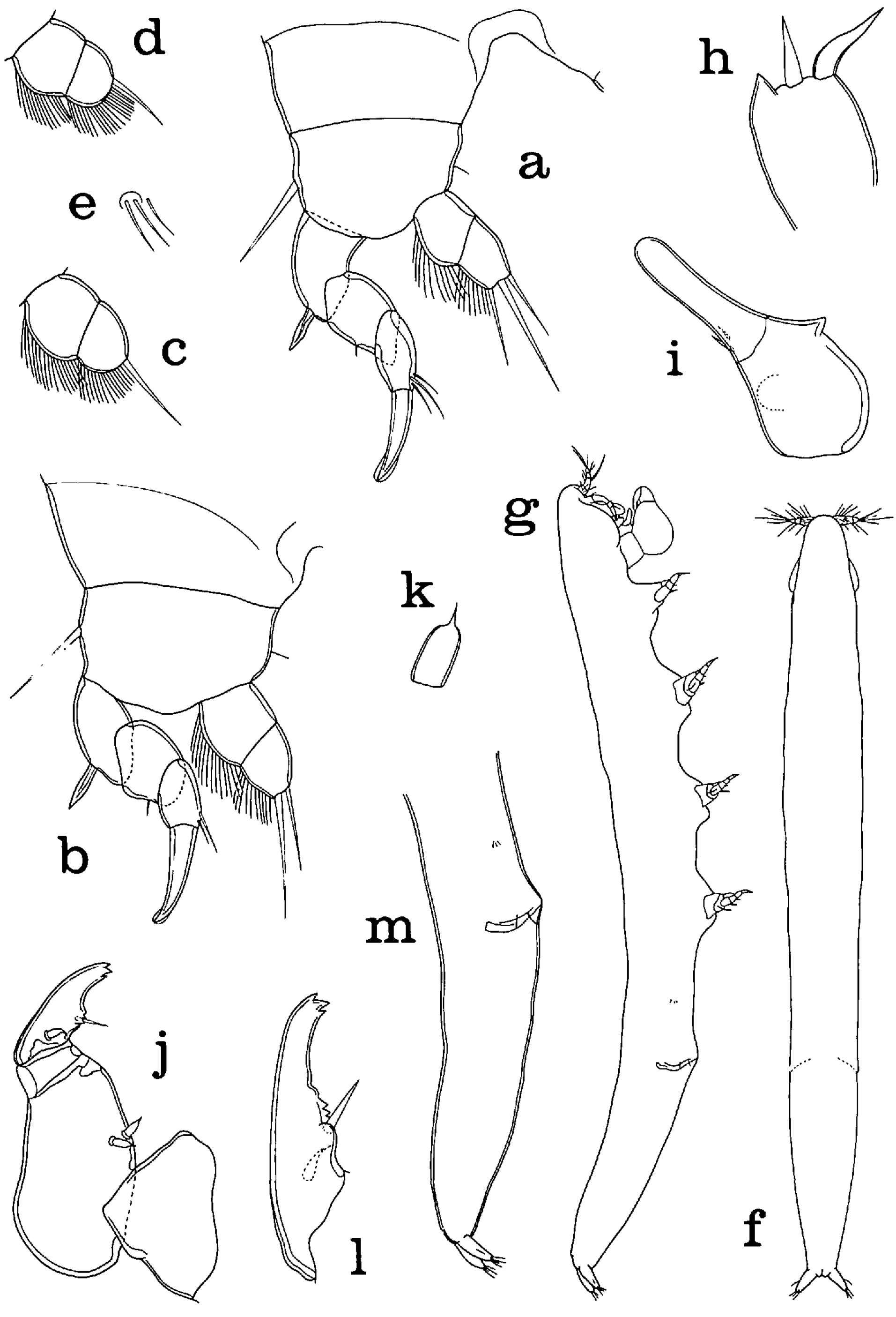


Figure 39. *Xarifia levis* new species. Female: a, leg 1 and intercoxal plate, anterior (scale D); b, leg 2, anterior (D); c, endopod of leg 3, anterior (D); d, endopod of leg 4, anterior (D); e, leg 5, lateral (E). Male: f, dorsal (B); g, lateral (B); h, first maxilla, anterior (E); i, second maxilla, outer (E); j, maxilliped, inner (I); k, seta on second segment of maxilliped, inner (E); l, claw of maxilliped, inner (D); m, urosome, with legs 5 and 6, lateral (H).

process on first segment. Maxilliped (Fig. 39j) 4-segmented. First segment unarmed. Second segment with 2 aristate inner setae (Fig. 39k). Small third segment unarmed. Claw (fourth segment) short, 65 μm (Fig. 39l), with 2 proximal setae, more distal of these located on concave margin between rounded smooth process and serrate expansion; tip of claw trifid.

Legs 1–4 as in female.

Leg 5 (Fig. 39m) represented only by 3 small setae.

Leg 6 (Fig. 39m) represented by 2 small setae on posteroventral flap on genital segment.

Color as in female.

Etymology.—The specific name *levis,* Latin meaning smooth, refers to the smooth rounded area without processes or knobs above the fifth legs in the female.

Remarks.—The females of three species of *Xarifia* lack processes or knobs on the region dorsal to the fifth legs and do not have a free segment in leg 5, as in *Xarifia levis.* These may be distinguished from the new species as follows: in *Xarifia anopla* Humes and Dojiri, 1982, the caudal ramus is fused with the anal segment, the second antenna is 3-segmented, the armature of the expods of legs 1–4 is I,I,I, and leg 5 in the female is absent; in *Xarifia extensa* Humes and Dojiri, 1982, the armature of the exopods is I,I,I in leg 1 and I,0,I in legs 2–4 and the endopods of legs 1–4 are 1-segmented; and in *Xarifia acicularis* new species, described above, the armature of the exopods of legs 1–4 is I,I,I and the length of the female is 1.98 mm (1.68–2.18 mm), much greater than in the new species.

In *Xarifia serrata* Humes, 1962, the endopods of legs 1–4 are armed terminally with 3, 2, 1, 1, and the region above the fifth legs lacks processes or knobs, as in *Xarifia levis.* However, *Xarifia serrata* has a distinct free segment in leg 5 of the female, and thus is easily distinguished from *Xarifia levis.*

Xarifia lissa Humes and Ho, 1968

Host.—*Stylophora pistillata* (Esper) and *Stylophora mordax* (Dana).

New Records.—1 ♀ from *Stylophora* sp., in 4 m, Antsamantsara, Nosy Bé, Madagascar, 9 June 1967; 36 ♀♀ from *Stylophora* sp., in 2 m, Pointe Vacao, Mauritius, 5 February 1964.

Localities.—Madagascar, Mauritius.

Features for Recognition.—Length of female 1.40 mm (1.36–1.50 mm) and male 1.32 mm (1.24–1.40 mm). Ratio of length to width of female about 6:1. Region above fifth legs in female smooth, without processes or knobs. Caudal ramus elongate in both sexes. Second antenna 4-segmented. Legs 1–4 with exopods having outer armature I,0,I and 1-segmented endopods (with slight indication of subdivision) having terminal armature 3, 3, 1, 1. Leg 1 in male with exopod having armature I-0; 1-0; I,2. Leg 5 in female with moderately long segment, 72 μm. Leg 5 in male represented by 3 small setae. Eggs seriate.

Xarifia longipes Humes, 1962

Host.—*Pavona angulata* Klunzinger.

Locality.—Madagascar.

Features for Recognition.—Length of female 1.48 mm (1.43–1.56 mm) and male 1.43 mm (1.34–1.50 mm). Ratio of length to width of female about 7:1. Female with 3 long processes above fifth legs, middle process slightly shorter than lateral processes. Caudal ramus in female long and slender, in male only about one-third as long. Second antenna 4-segmented. Legs 1–4 with exopods having outer armature I,I,I and 1-segmented endopods having terminal armature 2, 1, 1, 1. Leg 5 in female with elongate segment, 170 μm. Leg 5 in male a small protuberance and 3 setae.

Xarifia maldivensis Humes, 1960

Previously Known Host.—*Pocillopora* sp.

New Host.—10 ♀♀, 3 ♂♂ from *Pocillopora eydouxi* Milne Edwards and Haime, in 3 m, southwestern shore of Goenoeng Api, Banda Islands, Moluccas, 4°31′55″S, 129°52′12″E, 8 May 1975; 5 ♀♀, 4 ♂♂ from *Pocillopora eydouxi*, same locality, 4 May 1975.

Localities.—Maldive Islands, Moluccas (Banda Islands).

Features for Recognition.—Length of female 1.36 mm (1.26–1.46 mm) and male 1.20 mm (1.11–1.28 mm). Ratio of length to width of female about 5:1. Female with 3 long equal processes above fifth legs, with 2 small knobs between them. Caudal ramus in both sexes small, but distinct from anal segment. Second antenna 3-segmented. Legs 1–4 with exopods having outer armature I,1,I and 1-segmented endopods with terminal armature 3, 3, 1, 1. Leg 5 in female with small segment, 16 μm. Leg 5 in male consisting of 3 small setae.

Xarifia mediolobata Humes and Dojiri, 1982

Host.—*Alveopora mortenseni* Crossland.

Locality.—Moluccas (Halmahera).

Features for Recognition.—Length of female 2.64 mm (2.49–2.89 mm) and male 2.59 mm. Ratio of length to width of female about 5.13:1. Region above fifth legs with prominent stout posteriorly directed median lobe; no lateral processes. Caudal ramus in both sexes distinct from anal segment. Second antenna 4-segmented. Legs 1–4 with exopods having outer armature I,I,I and 2-segmented endopods with terminal armature 3, 3, 0, 0. Leg 5 in female with oval segment, 81 μm. Leg 5 in male represented by 3 slender setae. Eggs in cluster.

Xarifia minax Humes and Dojiri, 1983

Host.—*Physogyra* sp. (very likely *P. lichtensteini* Milne Edwards and Haime).

Locality.—Madagascar.

Features for Recognition.—Length of female 1.43 mm (1.39–1.46 mm) and male 1.61 mm (1.56–1.66 mm). Ratio of length to width of female about 7.2:1. Female with region above fifth legs bearing 3 moderately long processes, middle process nearly twice length of lateral processes. Caudal ramus elongate in both sexes. Second antenna 4-segmented. Legs 1–4 with exopods having outer armature I,I,I and 2-segmented endopods with terminal armature 2, 3, 0, 0. Leg 5 in female with elongate segment, 116 μm. Leg 5 in male represented by 2 small setae.

Xarifia mucronata Humes and Dojiri, 1982

Hosts.—*Acropora palifera* (Lamarck) and *Acropora palifera* forma *alpha* (Brook).

Localities.—New Caledonia, Moluccas (Poelau Gomumu, south of Obi).

Features for Recognition.—Length of female 2.08 mm (1.66–2.36 mm) and male 1.74 mm (1.59–1.86 mm). Ratio of length to width of female 11.5:1. Body elongate and slender. Female with 3 long processes above fifth legs, middle process distinctly longer than 2 lateral processes. Caudal ramus in both sexes elongate. Second antenna 3-segmented. Legs 1–4 with exopods having outer armature I,I,I. Endopods in female segmented as follows: 1, 2, 1, 1; in male segmented as 2, 2, 1, 2. Endopods in both sexes having terminal armature 3, 3, 1, 1. Leg 5 in female with long segment 68–86 μm. Leg 5 in male represented by 3 small setae.

Xarifia obesa Humes and Ho, 1968
Figure 40a–h

Previously Known Hosts.—*Pocillopora danae* Verrill, *Pocillopora verrucosa* (Ellis and Solander), and *Pocillopora* sp. cf. *P. verrucosa* (Ellis and Solander).

New Hosts.—From *Pocillopora damicornis* (Linnaeus): 8 ♀♀, 17 ♂♂, in 3 m, Karang Mie, eastern central Halmahera, Moluccas, 00°20′07″N, 128°25′00″E, 19 May 1975; 5 ♀♀, 2 ♂♂, in 2 m, Mermaid Cove, Lizard Island, Great Barrier Reef, northeastern Australia, 14°39′50″S, 145°27′00″E, 26 October 1982. From *Pocillopora eydouxi* Milne Edwards and Haime: 3 ♀♀, 2 ♂♂, in 3 m, Poelau Marsegoe, western Ceram, 02°59′30″S, 128°03′30″E, 15 May 1975; 17 ♀♀, 17 ♂♂, and 5 copepodids, in 3 m, Bowl Reef, Great Barrier Reef, northeastern Australia, 18°30′00″S, 147°34′00″E, 2 November 1982. From *Stylophora pistillata* (Esper), var. *palmata* de Blainville: 14 ♀♀, 17 ♂♂, and 1 copepodid, in 1.5 m, Rocher à la Voile, Noumea, New Caledonia, 22°18′24″S, 166°25′50″E, 17 June 1971. From *Stylophora pistillata*: 1 ♀, 3 ♂♂, in 10 m, Poelau Parang, eastern Ceram, 03°17′00″S, 130°44′48″E, 23 May 1975. From *Seriatopora hystrix* Dana: 95 ♀♀, 78 ♂♂, and 2 copepodids, in 2 m, Mermaid Cove, Lizard Island, northeastern Australia, 26 October 1982.

New Records.—From *Pocillopora verrucosa* (Ellis and Solander): 8 ♀♀, 1 ♂, in 2 m, fringe reef east of Batterie des Grenadiers, near Tron aux Biches, Mauritius, 29 January 1964; 15 ♀♀, 15 ♂♂, and 3 copepodids, in 3 m, Bowl Reef, Great Barrier Reef, northeastern Australia, 18°30′00″S, 147°34′00″E, 2 November 1982. From *Pocillopora* sp.: 2 ♀♀, 1 ♂, and 1 copepodid, in 20 m, Banc de Cinq Mètres, near Nosy Bé, Madagascar, 6 August 1967; 1 ♀, in 1.5 m, Black River Bay, Mauritius, 24 January 1964.

Localities.—Madagascar, Mauritius, Moluccas (Halmahera, Ceram), New Caledonia, Great Barrier Reef (Bowl Reef, Lizard Island).

Notes.—Females from *Stylophora pistillata* in New Caledonia and Ceram and from *Seriatopora hystrix* from the Great Barrier Reef sometimes have a small median knob above the area of the fifth legs (Fig. 40a–c) or may (in 8 of 95 specimens) lack a median knob entirely (Fig. 40d), as in type material from *Pocillopora verrucosa* in Madagascar (Humes and Ho, 1968). The females from the Southwest Pacific show considerable variation in the shape of the lateral processes (Fig. 40e). The eggs, arranged in a cluster (Fig. 40f), have dimensions of 159 μm (151–172 μm) × 131 μm (127–135 μm). The spermatophore (Fig. 40h), attached to a female, is 224 × 78 μm, not including the neck.

No other significant differences were found between the specimens from Madagascar and those from the Southwest Pacific. Although coming from a variety of hosts and from widely separated localities they represent one species, *Xarifia obesa*, that may show variation in minor respects. For the interpretation of such specimens the desirability of having at hand a large number of specimens from many localities is obvious.

Features for Recognition.—Length of female 1.34 mm (1.21–1.48 mm) and male 1.21 mm (1.14–1.30 mm). Ratio of length to width of female about 4:1. Female with 2 long lateral posteriorly directed processes. Caudal ramus nearly completely fused with anal segment in both sexes. Second antenna 3-segmented. Legs 1–4 with exopods having outer armature I,1,I and 1-segmented endopods having terminal armature 3, 3, 1, 1. Leg 5 in female with small segment, 24 μm. Leg 5 in male a small lobe and 3 setae. Eggs in cluster.

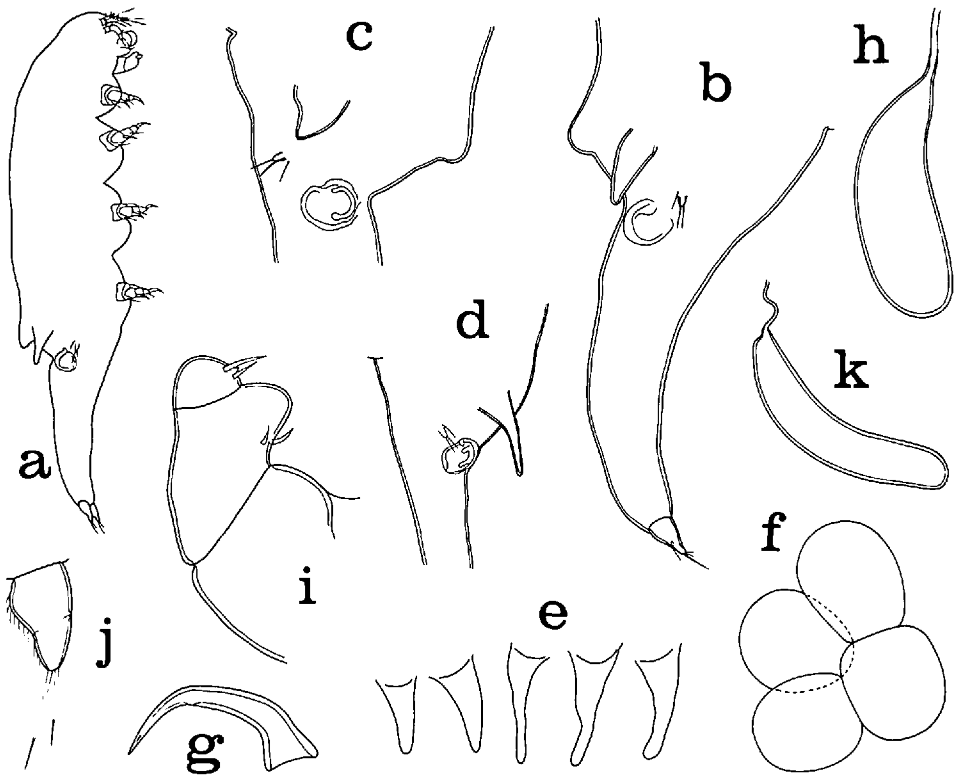


Figure 40. *Xarifia obesa* Humes and Ho, 1968. Female: a, lateral (scale A); b, process and urosome, lateral (B); c, process and leg 5, lateral (B); d, process and leg 5, lateral (B); e, outlines of five processes of five different females, lateral (H); f, egg sac, lateral (B); g, claw of second antenna, ventral (F). Male: h, spermatophore, attached to female, lateral (H). *Xarifia reducta* Humes, 1962, female: i, maxilliped, antero-inner (F); j, abnormal endopod of leg 1, anterior (F); k, spermatophore, attached to female, lateral (H).

Xarifia pectinea Humes and Dojiri, 1982

Previously Known Hosts.—*Acropora florida* (Dana), *Acropora humilis* (Dana), *Acropora hyacinthus* (Dana), *Acropora intermedia* (Brook), *Acropora patula* (Brook), *Acropora rambleri* (Bassett-Smith), and *Montipora ramosa* Bernard. [*Acropora gravida* (Dana) and *Acropora affinis* (Brook), reported by Humes and Dojiri (1982) as hosts for this species, are synonyms of *Acropora florida* (Dana) (Pichon, pers. comm.).]

New Host.—6 ♀♀, 3 ♂♂, and 5 copepodids from *Acropora sarmentosa* (Brook), in 2 m, Mermaid Cove, Lizard Island, Great Barrier Reef, northeastern Australia, 14°39′50″S, 145°27′00″E, 26 October 1982.

Localities.—New Caledonia, Moluccas (Halmahera, Ceram), Great Barrier Reef (Lizard Island).

Features for Recognition.—Length of female 1.64 mm (1.53–1.83 mm) and male 1.52 mm (1.39–1.66 mm). Ratio of length to width of female 4.6:1. Female with area above fifth legs bearing 3 long processes, middle process a little shorter and stouter than others. Caudal ramus distinct, not fused with anal segment. Second antenna 4-segmented. Legs 1–4 with exopods having outer armature I,I,I and 1-segmented endopods (with slight indication of subdivision) with terminal armature 3, 3, 1, 1. Leg 5 in female with elongate segment, 200 μm. Leg 5 in male represented by 3 small setae.

Xarifia plectrata new species
Figures 41a–l, 42a–l

Type Material.—12 ♀♀, 4 ♂♂ from *Acrhelia horrescens* Dana, in 10–20 m, Big Broadhurst Reef, Great Barrier Reef, northeastern Australia, 18°58′03″S, 147°45′04″E, 1 November 1982. Holotype ♀ (USNM 210356), allotype (USNM 210357), and 10 paratypes (8 ♀♀, 2 ♂♂) (USNM 210358) deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C.

Female.—Body (Fig. 41a, b) about 6 times longer than wide. Length 0.97 mm (0.90–1.03 mm) and greatest width 0.15 mm (0.13–0.16 mm), based on 10 specimens. Region dorsal to fifth legs with 3 long, posteriorly directed processes of about equal length. Genital and postgenital segments together about 22 percent of body length. Urosome (Fig. 41c) with very slight indication of segmentation. Caudal ramus (Fig. 41d) elongate, 73 × 16 μm, ratio 4.6:1, bearing 1 subterminal outer lateral seta and 4 terminal setae. Egg sac (Fig. 41e) 277 × 120 μm, with 3 eggs linearly arranged; eggs with average dimensions 118 × 103 μm (extremes 117–120 × 101–107 μm).

Rostrum (Fig. 41f) broad with small median notch. First antenna (Fig. 41f) 61 μm long, 5-segmented. Lengths of segments (measured along anterior side): 12 (21 μm along posterior side), 21, 6, 8, and 7 μm, respectively. Armature: 3, 15, 3, 2 + 1 aesthete, and 7 + 1 aesthete. Second antenna (Fig. 41g) 4-segmented, slender, 104 μm long including claw. Armature: 1, 1, 2, and I + 1. Claw 22 μm and slender.

Labrum (Fig. 41h) with posteroventral margin having small median indentation and rounded lateral lobes. Mandible (Fig. 41i) 30 μm, blade with very narrow lamellae. Paragnath a small rounded lobe. First maxilla (Fig. 41j) with 2 setae. Second maxilla (Fig. 41k) 2-segmented, first segment unarmed, second segment with proximal outer pointed knob, 2 unequal inner setae, and rather short bilamellate distal portion. Maxilliped (Figs. 41l, 42a) 3-segmented. First segment with prominent anterior lobe. Second segment with round antero-inner lobe and 2 setae. Small third segment with 2 small spines.

Legs 1–4 (Fig. 42b, e) with 3-segmented exopods and 2-segmented endopods. Spine and setal formula as follows:

P_{1+2}	coxa	0-0	basis	1-0	exp	I-0;	I-0;	I,3
					enp	0-0;	2	
P_{3+4}	coxa	0-0	basis	1-0	exp	I-0;	I-0;	I,2
					enp	0-0;	1	

Basis in all 4 legs with smooth inner edge. Endopods very lightly haired along outer side of both segments. Formula for terminal armature of endopods: 2, 2, 1, 1. First segment of exopod in all 4 legs with short broad outer spine having large lamella extending far beyond tip of spine. This spine flanked by anteroterminal hooked process (Fig. 42c, d). Spines on second and third segments of exopods long and slender.

Leg 5 (Fig. 42f) elongate, 120–146 μm long, 31 μm wide proximally, then rather abruptly tapered to 8 μm wide distally, bearing 2 terminal setae. With adjacent dorsal seta.

Color in life in transmitted light opaque gray, eye red, eggs light brownish gray.

Male.—Body (Fig. 42g, h) slender, about 9.4 times longer than wide. Length 0.91

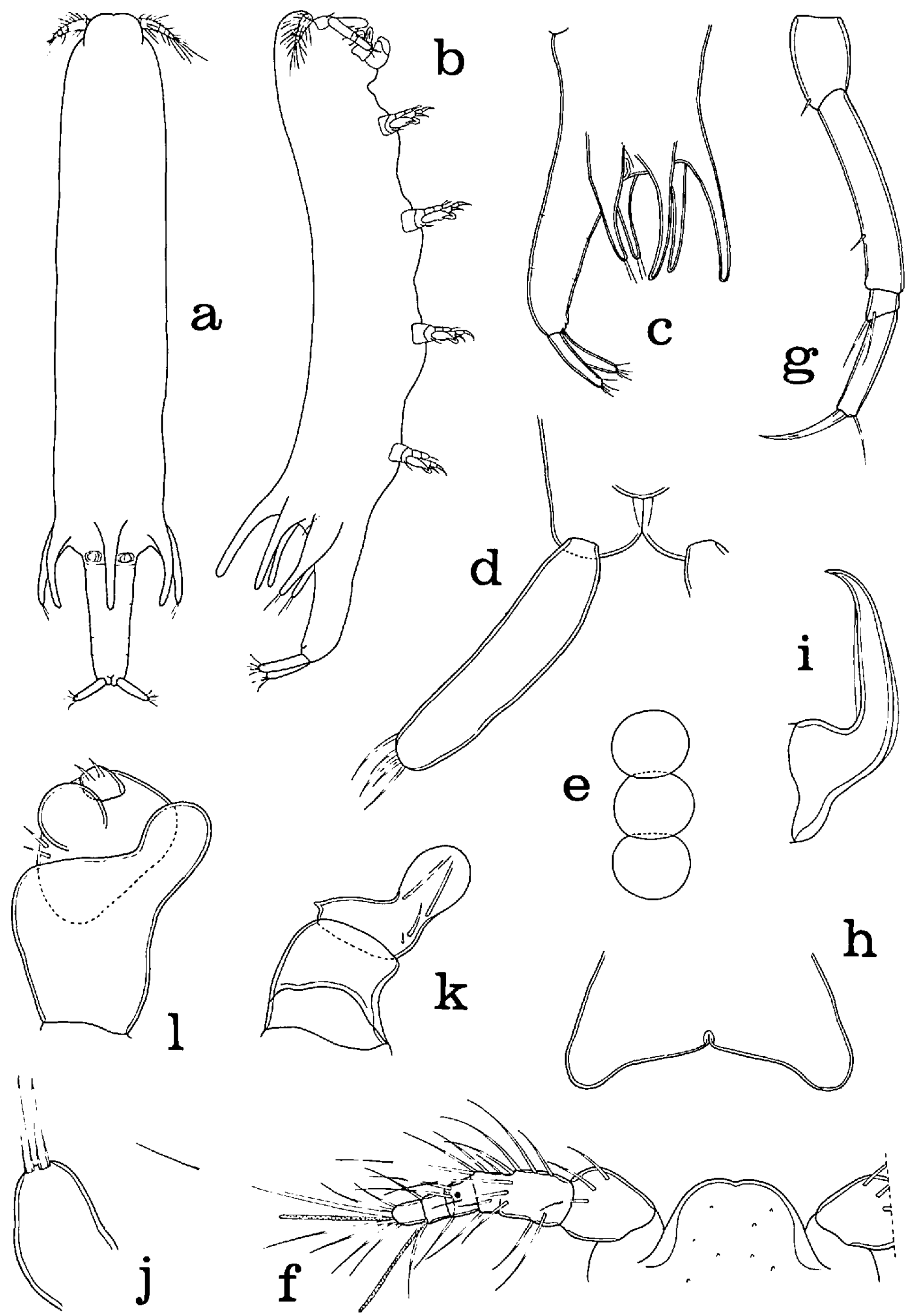


Figure 41. *Xarifia plectrata* new species, female: a, dorsal (scale B); b, lateral (B); c, processes and urosome, lateral (H); d, caudal ramus, dorsal (D); e, egg sac, lateral (B); f, rostrum and first antenna, with dot indicating position of aesthete in male, dorsal (D); g, second antenna, dorsal (D); h, labrum, ventral (D); i, mandible, ventral (E); j, first maxilla, lateral (E); k, second maxilla, inner (F); l, maxilliped, antero-inner (F).

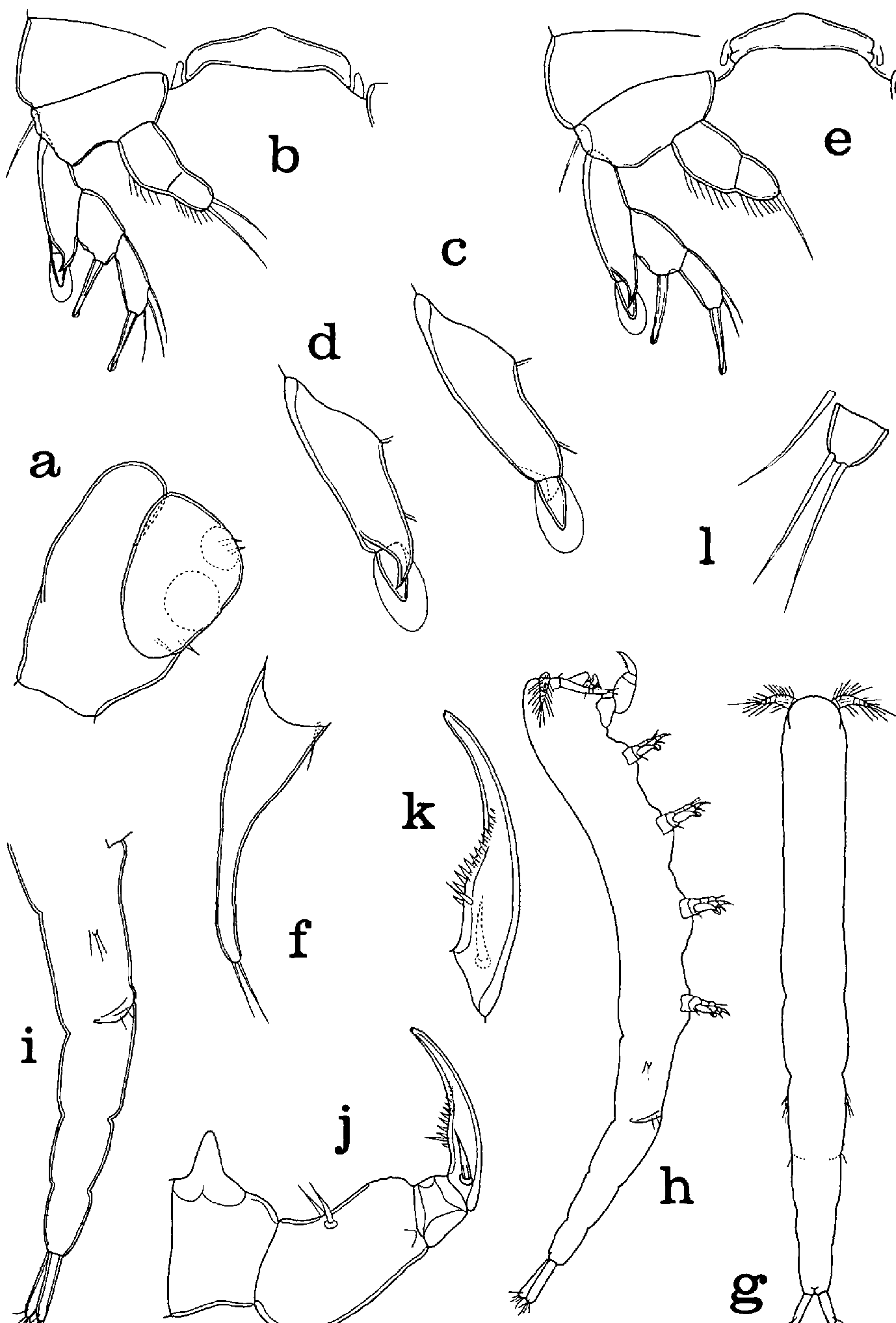


Figure 42. *Xarifia plectrata* new species. Female: a, maxilliped, postero-outer (scale F); b, leg 1 and intercoxal plate, anterior (D); c, first segment of exopod of leg 1, posterior (F); d, first segment of exopod of leg 1, anterior (F); e, leg 3 and intercoxal plate, anterior (D); f, leg 5, lateral (I). Male: g, dorsal (B); h, lateral (B); i, urosome, lateral (H); j, maxilliped, inner (D); k, claw of maxilliped, outer (F); l, leg 5, lateral (F).

mm (0.90–0.92 mm) and greatest width 0.11 mm (0.11–0.12 mm), based on 3 specimens. Urosome (Fig. 42i) with segmentation strongly marked, having lateral indentations but lacking evident sutures. Caudal ramus similar to that of female, but smaller, 66 × 13 μm, ratio 5.1:1.

Rostrum as in female. First antenna resembling that of female, but 1 aesthete added on third segment (at location shown by dot in Fig. 41f). Second antenna like that of female.

Labrum, mandible, paragnath, first maxilla, and second maxilla similar to those in female. Maxilliped (Fig. 42j) 4-segmented. First segment with anteriorly directed sclerotized process. Second segment with 2 inner setae. Small third segment unarmed. Claw (fourth segment) short, 44 μm, with 2 proximal setae; concave margin with row of dentiform spines, tip of claw minutely bifurcate (Fig. 42k).

Legs 1–4 as in female.

Leg 5 (Fig. 42l) with very small free segment 6.5 × 5.5 μm, bearing 2 setae. Adjacent dorsal seta.

Leg 6 (Fig. 42i) represented by 2 setae on posteroventral flap on genital segment.

Color as in female.

Etymology.—The specific name *plectrata,* Latin *plectrum,* a tool for plucking stringed instruments, a spur, and the suffix *-atus,* provided with, refers to the hooked process on the first segment of the exopods in legs 1–4.

Remarks.—Among those species of *Xarifia* with the formula 2, 2, 1, 1 for the terminal armature of the endopods of legs 1–4 only one species, *Xarifia gracilipes* Humes and Dojiri, 1983, has, as in *Xarifia plectrata,* the following combination of characters: (1) three long processes dorsal to the fifth legs in the female, (2) a hooked process on the first segment of the exopod in legs 1–4, and (3) a row of dentiform spines on the claw of the maxilliped in the male. *X. gracilipes* is, however, much larger (♀ 2.09 mm, ♂ 1.85 mm) than the new species and has slender elongate rami in legs 1–4.

Xarifia quinaria new species

Figures 43a–m, 44a–m

Type Material.—348 ♀♀, 320 ♂♂ from 1 colony (diameter 16 cm) of *Pocillopora damicornis* (Linnaeus), var. *caespitosa* Dana, in 1 m, Rocher à la Voile, Noumea, New Caledonia, 22°18′24″S, 166°25′50″E, 15 June 1971. Holotype ♀ (USNM 210346), allotype (USNM 210347), and 656 paratypes (340 ♀♀, 316 ♂♂) (USNM 210348) deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C.

Female.—Body (Fig. 43a, b) stout, about 4.8 times longer than wide. Length 1.30 mm (1.22–1.35 mm) and greatest width 0.28 mm (0.27–0.30 mm), based on 10 specimens. Greatest dorsoventral thickness 0.33 mm. Region dorsal to fifth legs with 3 posteriorly directed processes (Fig. 43c, d), 2 lateral processes longest, median process shorter and variable in shape (Fig. 43e–g). Pair of shorter processes (knobs) between median and lateral processes. Genital and postgenital segments together about 29 percent of body length. Caudal ramus (Fig. 43h) 36 × 24 μm, ratio 1.4:1, not clearly set off from anal segment, and having terminal appendix. Three naked setae, 1 lateral (11 μm), and 2 terminal (39 μm and 11 μm). Egg sac (Fig. 43i) 350 × 253 μm, containing 6 eggs with diameter from 117–130 μm. Several females with only 1 or 2 eggs in sac.

Rostrum (Fig. 43j) broadly rounded. First antenna (Fig. 43j) short, 45 μm, 3-segmented (though separation of segments not always clear). Lengths of segments (measured along posterior side): 11, 19, and 9 μm, respectively. Armature: 3, 15 + 1 aesthete, and 7 + 1 aesthete, respectively. Second antenna (Fig. 43k)

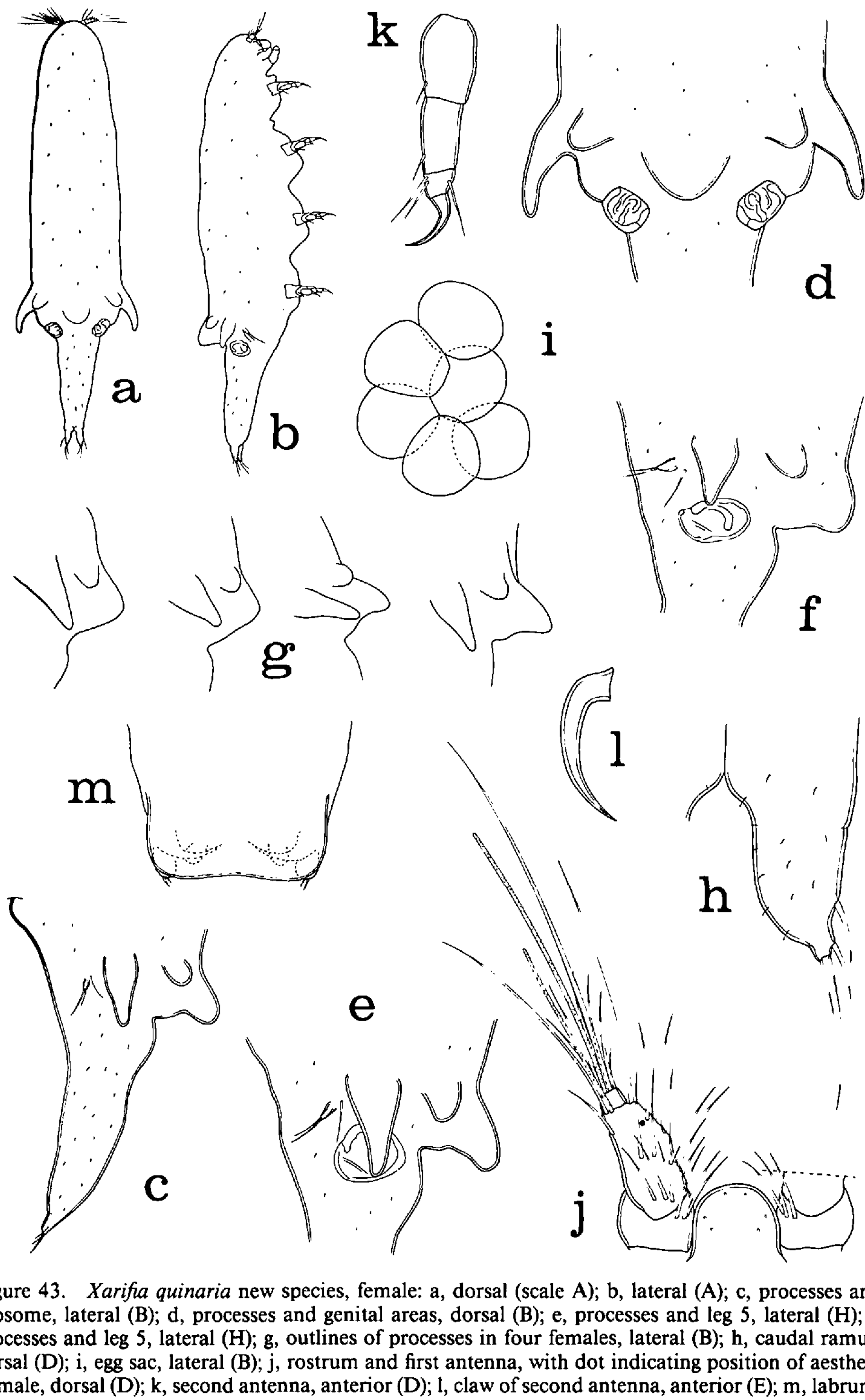


Figure 43. *Xarifia quinaria* new species, female: a, dorsal (scale A); b, lateral (A); c, processes and urosome, lateral (B); d, processes and genital areas, dorsal (B); e, processes and leg 5, lateral (H); f, processes and leg 5, lateral (H); g, outlines of processes in four females, lateral (B); h, caudal ramus, dorsal (D); i, egg sac, lateral (B); j, rostrum and first antenna, with dot indicating position of aesthete in male, dorsal (D); k, second antenna, anterior (D); l, claw of second antenna, anterior (E); m, labrum, with position of mandibles, paragnaths, and first maxillae indicated by broken lines, ventral (C).

3-segmented, 48 μm long without claw. Armature: 1, 1, 3, and I. Claw (Fig. 43l) 17 μm long.

Labrum (Fig. 43m) with nearly straight posteroventral margin. Mandible (Fig. 44a) 44 μm long and bilaterally spined. Paragnath a small lobe. First maxilla (Fig. 44b) with 2 setae. Second maxilla (Fig. 44c) lobate, probably 2-segmented, both segments with 2 small setae. Maxilliped (Fig. 44d) 3-segmented, first segment unarmed, second segment with 2 setae, and small third segment with 2 small setae.

Legs 1–4 (Fig. 44e–g) with 3-segmented exopods and 1-segmented endopods. Spine and setal formula as follows:

P_{1+2}	coxa	0-0	basis	1-0	exp	I-0;	1-0;	I,1
					enp	3		
P_{3+4}	coxa	0-0	basis	1-0	exp	I-0;	1-0;	I
					enp	1		

Shape of intercoxal plate different in leg 1 (Fig. 44e) from other legs. Endopods of all 4 legs with small terminal indentation. Terminal armature of endopods 3, 3, 1, 1.

Leg 5 (Fig. 44h) relatively small, 23 × 11 μm, with 2 terminal setae 47 μm and 31 μm, and dorsal seta 44 μm.

Color in life in transmitted light opaque gray, eye red, egg sacs gray with orange globules in eggs.

Male.—Body (Fig. 44i, j) more slender than in female, about 5.9 times longer than wide. Length 1.09 mm (1.05–1.12 mm) and greatest width 0.20 mm (0.20–0.22 mm), based on 10 specimens. Caudal ramus resembling that of female, but smaller, 23 × 18 μm, ratio 1.3:1.

Rostrum as in female. First antenna like that of female but 1 aesthete added on second segment (at point indicated by dot in Fig. 43j). Second antenna as in female.

Labrum, mandible, paragnath, first maxilla, and second maxilla like those of female. Maxilliped (Fig. 44k) slender, 4-segmented. First segment unarmed. Second segment with 2 proximal inner setae. Third segment unarmed. Claw (fourth segment) 57 μm long, with attenuate tip, and bearing 2 proximal setae, 1 strongly reflexed.

Legs 1–4 as in female.

Leg 5 (Fig. 44l) with 2 setae arising from slight base; adjacent dorsal seta.

Leg 6 (Fig. 44l) consisting of 2 setae on posteroventral flap on genital segment.

Spermatophore (Fig. 44m) elongate, 265 × 70 μm without neck, ratio 3.8:1.

Color as in female.

Etymology.—The specific name *quinaria,* Latin meaning containing five, alludes to the five processes or knobs on the region dorsal to the fifth legs in the female.

Remarks.—The four species of *Xarifia* that have, as in *Xarifia quinaria,* three processes and two knobs on the region dorsal to the fifth legs in the female may be distinguished from the new species as follows: in *Xarifia umbonata* new species, described below, the processes, knobs, and many other features resemble those of *X. quinaria,* even to the reflexed seta on the claw of the maxilliped in the male, but legs 1–4 have a seta rather than a spine on the first segment of the exopod (formula 1,1,I); in *Xarifia maldivensis* Humes, 1960, and *Xarifia gibberula* new species, described above, the three processes above the fifth legs are elongate and

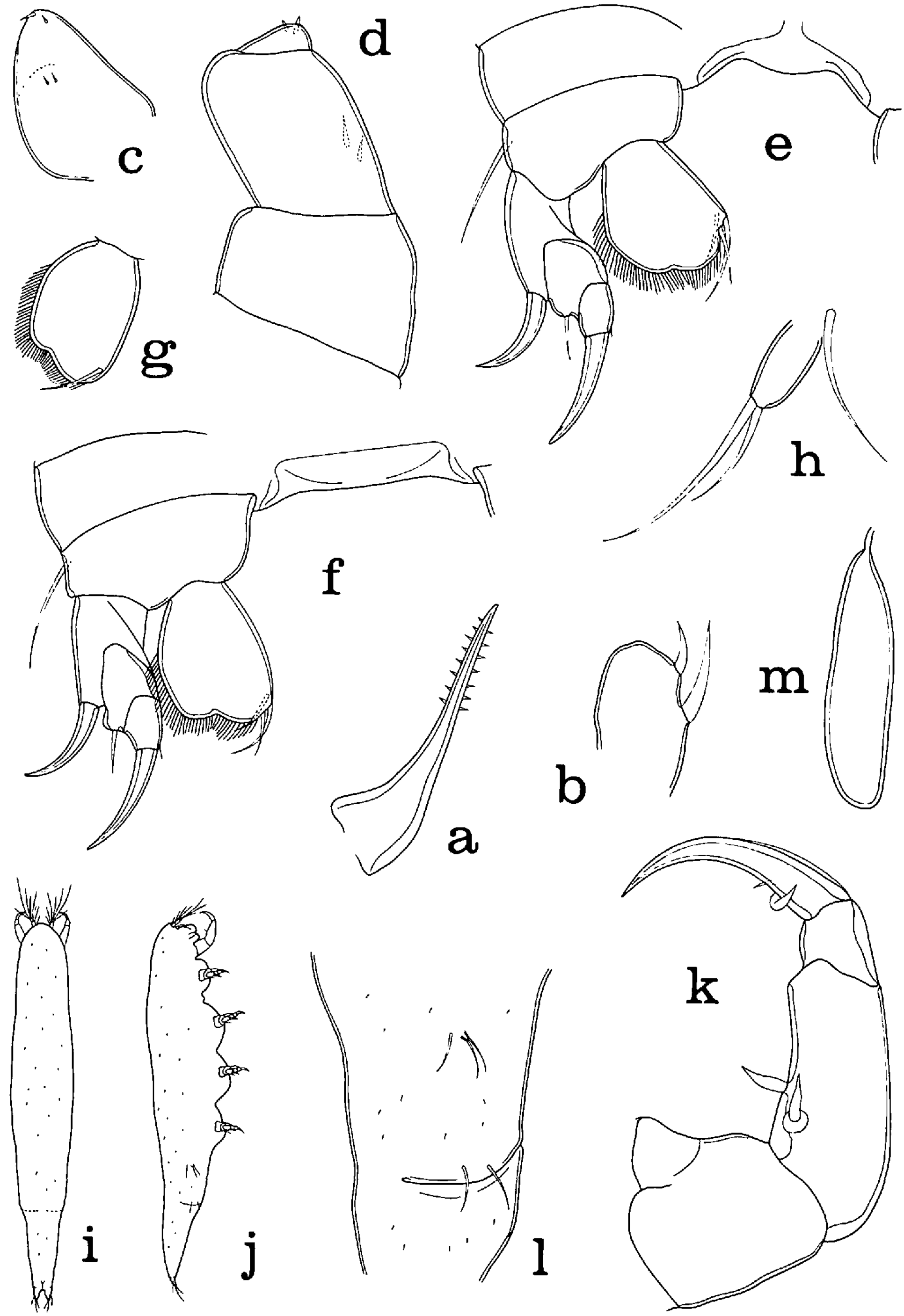


Figure 44. *Xarifia quinaria* new species. Female: a, mandible, anterior (scale E); b, first maxilla, ventral (E); c, second maxilla, outer (F); d, maxilliped, posterior (F); e, leg 1 and intercoxal plate, anterior (D); f, leg 2 and intercoxal plate, anterior (D); g, endopod of leg 3, posterior (D); h, leg 5, lateral (D). Male: i, dorsal (A); j, lateral (A); k, maxilliped, inner (D); l, legs 5 and 6, lateral (J); m, spermatophore, attached to female, lateral (H).

of nearly equal length; in *Xarifia tenta* new species, described below, the median process in dorsal view is narrow (Fig. 51a) rather than broadly rounded and the caudal ramus is distinctly expanded inwardly (Fig. 51e).

Xarifia radians Humes and Dojiri, 1982

Host.—*Alveopora mortenseni* Crossland.

Locality.—Moluccas (Halmahera).

Features for Recognition.—Length of female 2.34 mm (2.29–2.39 mm) and male 2.49 mm. Ratio of length to width of female 5.6:1. Female with 3 long nearly equal processes above fifth legs. Caudal ramus elongate in both sexes. Second antenna 4-segmented. Legs 1–4 with exopods having outer armature I,I,I and 2-segmented endopods with terminal armature 3, 3, 1, 1. Leg 5 in female with elongate segment, 460 μm. Leg 5 in male represented by 3 slender setae. Eggs in cluster.

Xarifia rasilis new species
Figures 45a–k, 46 a–d

Type Material.—6 ♀♀ from *Gardineroseris planulata* (Dana), in 10–20 m, Big Broadhurst Reef, Great Barrier Reef, northeastern Australia, 18°58′03″S, 147°45′04″E, 1 November 1982. Holotype (USNM 210352) and 2 paratypes (USNM 210353) deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C.

Female.—Body (Fig. 45a, b) 5.14 times longer than wide. Length 0.89 mm (0.85–0.91 mm) and greatest width 0.15 mm (0.14–0.16 mm), based on 6 specimens. Region dorsal to fifth legs smooth, without processes (Fig. 45c). Genital and postgenital segments together about 18.5 percent of body length. Caudal ramus (Fig. 45d) elongate, 46 × 15.5 μm (width taken at middle, ratio about 3:1, bearing 1 outer lateral seta (situated subterminally) and 4 terminal setae, one of them much smaller than others and sometimes difficult to see. Egg sac unknown.

Rostrum (Fig. 45e) broadly rounded. First antenna (Fig. 45e) 44 μm long, 3-segmented. Lengths of segments (measured along posterior side): 7 (15 μm along anterior side), 18, and 11 μm, respectively. Armature: 3, 15, and 9 + 2 aesthetes (2 + 1 aesthete and 7 + 1 aesthete). Second antenna (Fig. 45f) 4-segmented, 51 μm long including claw. Armature: 1, 1, 2, and I + 1. Claw 10 μm.

Labrum (Fig. 45g) with posteroventral margin having median cleft and weak lateral lobes. Mandible (Fig. 45h) 27 μm, blade smooth. Paragnath a small rounded lobe. First maxilla (Fig. 45i) with 2 setae. Second maxilla (Fig. 45j) 2-segmented, first segment unarmed, second segment with 2 small setae and having elongate lamellate tip. Maxilliped (Fig. 45k) 3-segmented. First segment with prominent postero-inner lobe. Second segment with antero-inner lobe and 2 inner setae. Small third segment with 2 small spines.

Legs 1–4 (Fig. 46a, b) with 3-segmented exopods and 2-segmented endopods. Spine and setal formula as follows:

P_{1+2}	coxa	0-0	basis	1-0	exp	I-0;	I-0;	I,3
					enp	0-0;	1	
P_{3+4}	coxa	0-0	basis	1-0	exp	I-0;	I-0;	I,2
					enp	0-0;	0	

Basis in all 4 legs with smooth inner edge. Endopods lightly haired along outer side of both segments. Formula for terminal armature of endopods 1, 1, 0, 0.

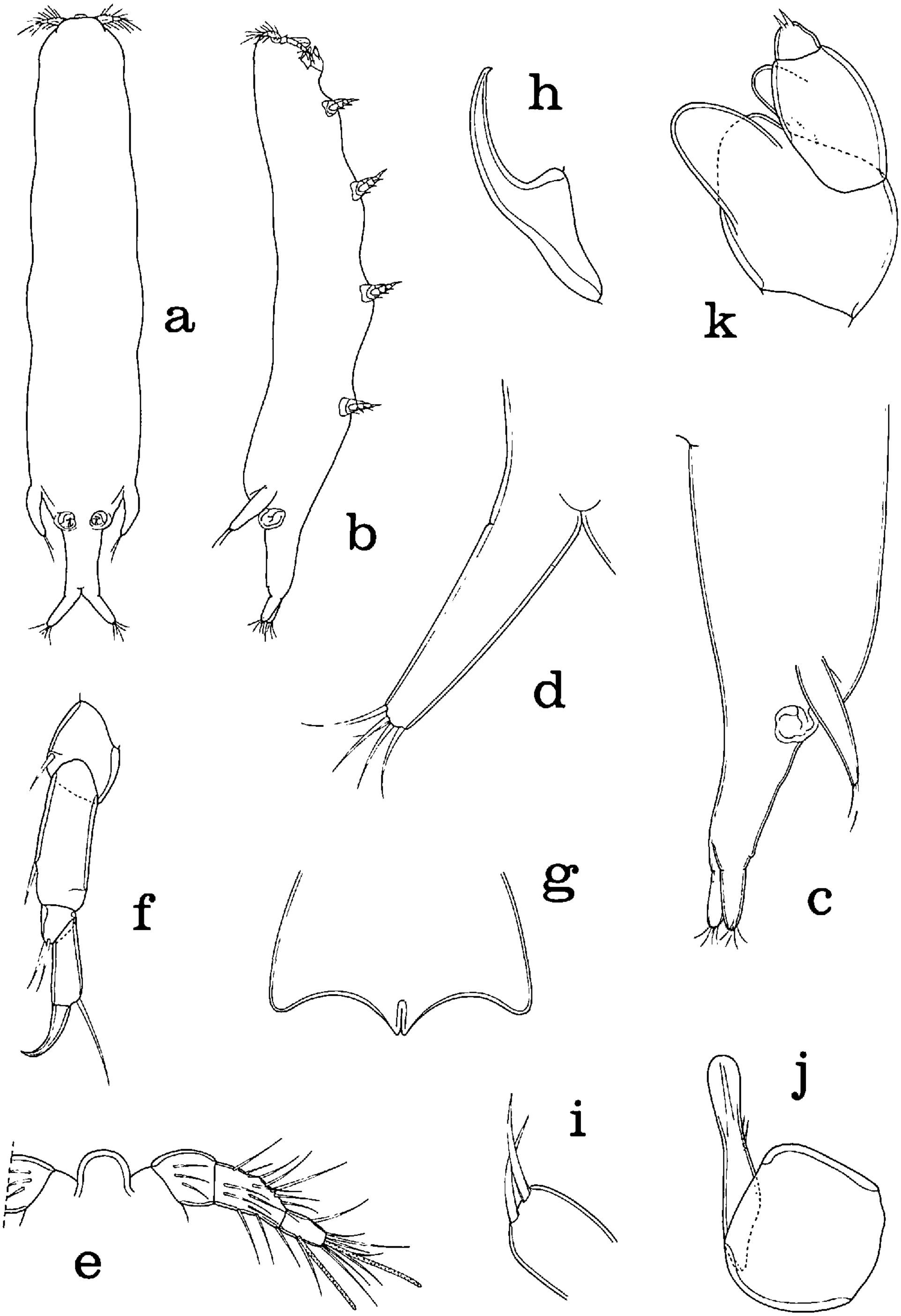


Figure 45. *Xarifia rasilis* new species, female: a, dorsal (scale B); b, lateral (B); c, urosome, lateral (J); d, caudal ramus, dorsal (D); e, rostrum and first antenna, dorsal (D); f, second antenna, dorsal (F); g, labrum, ventral (F); h, mandible, ventral (E); i, first maxilla, ventral (E); j, second maxilla, antero-ventral (E); k, maxilliped, posterior (E).

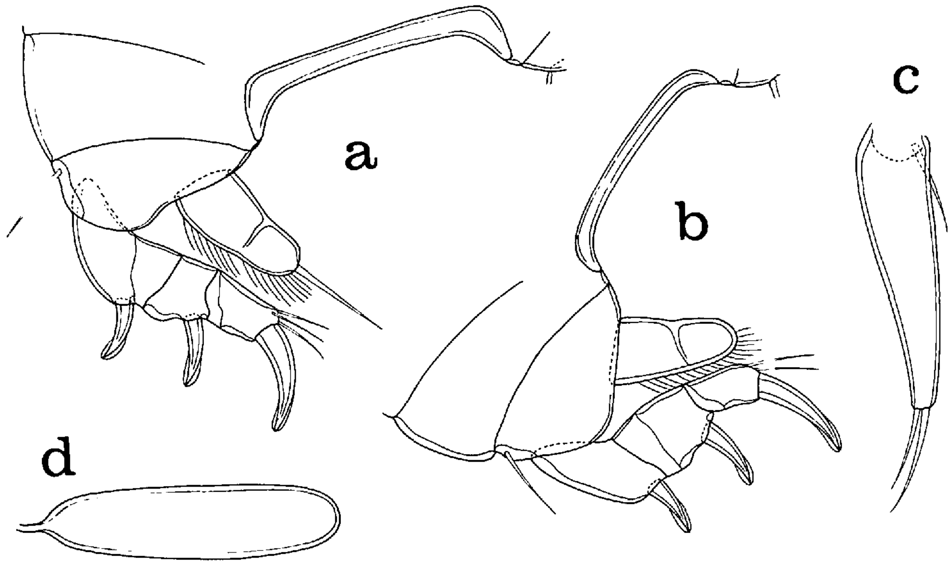


Figure 46. *Xarifia rasilis* new species. Female: a, leg 1 and intercoxal plate, posterior (scale F); b, leg 3 and intercoxal plate, posterior (F); c, leg 5, lateral (C). Male: d, spermatophore, attached to female, lateral (J).

Leg 5 (Fig. 46c) elongate, 94 μm, 23 μm wide proximally, and 9 μm wide distally, bearing 2 terminal setae. With adjacent dorsal seta.

Color in life in transmitted light opaque gray, eye red.

Male.—Unknown, except for pair of spermatophores (Fig. 46d) attached to holotype female. Spermatophore elongate, 192 × 49 μm.

Etymology.—The specific name *rasilis,* Latin meaning having a smooth surface, alludes to the absence of processes on the area dorsal to the fifth legs in the female.

Remarks.—*Xarifia rasilis* may be differentiated from all nine species of *Xarifia* that lack processes on the region dorsal to the fifth legs in the female by the observation of three characters: (1) the nature of leg 5 in the female, (2) the number of segments in the endopods of legs 1–4, and (3) the presence of a distinct outer spine on the second segment of the exopods of legs 1–4. In *X. anopla* Humes and Dojiri, 1982, leg 5 is entirely absent. In *X. extensa* Humes and Dojiri, 1982, *X. levis* new species, described above, and *X. acicularis* new species, described above, leg 5 is represented only by two or three setae. *X. reducta* Humes, 1962, *X. serrata* Humes, 1962, *X. lissa* Humes and Ho, 1968, and *X. temnura* Humes and Ho, 1968, lack a distinct outer spine on the second segment of the exopods of legs 1–4. In *X. exuta* Humes and Dojiri, 1982, leg 5 of the female is oval, 47 × 31 μm, and the endopods of legs 1–4 are 1-segmented.

Four species of *Xarifia* have, as in *X. rasilis,* the formula 1, 1, 0, 0 for the terminal armature of the endopods of legs 1–4. Of these, *X. torigera* new species, described below, and *X. heteromeles* Humes and Dojiri, 1982, may be distinguished from the new species by their three long processes above the fifth legs in the female. The remaining two species, *X. extensa* and *X. temnura,* may be distinguished from *X. rasilis* as mentioned above.

Xarifia reducta Humes, 1962

Hosts.—*Seriatopora caliendrum* Ehrenberg and *Seriatopora* sp.

New Record.—12 ♀♀, 10 ♂♂, and 2 copepodids from *Seriatopora* sp., in 2 m, Ambariobe, near Nosy Bé, Madagascar, 25 May 1967.

Locality.—Madagascar.

Notes.—The maxilliped of the female (Fig. 40i) shows a minute process on the third segment in addition to the two setae. In one female the endopods of leg 1 had a slightly abnormal shape (Fig. 40j). The spermatophore (Fig. 40k), attached to the female, measures 233 × 47 μm, not including the neck.

Features for Recognition.—Length of female 1.06 mm (1.00–1.12 mm) and male 0.91 mm (0.84–0.97 mm). Ratio of length to width of female about 7:1. Female with region above fifth legs lacking processes. Caudal ramus in both sexes distinct from anal segment. Second antenna 4-segmented. Legs 1–4 with exopods having outer armature I,0,I (but small knob on second segment) and 1-segmented endopods with terminal armature 2, 2, 1, 1. Leg 5 in female with moderately long segment, 34 μm. Leg 5 in male represented by 3 setae. Eggs seriate.

Xarifia resex Humes and Dojiri, 1983

Hosts.—*Goniopora tenuidens* (Quelch) and *Goniopora* sp.

Localities.—Madagascar, Moluccas (Halmahera).

Features for Recognition.—Length of female 1.41 mm (1.33–1.39 mm) and male 1.57 mm (1.49–1.66 mm). Ratio of length to width in female about 5.8:1. Female with 3 long nearly equal processes above fifth legs. Caudal ramus in both sexes short, only a little longer than wide. First antenna very short, only 19 μm long. Second antenna 4-segmented. Legs 1–4 with exopods having outer armature I,I,I and 2-segmented endopods with terminal armature 3, 3, 0, 0. Leg 5 in female with moderately long segment, 70 μm. Leg 5 in male represented by 3 small setae.

Xarifia rosariae Humes and Dojiri, 1982

Host.—*Acropora rosaria* (Dana).

Locality.—New Caledonia.

Features for Recognition.—Length of female 1.67 mm (1.53–1.76 mm) and male 1.44 mm (1.36–1.53 mm). Body very long and slender, female about 13 times longer than wide. Female with 3 long processes above fifth legs, middle process distinctly longer than 2 lateral processes. Caudal ramus short, less than 2 times longer than wide. Second antenna 3-segmented. Legs 1–4 with exopods having outer armature I,I,I for leg 1 but I,0,I for legs 2–4; 1-segmented endopods with terminal armature 0, 0, 0, 0. Leg 5 in female with elongate segment, 105 μm. Leg 5 in male represented by 3 small setae.

Xarifia sabiuraensis Misaki, 1978

Hosts.—*Acropora abrotanoides* (Lamarck), *Acropora convexa* (Dana), *Acropora florida* (Dana), *Acropora hyacinthus* (Dana), *Acropora intermedia* (Brook), *Acropora patula* (Brook), and *Acropora rambleri* (Bassett-Smith). [*Acropora pectinata* (Brook), reported as a host by Misaki (1978), is a synonym of *Acropora hyacinthus* (Dana); *Acropora gravida* (Dana) and *Acropora affinis* (Brook), reported as hosts by Humes and Dojiri (1982), are synonyms of *Acropora florida* (Dana); *Acropora danai* (Milne Edwards and Haime), also reported as a host by Humes and Dojiri (1982), is a synonym of *Acropora abrotanoides* (Lamarck) (Pichon, pers. comm.).]

Localities.—Japan (southern Honshu), Enewetak Atoll, Moluccas (Halmahera, Ceram), New Caledonia.

Features for Recognition.—Length of female 1.59 mm (1.56–1.66 mm) and male 1.44. Ratio of length to width in female about 10:1. Female with 3 long processes above fifth legs, middle process distinctly longer than other two processes (relative lengths of these processes variable). Caudal ramus in both sexes set off from anal segment. Second antenna 4-segmented, but third and fourth segments indistinctly separated. Legs 1–4 with exopods having outer armature I,I,I in leg 1 but I,0,I in legs 2–4; 1-segmented endopods with terminal armature 0, 0, 0, 0. Leg 5 in female with moderately long segment, 65 μm. Leg 5 in male represented by 3 small setae. Eggs seriate.

Xarifia scutipes Humes and Dojiri, 1983

Hosts.—*Goniopora tenuidens* (Quelch) and *Goniopora pedunculata* Quoy and Gaimard.

Locality.—Moluccas (Halmahera).

Features for Recognition.—Length of female 2.03 mm (1.93–2.09 mm) and male 2.02 mm (1.96–2.09 mm). Ratio of length to width in female 4.5:1. Female with 3 long equal recurved processes above fifth legs. Caudal ramus in female set off from anal segment, but in male fused with that segment. Second antenna 4-segmented. Legs 1–4 with exopods having outer armature I,I,I and 2-segmented endopods (segments incompletely separated) with terminal armature 2, 2, 0, 0. Leg 5 in female with large, nearly round, flat, shieldlike free segment 288 × 259 μm; in male represented only by 3 setae. Eggs in cluster.

Xarifia sectilis new species
Figures 47a–o, 48a–m

Type Material.—33 ♀♀, 31 ♂♂ from 1 colony of *Pocillopora damicornis* (Linnaeus) in 2 m, west of Isle Mando, near Noumea, New Caledonia, 22°18′59″S, 166°09′30″E, 1 July 1971. Holotype ♀ (USNM 210329), allotype (USNM 210330), and 55 paratypes (28 ♀♀, 27 ♂♂) (USNM 210331) deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C.

Other Specimens.—From *Pocillopora eydouxi* Milne Edwards and Haime: 14 ♀♀, 16 ♂♂, and 1 copepodid, in 4 m, west of Enewetak Island, Enewetak Atoll, Marshall Islands, 17 July 1969; 11 ♀♀, 16 ♂♂, in 3 m, same locality and date; 7 ♀♀, 6 ♂♂, in 2 m, Rigili Island, Enewetak Atoll, 3 July 1969. From *Stylophora pistillata* (Esper): 2 ♀♀, in 2 m, Big Broadhurst Reef, Great Barrier Reef, northeastern Australia, 18°58′03″S, 147°45′04″E, 1 November 1982.

Female.—Body (Fig. 47a, b) moderately slender, ratio of length to width 7:1. Length 1.73 mm (1.54–1.93 mm) and greatest width 0.25 mm (0.22–0.28 mm), based on 10 specimens. External segmentation obscure. Region dorsal to fifth legs with 3 moderately long posteriorly directed processes of nearly equal length (Fig. 47c). Genital and postgenital segments together about 27 percent of body length. Genital areas situated dorsolaterally. Caudal ramus (Fig. 47d) elongate, tapered distally, 88 μm long, 37 μm wide at base, 8 μm wide at distal end; bearing 5 smooth setae (1 outer lateral and 4 terminal). Ratio 2.38:1 (greatest width). Surface of body with numerous small setules. Egg sac (Fig. 47e–g) containing 1–10 linearly arranged eggs. Dimensions of sac with 2 eggs 242 × 143 μm, with 3 eggs 330 × 154 μm, and with 10 eggs 836 × 154 μm.

Rostrum (Fig. 47h) broadly rounded. First antenna (Fig. 47h) 59 μm long,

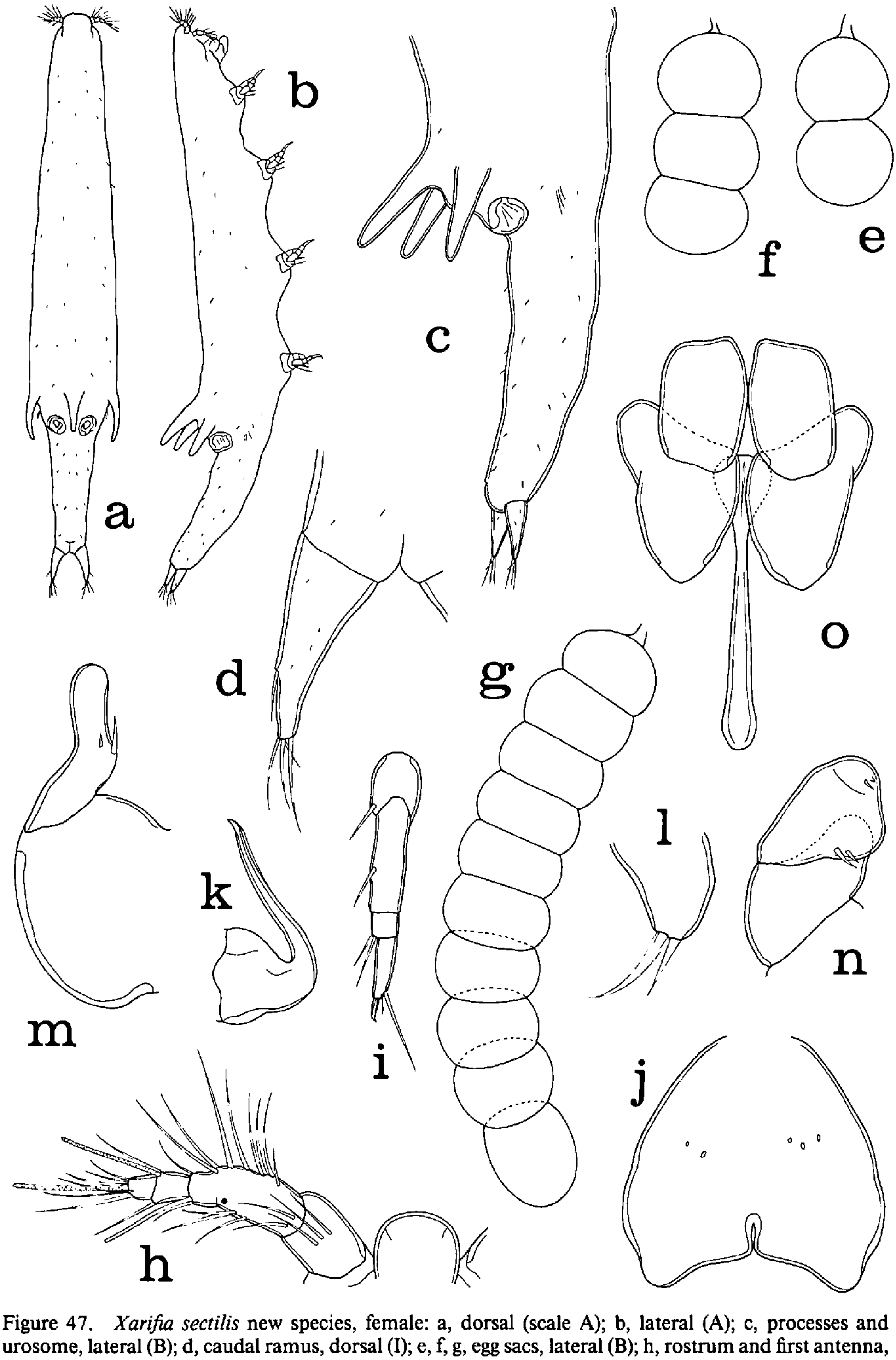


Figure 47. *Xarifia sectilis* new species, female: a, dorsal (scale A); b, lateral (A); c, processes and urosome, lateral (B); d, caudal ramus, dorsal (I); e, f, g, egg sacs, lateral (B); h, rostrum and first antenna, with dot indicating position of aesthete in male, anterodorsal (D); i, second antenna, anterodorsal (D); j, labrum, ventral (D); k, mandible, anterior (F); l, first maxilla, anterior (F); m, second maxilla, inner (F); n, maxilliped, antero-inner (D); o, maxillipeds and intermaxillipedal sclerite, posteroventral (D).

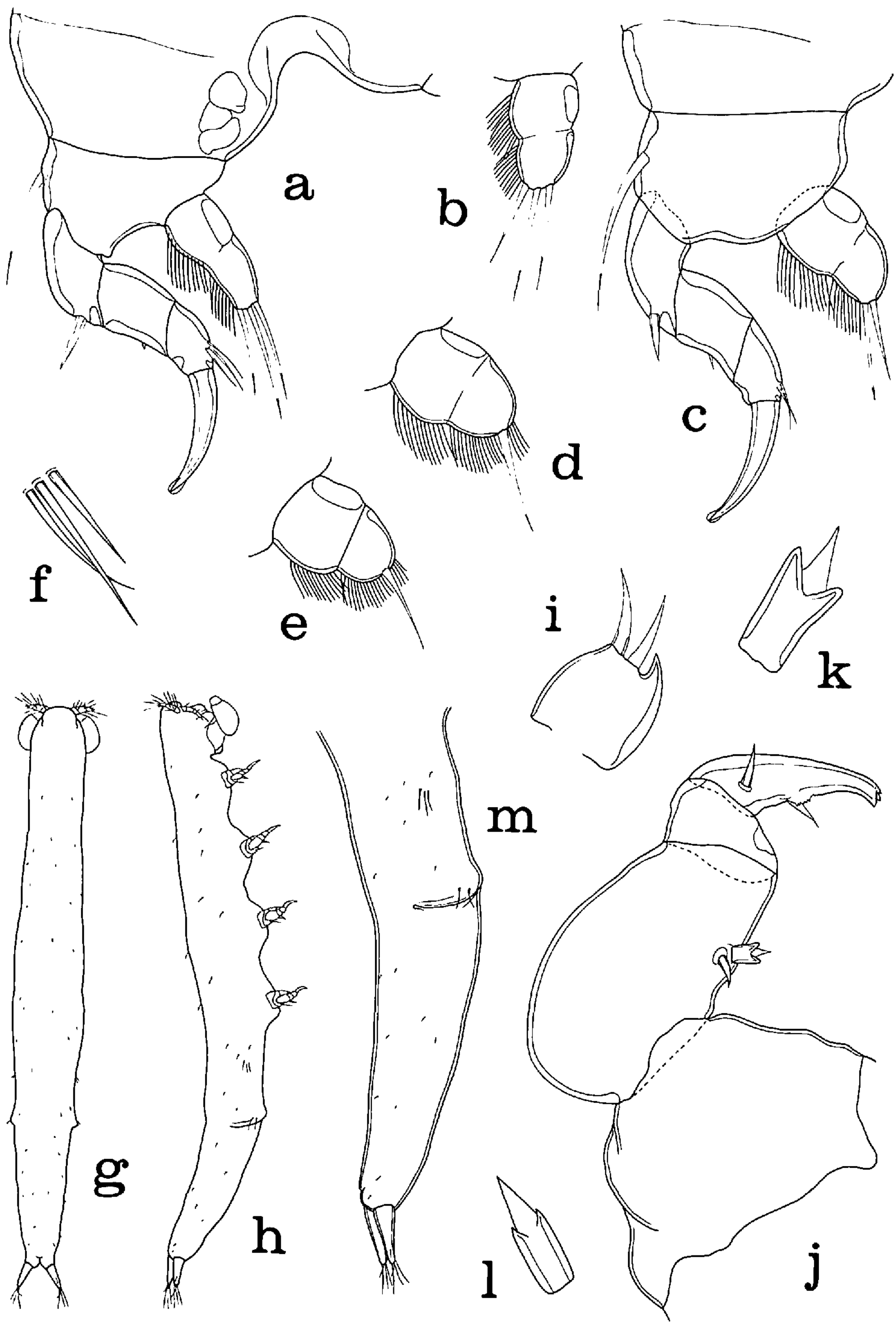


Figure 48. *Xarifia sectilis* new species. Female: a, leg 1 and intercoxal plate, anterior (scale D); b, endopod of leg 1, anterior (D); c, leg 2, posterior (D); d, endopod of leg 3, anterior (D); e, endopod of leg 4, anterior (D); f, leg 5, lateral (E). Male: g, dorsal (A); h, lateral (A); i, first maxilla, posterior (F); j, maxilliped, inner (C); k, modified seta on second segment of maxilliped, inner (E); l, modified seta from another male, inner (E); m, urosome, with legs 5 and 6, lateral (B).

probably 4-segmented but separation of segments sometimes weak. Lengths of segments (measured along posterior side): 12 (22 μm along anterior side), 25, 9, and 5 μm, respectively. Armature: 3, 15 + 1 aesthete, 2 + 1 aesthete, and 7 + 1 aesthete. All setae naked. Second antenna (Fig. 47i) 4-segmented, 60 μm long not including claw. Formula: 1, 1, 2, and I + 2. Claw very small, only 5 μm, adjacent long seta about 25 μm.

Labrum (Fig. 47j) with posteroventral margin deeply indented medially and having small outer lobes. Ventral surface with few refractile areas. Mandible (Fig. 47k) 28 μm, blade slender, smooth. Paragnath a small lobe. First maxilla with 2 setae. Second maxilla (Fig. 47l) 2-segmented, first segment unarmed, second segment recurved, digitiform, with 2 unequal setae. Maxilliped (Fig. 47m, n) 3-segmented, though third segment indistinctly set off from second segment. First segment with large distal outer lobe. Second segment with 2 proximal inner setae. Third segment with small seta and minute process. Elongate sclerite between bases of maxillipeds (Fig. 47o), extending posteriorly nearly to intercoxal plate of leg 1.

Legs 1–4 (Fig. 48a–e) with 3-segmented exopods and 2-segmented endopods (though segments of endopods not always completely separated). Spine and setal formula as follows:

P_1	coxa	0-0	basis	1-0	exp	I-0;	I-0;	I,3
					enp	0-0;	3	
P_2	coxa	0-0	basis	1-0	exp	I-0;	I-0;	I,2
					enp	0-0;	2	
P_{3+4}	coxa	0-0	basis	1-0	exp	I-0;	I-0;	I,2
					enp	0-0;	1	

Outer spine on second segment of exopod of leg 1 very small, only 2 μm long and hyaline, sometimes difficult to distinguish. This spine in legs 2–4 slightly longer. Inner side of first segment of endopods of all legs with unusually thick sclerotization. Both segments of endopods with outer hairlike setules. Endopods with terminal armature 3, 2, 1, 1.

Leg 5 (Fig. 48f) without free segment and consisting only of 3 smooth setae, 2 of them 15 μm and 19 μm long, dorsal seta 12 μm long. These setae often difficult to identify except under very high magnification.

Color in life in transmitted light opaque gray, eye red, eggs dark greenish gray.

Male.—Body (Fig. 48g, h) slender, about 8.65 times longer than wide. Length 1.65 mm (1.56–1.69 mm) and greatest width 0.21 mm (0.19–0.22 mm), based on 10 specimens. Caudal ramus similar to that of female but smaller, 78 × 34 μm, ratio 2.29:1.

Rostrum like that of female. First antenna resembling that of female, but 1 aesthete added on second segment (at location shown by dot in Fig. 47h). Second antenna as in female.

Labrum, mandible, and paragnath as in female. First maxilla (Fig. 48i) with spiniform process in addition to 2 setae. Second maxilla as in female. Maxilliped (Fig. 48j) 4-segmented. First segment unarmed. Second segment with 2 inner setae, one normal, other modified with broad sclerotized distally cleft proximal part and hyaline attenuate distal part (Fig. 48k, l). Small third segment unarmed. Claw (fourth segment) short, 70 μm, bearing 2 proximal setae and having small serrate process on concave surface and trifid tip.

Legs 1–4 as in female.

Leg 5 (Fig. 48m) consisting only of 3 setae as in female.

Leg 6 (fig. 48m) represented by 2 small setae on posteroventral flap on genital segment.

Spermatophore not seen.

Color as in female.

Etymology.—The specific name *sectilis,* Latin meaning cleft or divided, alludes to the appearance of the modified seta on the second segment of the maxilliped of the male.

Remarks.—Five species of *Xarifia* have the formula 3, 2, 1, 1 for the terminal armature of the endopods of legs 1–4, as in *Xarifia sectilis.* These five species are readily distinguishable from the new species as follows: in the female of *Xarifia serrata* Humes, 1962, the region dorsal to the fifth legs lacks processes and has only a small ridge; in the female of *Xarifia trituberata* Humes and Dojiri, 1982, this region bears three small subequal knobs; in *Xarifia levis* new species, described above, this region is smooth, without knobs or processes; in *Xarifia basilica* new species, described above, the region bears three short processes (knobs); and in *Xarifia dissona* new species, described above, the outer armature of the exopods of legs 1–4 is 1,0,I.

A similarly modified seta on the second segment of the maxilliped of the male is not found in other species of the genus and is diagnostic of *Xarifia sectilis.*

Xarifia serrata Humes, 1962

Hosts.—*Pocillopora damicornis* (Linnaeus), *Stylophora subseriata* (Ehrenberg), *Pocillopora verrucosa* (Ellis and Solander), *Pocillopora* sp. cf. *P. verrucosa* (Ellis and Solander). [*Pocillopora bulbosa* Ehrenberg, reported as a host by Humes and Ho (1968), is a synonym of *Pocillopora damicornis* Dana; *Seriatopora subseriata* Ehrenberg, also reported by Humes (1962) and Humes and Frost (1964) as a host, is a *Stylophora* (Pichon, pers. comm.).]

New Records.—From *Pocillopora damicornis* (Linnaeus): 11 ♀♀, 13 ♂♂, in 1–3 m, Pte. Lafayette, Mauritius, 1 February 1964. From *Pocillopora* sp.: 4 ♀♀, in 20 m, Banc de Cinq Mètres, near Nosy Bé, Madagascar, 6 August 1967; 1 ♀, 3 ♂♂, in 2–3 m, Pointe aux Sables, near Great River Bay, outer side of barrier reef, Mauritius, 25 January 1964.

Localities.—Madagascar, Mauritius.

Features for Recognition.—Length of female 1.30 mm (1.18–1.40 mm) and male 1.35 mm (1.24–1.55 mm). Ratio of length to width of female about 6:1. Female with area above fifth legs without process but may be produced as transverse ridge. Caudal ramus set off from anal segment in both sexes. Second antenna 4-segmented. Legs 1–4 with exopods having outer armature I,0,I and 1-segmented endopods (with slight indication of subdivision) with terminal armature 3, 2, 1, 1. Leg 5 in female with elongate segment, 122 μm. Leg 5 in male represented by 3 setae. Eggs seriate.

Xarifia simplex new species
Figures 49a–m, 50a–k

Type Material.—10 ♀♀, 3 ♂♂ from *Scapophyllia cylindrica* Milne Edwards and Haime, in 2 m, Isle Mando, near Noumea, New Caledonia, 22°18′59″S, 166°09′30″E, 1 July 1971. Holotype ♀ (USNM 210338), allotype (USNM 210339), and 7 paratypes (6 ♀♀, 1 ♂) (USNM 210340) deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C.

Female.—Body (Fig. 49a, b) moderately stout, 5.38 times longer than wide. Length 1.81 mm (1.72–1.93 mm) and greatest width 0.31 mm (0.26–0.33 mm), based on 9 specimens. Region dorsal to fifth legs with 3 long posteriorly directed processes (Fig. 49c) of nearly equal length but variable in form (compare Fig. 49c and d). Genital and postgenital segments together about 17 percent of body length. Caudal ramus (Fig. 49e) elongate, 104 × 36 μm, ratio 2.88:1, with 1 outer lateral seta and 4 terminal setae. Body surface with scattered small hairs (setules). Egg sac (Fig. 49f) 352 × 260 μm, containing 6 eggs with average diameter 157 μm (146–174 μm) × 129 μm (120–138 μm).

Rostrum (Fig. 49g) broadly rounded with conspicuous setules. First antenna (Fig. 49g) 100 μm long, 5-segmented. Lengths of segments (measured along posterior side): 17 (33 μm along anterior side), 33, 10, 11, and 10 μm, respectively. Armature: 3, 18, 3, 2 + 1 aesthete, and 7 + 1 aesthete. Second antenna (Fig. 49h) 4-segmented, 122 μm long including claw. Armature: 1, 1, 2, and I + 1. Claw (Fig. 49i) 17.5 μm.

Labrum (Fig. 49j) broad with posteroventral margin having only slight median indentation and weakly developed lateral lobes. Mandible (Fig. 49k) 39 μm, with smooth blade. Paragnath a small lobe. First maxilla (Fig. 49l) with 2 setae. Second maxilla (Fig. 49m) 2-segmented, first segment unarmed, second segment slender, arcuate, with unilamellate tip, and bearing 2 proximal inner setae. Maxilliped (Fig. 50a, b) 3-segmented, unarmed first segment with large anterior lobe, second segment with 2 small inner setae and slight inner distal lobe, and small third segment with 2 small setae (processes ?).

Legs 1–4 (Fig. 50c–f) with 3-segmented exopods and 2-segmented endopods. Spine and setal formula as follows:

P_1	coxa	0-0	basis	1-0	exp	I-0;	I-0;	I,3
					enp	0-0;	1	
P_2	coxa	0-0	basis	1-0	exp	I-0;	I-0;	I,3
					enp	0-0;	2	
P_3	coxa	0-0	basis	1-0	exp	I-0;	I-0;	I,2
					enp	0-0;	0	
P_4	coxa	0-0	basis	1-0	exp	I-0;	I-0;	I,2
					enp	0-0;	1	

Basis in all 4 legs with inner tuft of long setules. Tips of exopod spines with minutely bifurcate tips, particularly in leg 1. Both segments of endopods in all 4 legs with outer hairs. Terminal armature of endopods 1, 2, 0, 1.

Leg 5 (Fig. 50g) elongate, approximately 218 μm, with 2 terminal setae about 26 μm.

Color in life in transmitted light opaque gray, eye red, egg sacs gray.

Male.—Body (Fig. 50h, i) more slender than in female, about 7.7 times longer than wide. Length 2.18 mm (2.13–2.23 mm) and greatest width 0.29 mm (0.28–0.29 mm), based on 3 specimens. Caudal ramus similar to that of female but smaller, 83 × 26 μm, ratio 3.19:1.

Rostrum as in female. First antenna similar to that of female but 1 aesthete added on second segment (at location indicated by dot in Fig. 49g). Second antenna like that of female.

Labrum, mandible, paragnath, first maxilla, and second maxilla as in female. Maxilliped (Fig. 50j) 4-segmented. First segment unarmed. Somewhat swollen second segment with 2 inner setae. Small third segment unarmed. Claw (fourth segment) 88 μm long, with trifurcate tip and triangular process on concave edge, and bearing 2 proximal setae, one of them with reflexed tip.

Legs 1–4 as in female.

Leg 5 (Fig. 50k) with small free segment 15 × 10 μm.

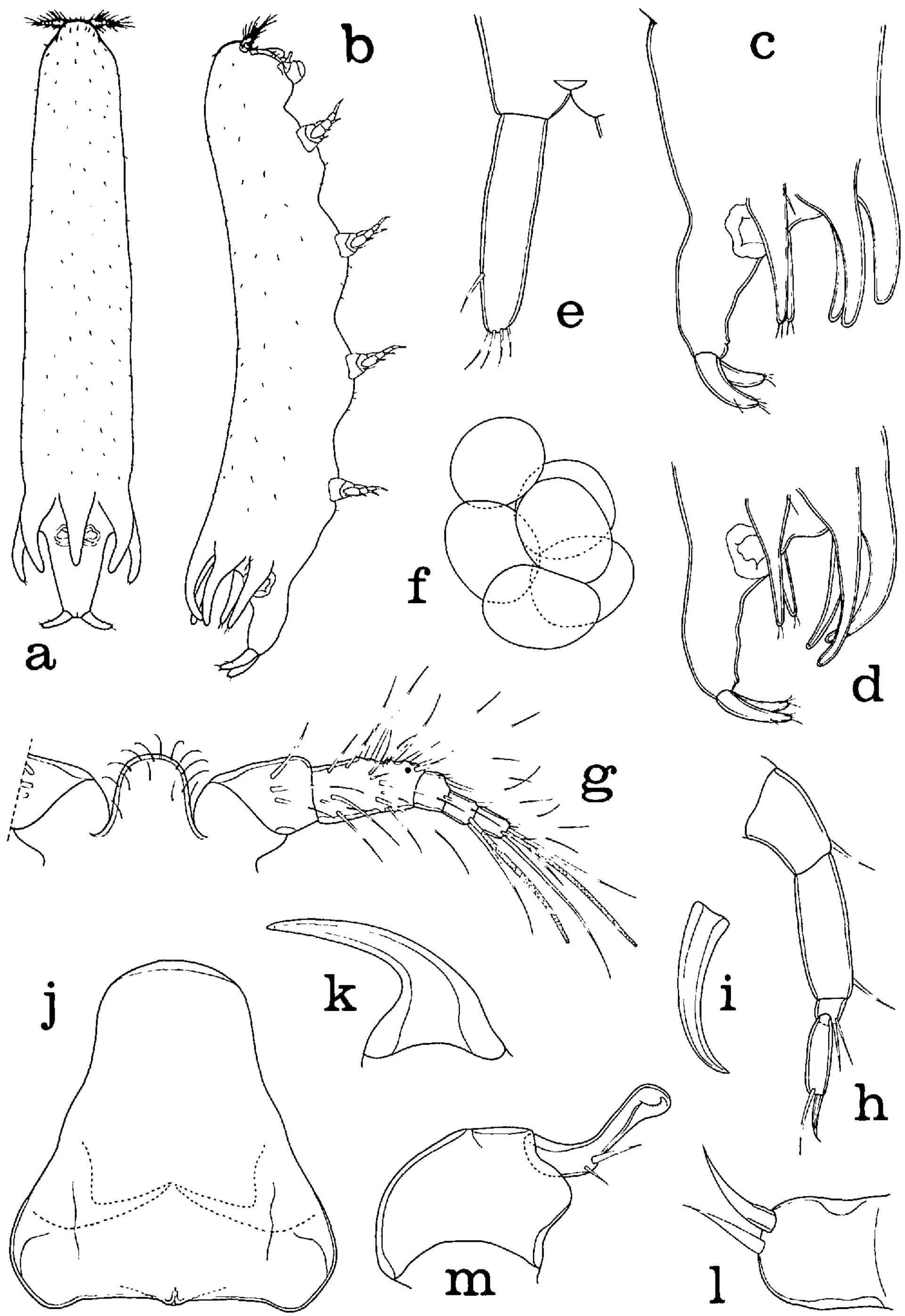


Figure 49. *Xarifia simplex* new species, female: a, dorsal (scale A); b, lateral (A); c, processes and urosome, lateral (B); d, processes and urosome, lateral (B); e, caudal ramus, dorsal (I); f, egg sac, lateral (B); g, rostrum and first antenna, with dot indicating position of aesthete in male, dorsal (C); h, second antenna, ventral (C); i, claw of second antenna, ventral (E); j, labrum, with positions of mandibles shown by broken lines, ventral (D); k, mandible, ventral (F); l, first maxilla, ventral (F); m, second maxilla, postero-outer (D).

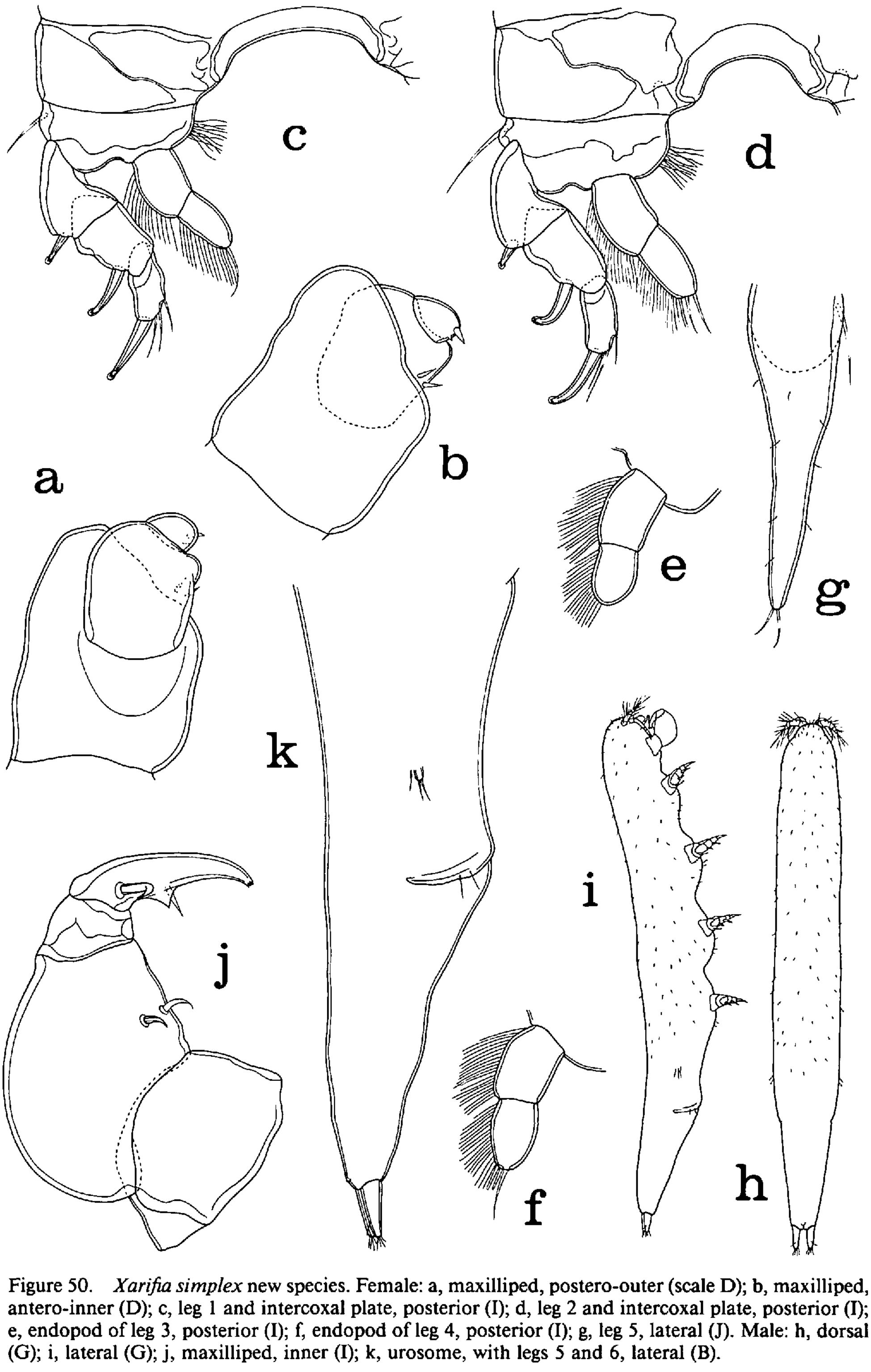


Figure 50. *Xarifia simplex* new species. Female: a, maxilliped, postero-outer (scale D); b, maxilliped, antero-inner (D); c, leg 1 and intercoxal plate, posterior (I); d, leg 2 and intercoxal plate, posterior (I); e, endopod of leg 3, posterior (I); f, endopod of leg 4, posterior (I); g, leg 5, lateral (J). Male: h, dorsal (G); i, lateral (G); j, maxilliped, inner (I); k, urosome, with legs 5 and 6, lateral (B).

Leg 6 (Fig. 50k) represented by 2 slender setae on posteroventral flap on genital segment.

Spermatophore not seen.

Color as in female.

Etymology.—The specific name *simplex,* Latin meaning simple, natural, or plain, is given in reference to the general appearance of this species.

Remarks.—*Xarifia simplex* is the only species in the genus with the formula 1, 2, 0, 1 for the terminal armature of the endopods of legs 1–4. Nineteen species have, as in the new species, the combination of five characters: a 4-segmented second antenna, 2-segmented endopods in legs 1–4, well-developed spines on all three segments of the exopods of legs 1–4, an elongate leg 5 in the female, and in the female three long processes of nearly equal size and length. Twelve of these species may be separated from *X. simplex* on the basis of the length of the female: those with the length less than 1.5 mm (*X. anomala* Humes and Ho, 1968, *X. brevicauda* Humes and Ho, 1968, *X. clavellata* new species, described above, *X. diminuta* Humes and Ho, 1967, *X. finitima* new species, described above, *X. formosa* new species, described above, *X. gradata* Humes and Dojiri, 1983, *X. imitans* new species, described above, *X. plectrata* new species, described above, and *X. resex* Humes and Dojiri, 1983), and those with the length greater than 2.0 mm (*X. curtata* Humes and Dojiri, 1983, and *X. radians* Humes and Dojiri, 1982).

The remaining seven species, whose length in the female may overlap that of the new species, may be distinguished as follows: in *X. apertipes* Humes and Dojiri, 1983, the inner margin of the basis of legs 1–4 is smooth; in *X. comptula* Humes and Dojiri, 1983, the mandible has a serrate lamella, and the claw of the male maxilliped has several teeth on the concave margin; in *X. echinoporae* Humes and Dojiri, 1982, the claw of the male maxilliped lacks a process on the concave margin; in *X. fastigiata* Humes and Dojiri, 1982, the rostrum is pointed, and the spines on the first and second segments of the exopods of legs 1–4 are slightly setiform; in *X. gracilipes* Humes and Dojiri, 1983, the rami in legs 1–4 are slender and elongate; in *X. lamellispinosa* Humes and Ho, 1968, the mandible is toothed, and the caudal ramus in the female is 51 × 28 μm; and in *X. uncinata* new species, described below, there is a clawlike spine on the second segment of the endopod of leg 3.

Xarifia syntoma Humes and Dojiri, 1982

Host.—*Montipora* sp. cf. *M. undata* Bernard.

Locality.—Moluccas (Ceram).

Features for Recognition.—Length of female 0.76 mm (0.71–0.81 mm) and male 0.91 mm (0.85–1.00 mm). Ratio of length to width of female about 6.6:1. Female with 3 moderately long processes above fifth legs, middle process slightly longer than 2 lateral processes. Caudal ramus in female about 2 times longer than wide, in male minute, wider than long. Second antenna 4-segmented. Legs 1–4 with exopods having outer armature I,I,I and 1-segmented endopods with terminal armature 1, 2, 0, 0. Leg 5 in both sexes without free segment and represented only by 2 setae and minute setule. Urosome very short.

Xarifia temnura Humes and Ho, 1968

Hosts.—*Montipora sinensis* Bernard, *Montipora* sp. cf. *M. undata* Bernard, and *Montipora ramosa* Bernard.

Localities.—Madagascar, New Caledonia, Moluccas (Ceram).

Features for Recognition.—Length of female 1.52 mm (1.47–1.65 mm) and male 1.46 mm (1.43–1.50 mm). Body of female very long and slender, about 10 times longer than wide. Female with region above fifth legs smooth, without processes. Caudal ramus in both sexes fused with anal segment. Postgenital segments in female forming a "tail" only about one-thirteenth body length. Second antenna 4-segmented. Legs 1–4 with exopods having outer armature I,I,I in leg 1 but I,0,I in legs 2–4; 1-segmented endopods with terminal armature 1, 1, 0, 0. Leg 5 in female with minute segment, 5 μm. Leg 5 in male represented by 3 small setae. Eggs seriate.

Xarifia tenta new species
Figures 51a–m, 52a–k

Type Material.—15 ♀♀, 5 ♂♂ from *Pocillopora verrucosa* (Ellis and Solander), in 2 m, western side of reef at northern end of Muti Island, Enewetak Atoll, Marshall Islands, 29 June 1969. Holotype ♀ (USNM 210314), allotype (USNM 210315), and 14 paratypes (11 ♀♀, 3 ♂♂) (USNM 210316) deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C.

Other Specimens.—8 ♀♀, 2 ♂♂ from *Pocillopora ligulata* Dana, in 2 m, in quarry, northern end of Enewetak Island, Enewetak Atoll, 20 July 1969.

Female.—Body (Fig. 51a, b) moderately stout, about 4.58 times longer than wide. Length 1.03 mm (0.97–1.08 mm) and greatest width 0.20 mm (0.19–0.22 mm), based on 10 specimens. Region dorsal to fifth legs with 3 short posteriorly directed processes and 2 small knobs (Fig. 51c, d). Genital and postgenital segments together about 29 percent of body length. Genital areas situated dorsolaterally. Caudal ramus (Fig. 51e) fused with anal segment, estimated length 31 μm, much expanded on inner side with width 17.5 μm. Ratio of length to width about 1.8: 1. Distal part of ramus contracted, width 5.5 μm, set off from large proximal part of ramus by slight subdivision on ventral surface. Armature consisting of 3 setae (1 outer lateral and 2 unequal terminal setae, longer seta 24 μm). Ramus ornamented with several hairs (sensilla). Egg sac (Fig. 51f) usually with 4 eggs (occasionally with 2 eggs), each egg 55–62 μm in diameter.

Rostrum (Fig. 51g) broadly rounded, with uneven anterior margin bearing 2 minute setae. First antenna (Fig. 51g) minute, 32 μm long, and 3-segmented (third segment 3 × 3 μm). Lengths of segments (measured along posterior side): 11, 14, and 3 μm, respectively. Armature: 3, 14 + 2 aesthetes, and 3 + 1 aesthete. All setae naked. Second antenna (Fig. 51h) 42 μm long (not including claw) and 3-segmented. Formula: 1, 1, and 1 + I + 2. Claw slender, 18 μm.

Labrum (Fig. 51i) with posteroventral margin lacking median indentation and having weak lateral lobes. Mandible (Fig. 51j) 23 μm long, with slender blade having small spinules along both sides. Paragnath a small smooth lobe. First maxilla (Fig. 51k) with 2 setae. Second maxilla (Fig. 51l) 2-segmented, somewhat conical, second segment bearing 2 minute spinules. Maxilliped (Fig. 51m, 52a) 3-segmented, truncate at tip. Second segment with 2 small inner setae and small third segment with spiniform process.

Legs 1–4 (Fig. 52b, c) with 3-segmented exopods and 1-segmented endopods. Spine and setal formula as follows:

P_{1+2}	coxa	0-0	basis	1-0	exp	I-0; 1-0; I
					enp	3
P_{3+4}	coxa	0-0	basis	1-0	exp	I-0; 1-0; I
					enp	1

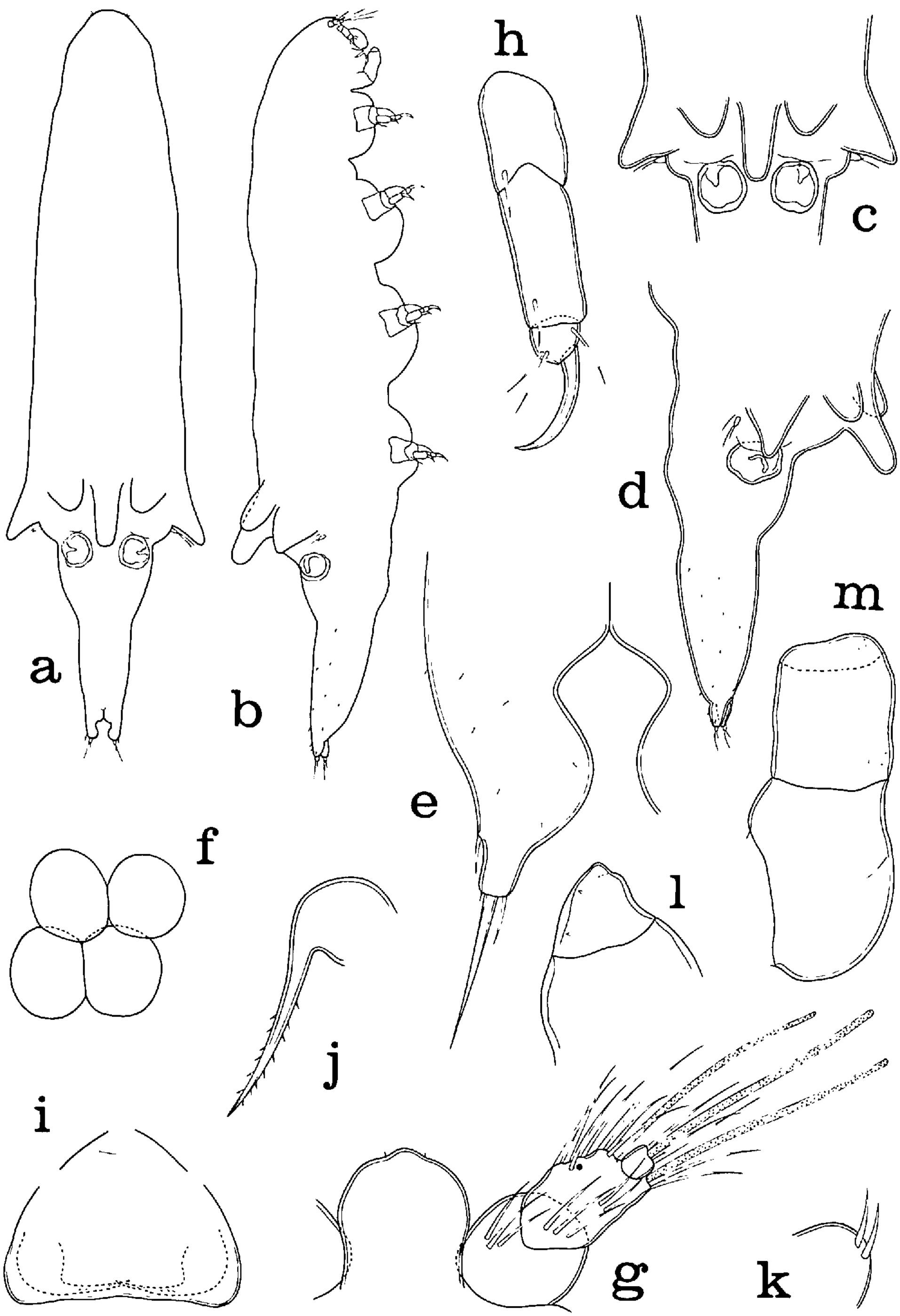


Figure 51. *Xarifia tenta* new species, female: a, dorsal (scale B); b, lateral (B); c, processes and genital areas, dorsal (H); d, processes and urosome, lateral (H); e, caudal ramus, dorsal (F); f, egg sac, lateral (B); g, rostrum and first antenna, with dot indicating position of aesthete in male, dorsal (F); h, second antenna, antero-inner (F); i, labrum, with position of mandibles shown by broken lines, ventral (D); j, mandible, ventral (E); k, first maxilla, anterior (E); l, second maxilla, inner (E); m, maxilliped, outer (F).

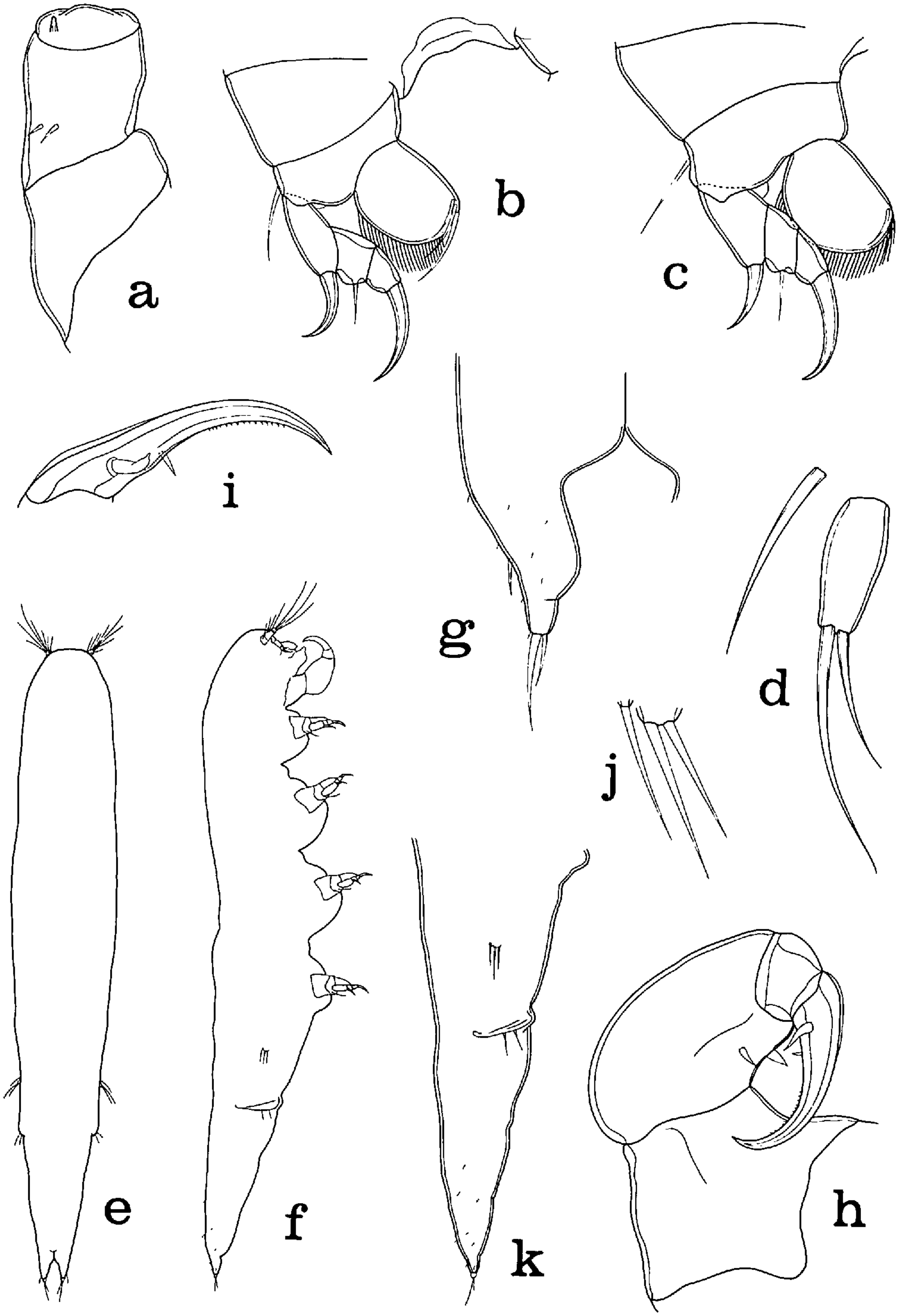


Figure 52. *Xarifia tenta* new species. Female: a, maxilliped, inner (scale F); b, leg 1 and intercoxal plate, posterior (D); c, leg 3, posterior (D); d, leg 5, lateral (E). Male: e, dorsal (B); f, lateral (B); g, caudal ramus, dorsal (F); h, maxilliped, inner (D); i, claw of maxilliped, inner (F); j, leg 5, lateral (F); k, urosome, with legs 5 and 6, lateral (H).

Outer margin of endopods in all 4 legs with row of hairlike setules. Terminal armature of endopods 3, 3, 1, 1.

Leg 5 (Fig. 52d) with small free segment 14 × 6.5 μm bearing 2 terminal setae 29 μm and 19 μm. Adjacent dorsal seta 24 μm.

Color in life in transmitted light opaque gray to tan, eye red, egg sacs gray.

Male.—Body (Fig. 52e, f) more slender than in female, 5.84 times longer than wide. Length 0.91 mm (0.87–0.94 mm) and greatest width 0.14 mm, based on 5 specimens. Caudal ramus (Fig. 52g) 24 × 11 μm, armed as in female, but inner expansion not as great as in that sex.

Rostrum as in female. First antenna like that of female, but 1 aesthete added on second segment (at location shown by dot in Fig. 51g). Second antenna similar to that of female.

Labrum, mandible, paragnath, first maxilla, and second maxilla like those of female. Maxilliped (Fig. 52h) 4-segmented. First segment unarmed. Second segment with 2 inner hyaline setae. Small third segment unarmed. Claw (fourth segment) (Fig. 52i) 45 μm, bearing 2 proximal setae and having row of minute spines along distal concave margin.

Legs 1–4 like those of female.

Leg 5 (Fig. 52j) with 2 setae arising on low pedestal and 1 adjacent dorsal seta.

Leg 6 (Fig. 52k) represented by 2 small setae on posteroventral flap on genital segment.

Spermatophore not seen.

Color as in female.

Etymology.—The specific name *tenta*, Latin meaning expanded or spread out, alludes to the expansion of the inner margin of the caudal ramus, especially in the female.

Remarks.—The presence of two knobs in addition to the three processes on the region dorsal to the fifth legs in the female is not common in the genus *Xarifia*. The four species showing this condition are: *Xarifia maldivensis* Humes, 1960, *Xarifia gibberula* new species, described above, *Xarifia quinaria* new species, described above, and *Xarifia umbonata* new species, described below, all having the formula 3, 3, 1, 1 for the terminal armature of their 1-segmented endopods in legs 1–4, as in *Xarifia tenta*. Each of these species differs, however, from the new species in several respects. *X. umbonata* has a small seta instead of a long spine on the outer side of the first segment of the exopod of legs 1–4 and the inner side of the caudal ramus of the female is not expanded. In *X. quinaria* the body is longer (♀ 1.30 mm, ♂ 1.09 mm) and the claw of the maxilliped in the male is smooth. In *X. gibberula* and *X. maldivensis* the three processes dorsal to the region of the fifth legs are long and slender.

In *Xarifia tenta* the caudal ramus of the female is much more expanded inwardly than in either *X. maldivensis* or *X. quinaria,* and serves as a useful character for recognition.

Xarifia tenuis Humes, 1962

Host.—*Acropora cytherea* (Dana).

Locality.—Madagascar.

Features for Recognition.—Length of female 1.38 mm (1.29–1.48 mm) and male 1.27 mm (1.22–1.30 mm). Ratio of length to width of female 11:1. Female with area above fifth legs with 3 long processes, middle process about twice as long as other two. Caudal ramus in both sexes set off from anal segment, about 4 times longer in female than in male. Second antenna 4-segmented, but third and fourth segments indistinctly separated. Legs 1–4 with exopods having outer armature 0,0,I (but minute process on first segment) and 1-segmented endopods with terminal armature 0, 0, 0, 0. Leg 5 in female with moderately long segment, 33 μm. Leg 5 in male represented by 2 setae. Eggs seriate.

Xarifia torigera new species
Figures 53a–j, 54a–j

Type Material.—3 ♀♀ from *Favites flexuosa* (Dana), in 3 m, southern shore of Goenoeng Api, Banda Islands, Moluccas, 04°32′05″S, 129°52′30″E, 26 April 1975. Holotype (USNM 210344) and 1 paratype (USNM 210345) deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C.

Female.—Body (Fig. 53a, b) moderately stout, 6.7 times longer than wide (but 4.4 times if width is taken at level of processes). Length 2.30 mm (2.18–2.43 mm) and greatest width 0.39 mm (0.37–0.40 mm) based on 3 specimens. Region dorsal to fifth legs with 2 long recurved lateral processes and large swollen median process 264 × 231 μm (Fig. 53c). Genital and postgenital segments together comprising about 16 percent of body length. Urosome recurved dorsally (Fig. 53b). Genital areas situated dorsolaterally. Caudal ramus (Fig. 53d) 92 × 42 μm, ratio 2.19:1, bearing 1 outer lateral seta and 4 terminal setae. Egg sac (Fig. 53e) containing 4 eggs with average size 158 × 133 μm, extreme dimensions 176 μm and 125 μm.

Rostrum (Fig. 53f) broad. First antenna (Fig. 53f) 120 μm long, 6-segmented (though separation between second and third segments incomplete). Lengths of segments (measured along posterior side): 28 (42 μm along anterior side), 52 (42 + 10), 11, 13, and 12 μm, respectively. Armature: 3, 16 (9 + 7), 4 + 1 aesthete, 2 + 1 aesthete, and 7 + 1 aesthete. Second antenna (Fig. 53g) 140 μm, 4-segmented. Formula: 1, 1, 2, and I + 1. Claw (Fig. 53h) 21 μm.

Labrum (Fig. 53i) broad, its posteroventral margin indented medially with 2 minute lobes associated with cleft and having lateral lobes. Mandible (Fig. 53j) 55 μm, blade smooth with tip slightly hooked. Paragnath a small lobe. First maxilla (Fig. 54a) with 2 small setae. Second maxilla (Fig. 54b) 2-segmented, second segment bearing 2 very unequal setae and distal lamellate prolongation with few minute terminal spinules. Maxilliped (Fig. 54c) 3-segmented. First segment with outer lobe. Second segment with 2 setae. Third segment with terminal spiniform process and small subapical seta.

Legs 1–4 (Fig. 54d–g) with 3-segmented exopods and 2-segmented endopods. Spine and setal formula as follows:

P_{1+2}	coxa	0-0	basis	1-0	exp	1-0;	1-0;	I,2
					enp	0-0;	1	
P_{3+4}	coxa	0-0	basis	1-0	exp	1-0;	1-0;	I,2
					enp	0-0;	0	

First and second segments of exopods with seta instead of spine. Terminal exopod spine bluntly tipped. Endopods with both segments having outer setules. Terminal armature of endopods 1, 1, 0, 0.

Leg 5 (Fig. 54h) elongate, about 215 μm long, tapered, with 2 terminal setae 16 μm and 34 μm. Adjacent dorsal seta 36 μm.

Color in life in transmitted light pale brown, orange brown intestine, eye red, egg sacs gray.

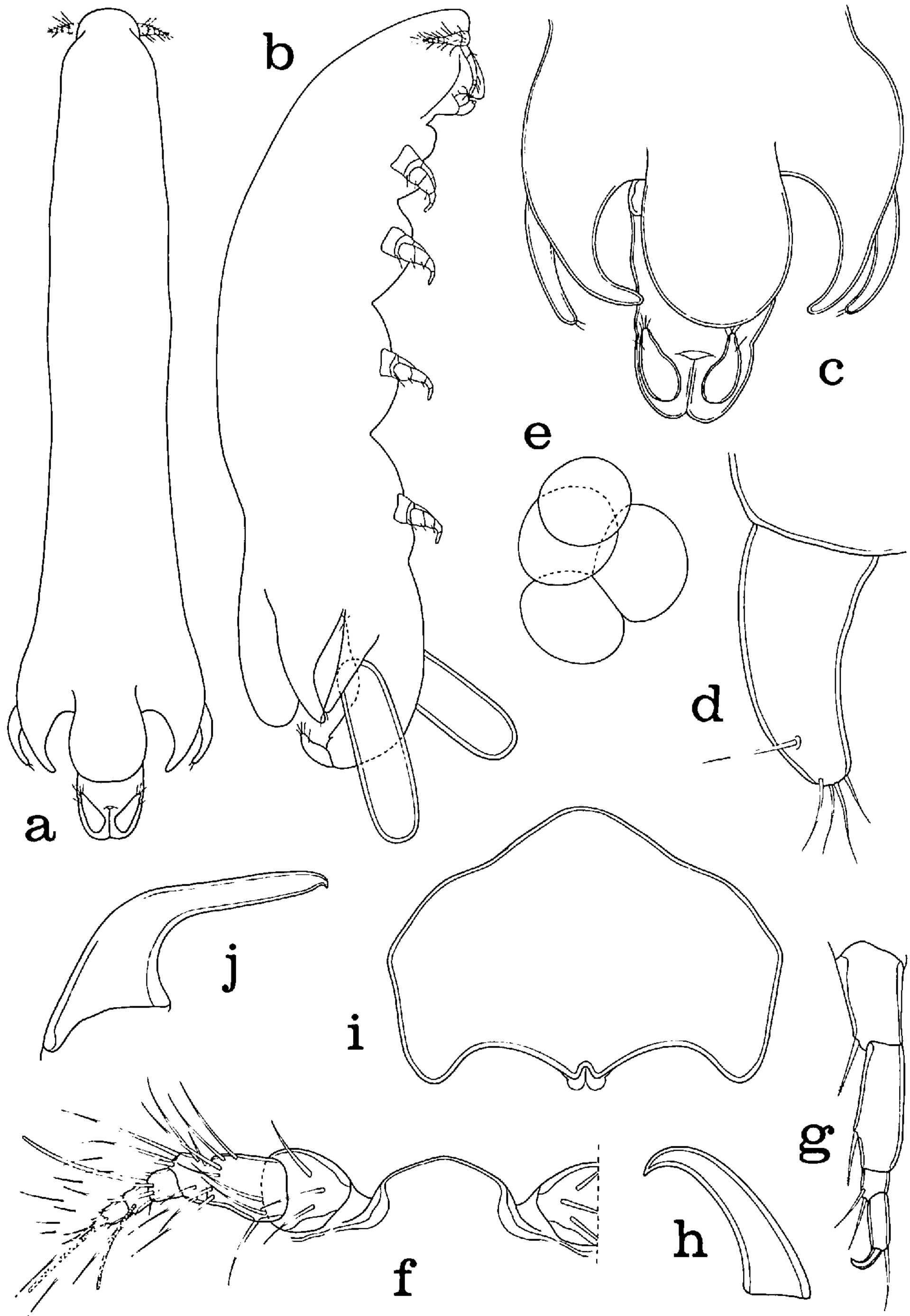


Figure 53. *Xarifia torigera* new species, female: a, dorsal (scale A); b, lateral (A); c, processes and urosome, dorsal (B); d, caudal ramus, dorsal (C); e, egg sac, lateral (B); f, rostrum and first antenna, dorsal (I); g, second antenna, anterior (I); h, claw of second antenna, anterior (E); i, labrum, ventral (C); j, mandible, ventral (F).

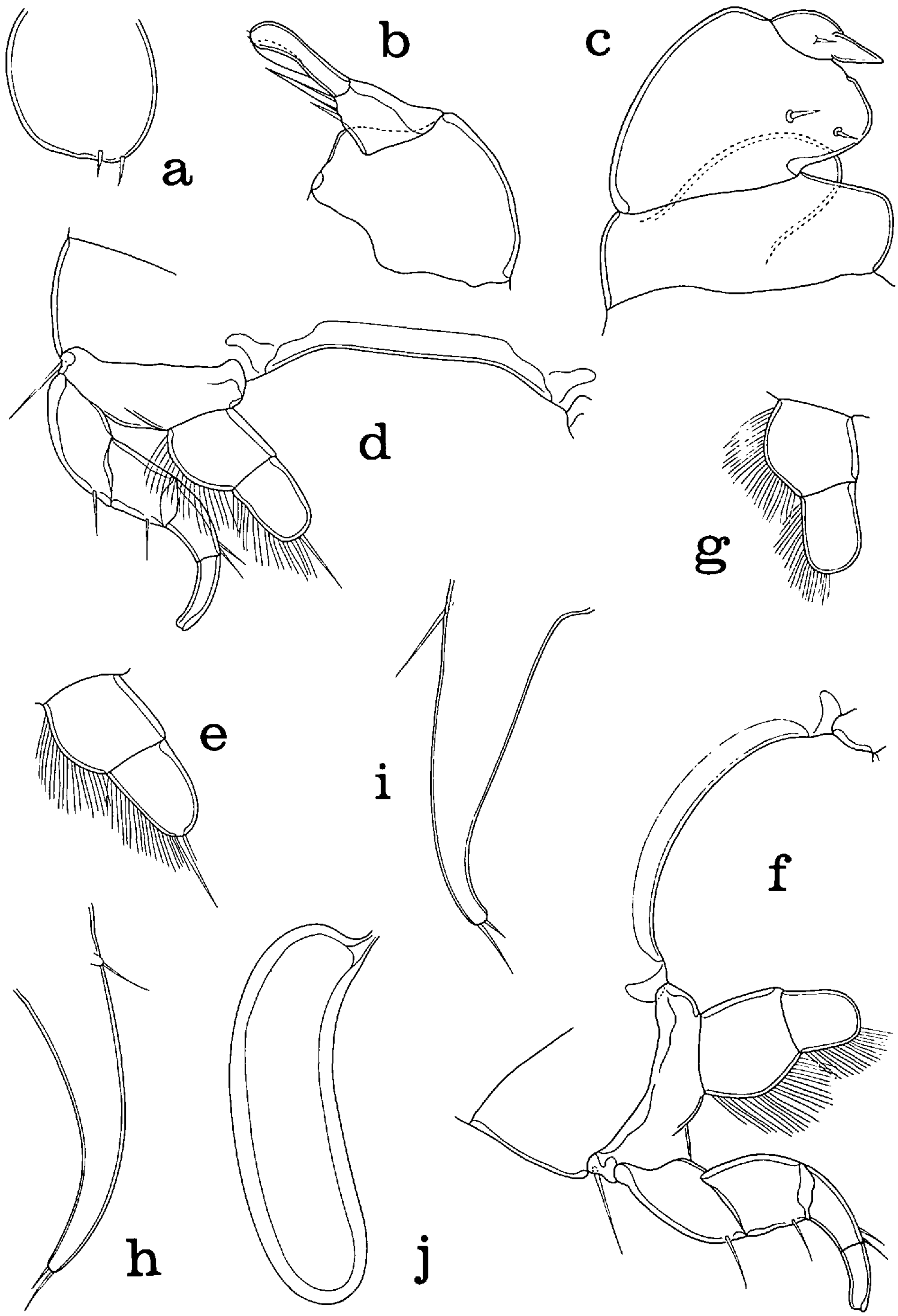


Figure 54. *Xarifia torigera* new species. Female: a, first maxilla, anteroventral (scale F); b, second maxilla, postero-outer (D); c, maxilliped, inner (D); d, leg 1 and intercoxal plate, anterior (I); e, endopod of leg 2, anterior (I); f, leg 3 and intercoxal plate, anterior (I); g, endopod of leg 4, anterior (I); h, leg 5, dorsal (J); i, leg 5, lateral (J). Male: j, spermatophore, attached to female, ventral (B).

Male.—Unknown, except for spermatophore (attached to female), elongate, 539 × 154 μm, ratio 3.5:1 (Figs. 53b, 54j).

Etymology.—The specific name *torigera,* Latin *torus,* a round swelling or protuberance, and *-ger,* bearing, refers to the swollen median process above the region of the fifth legs in the female.

Remarks.—*Xarifia torigera* may be distinguished by the large swollen median process (together with two long lateral processes) above the fifth legs in the female. Only *Xarifia mediolobata* Humes and Dojiri, 1982, has a stout median lobe resembling that in the new species. However, the lobe in *X. mediolobata* is smaller. *X. mediolobata* is further distinguished from *X. torigera* by its lack of lateral processes, and by the first and second segments of the exopods of legs 1–4 having a spine rather than a seta.

Two species of *Xarifia* have, as in the new species, a seta on both the first and second segments of the exopods of legs 1–4. They are separated from *X. torigera* on the basis of other characters. *Xarifia fimbriata* Humes, 1960, has three long slender processes and two small knobs on the region above the fifth legs in the female, and the endopods of legs 1–4 are 1-segmented rather than 2-segmented as in the new species. *Xarifia umbonata* new species, described below, has a short median process, two longer lateral processes, and two small knobs, and the endopods of legs 1–4 are 1-segmented.

Only three species of *Xarifia* have, as in the new species, the formula 1, 1, 0, 0 for the terminal armature of the endopods in legs 1–4. These species, *Xarifia temnura* Humes and Ho, 1968, *Xarifia heteromeles* Humes and Dojiri, 1982, and *Xarifia extensa* Humes and Dojiri, 1982, may be distinguished from *X. torigera* by their 1-segmented endopods in legs 1–4. Furthermore, *X. temnura* and *X. extensa* lack processes above the fifth legs in the female, and *X. heteromeles* has a 3-segmented second antenna.

Xarifia trituberata Humes and Dojiri, 1982

Hosts.—*Acropora abrotanoides* (Lamarck), *Acropora* "*corymbosa*" (Lamarck), *Acropora florida* (Dana), *Acropora humilis* (Dana), *Acropora hyacinthus* (Dana), *Acropora intermedia* (Brook), *Acropora patula* (Brook), and *Acropora rambleri* (Bassett-Smith) [*Acropora danai* (Milne Edwards and Haime), reported as a host for this species by Humes and Dojiri (1982), is a synonym of *Acropora abrotanoides* (Lamarck); *Acropora gravida* (Dana) and *Acropora affinis* (Brook), also reported as hosts by Humes and Dojiri (1982), are synonyms of *Acropora florida* (Dana); the name *Acropora* "*corymbosa*" (Lamarck) represents a mixture of 5 or 6 species (Pichon, pers. comm.).]

Localities.—New Caledonia, Moluccas (Halmahera, Ceram).

Features for Recognition.—Length of female 1.50 mm (1.49–1.53 mm) and male 1.59 mm (1.43–1.66 mm). Ratio of length to width in female about 7:1. Region above fifth legs in female with 3 small knobs or processes. Caudal ramus fused with anal segment. Second antenna 4-segmented. Legs 1–4 with exopods having outer armature I,I,I and 1-segmented endopods (with indication of subdivision) having terminal armature 3, 2, 1, 1. Leg 5 in female with relatively short segment, 42 μm. Leg 5 in male represented by 3 small setae.

Xarifia tumorisa Misaki, 1978

Previously Known Hosts.—*Acropora* "*corymbosa*" (Lamarck), *Acropora elseyi* (Brook), *Acropora florida* (Dana), *Acropora hyacinthus* (Dana), and *Acropora intermedia* (Brook). [*Acropora pectinata* (Brook), reported as a host by Misaki (1978), is a synonym of *Acropora hyacinthus* (Dana); *Acropora gravida* (Dana) and *Acropora affinis* (Brook), reported as hosts by Humes and Dojiri (1982), are synonyms of

Acropora florida (Dana); *Acropora exilis* (Brook), also reported as a host by Humes and Dojiri (1982), is a synonym of *Acropora elseyi* (Brook) (Pichon, pers. comm.).]

New Hosts.—1 ♀ from *Acropora sarmentosa* (Brook), in 2 m, Mermaid Cove, Lizard Island, Great Barrier Reef, northeastern Australia, 14°39′50″S, 145°27′00″E, 26 October 1982; 8 ♀♀, 10 ♂♂ from *Acropora formosa* (Dana), same locality and date; 7 ♀♀ from *Acropora squarrosa* (Ehrenberg), same locality and date.

Localities.—Japan (southern Honshu), New Caledonia, Moluccas (Halmahera), Great Barrier Reef (Lizard Island).

Features for Recognition.—Length of female 1.33 mm (1.23–1.39 mm) and male 1.28 mm (1.16–1.39 mm). Ratio of length to width of female 5.25:1. Female with 3 long nearly equal processes above fifth legs. First two postgenital segments with posterolateral lobelike expansions. Caudal ramus set off from anal segment in both sexes. Second antenna 4-segmented. Legs 1–4 with exopods having outer armature I,I,I and 1-segmented endopods (some with slight indication of subdivision) with terminal armature 3, 3, 1, 1. Leg 5 in female with long segment, 146 μm. Leg 5 in male represented by 3 small setae. Eggs seriate.

Xarifia umbonata new species
Figures 55a–j, 56a–k, 57a–c

Type Material.—14 ♀♀, 19 ♂♂ from 1 colony of *Seriatopora hystrix* Dana, in 1 m, west of Isle N'Gou, near Noumea, New Caledonia, 22°13′44″S, 166°23′01″E, 3 August 1971. Holotype ♀ (USNM 210362), allotype (USNM 210363), and 26 paratypes (10 ♀♀, 16 ♂♂) (USNM 210364) deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C.

Female.—Body (Fig. 55a, b) moderately stout, about 4.72 times longer than wide, with prosome arched dorsally in lateral view. Length 1.18 mm (1.11–1.22 mm) and greatest width 0.26 mm (0.23–0.29 mm), based on 10 specimens. External segmentation very poorly defined. Region dorsal to fifth legs bearing short median process, 2 longer lateral processes, and 2 small knobs (Fig. 55c). Form of lateral processes variable (Fig. 55d, e). Genital and postgenital segments together about 28 percent of body length. Genital areas situated dorsolaterally. Caudal ramus (Fig. 55f, g) 34 μm long, tapered, with greatest proximal width 18 μm. Ratio of length to width 1.89:1. Distal part of ramus set off as small appendage. Caudal ramus bearing 2 terminal setae, longer 26 μm, 1 outer marginal seta, and 2 small dorsal spinules. Body surface unornamented. Egg sac (Fig. 55h) with 2 eggs having dimensions 156 × 127–134 μm.

Rostrum (Fig. 55i) rounded. First antenna (Fig. 55i) small, 52 μm long, 3-segmented. Lengths of segments (measured along posterior side): 15, 17.5, and 5.5 μm, respectively. Armature: 3, 16 + 1 aesthete, and 7 + 1 aesthete. All setae naked. Second antenna (Fig. 55j) 3-segmented, 55 μm long without claw. Armature: 1, 1, and 2 + I + 1. Claw (Fig. 56a) 25 μm long, angular proximally.

Labrum (Fig. 56b) with undulate posteroventral margin having laterally minute spiniform process and small rounded lobe. Mandible (Fig. 56c) with several small spines along both sides of blade. Paragnath a small lobe. First maxilla (Fig. 56d) with 2 setae. Second maxilla (Fig. 56e) 1-segmented, lobate, bearing 2 very small spinules. Maxilliped (Fig. 56f) 3-segmented with 2 small setae on second segment and 1 spiniform process and 1 very small seta on third segment.

Legs 1–4 (Fig. 56g, h) with 3-segmented exopods and 1-segmented endopods. Spine and setal formula as follows:

P_{1+2}	coxa	0-0	basis	1-0	exp	1-0;	1-0;	I,1
					enp	3		
P_{3+4}	coxa	0-0	basis	1-0	exp	1-0;	1-0;	I,1
					enp	1		

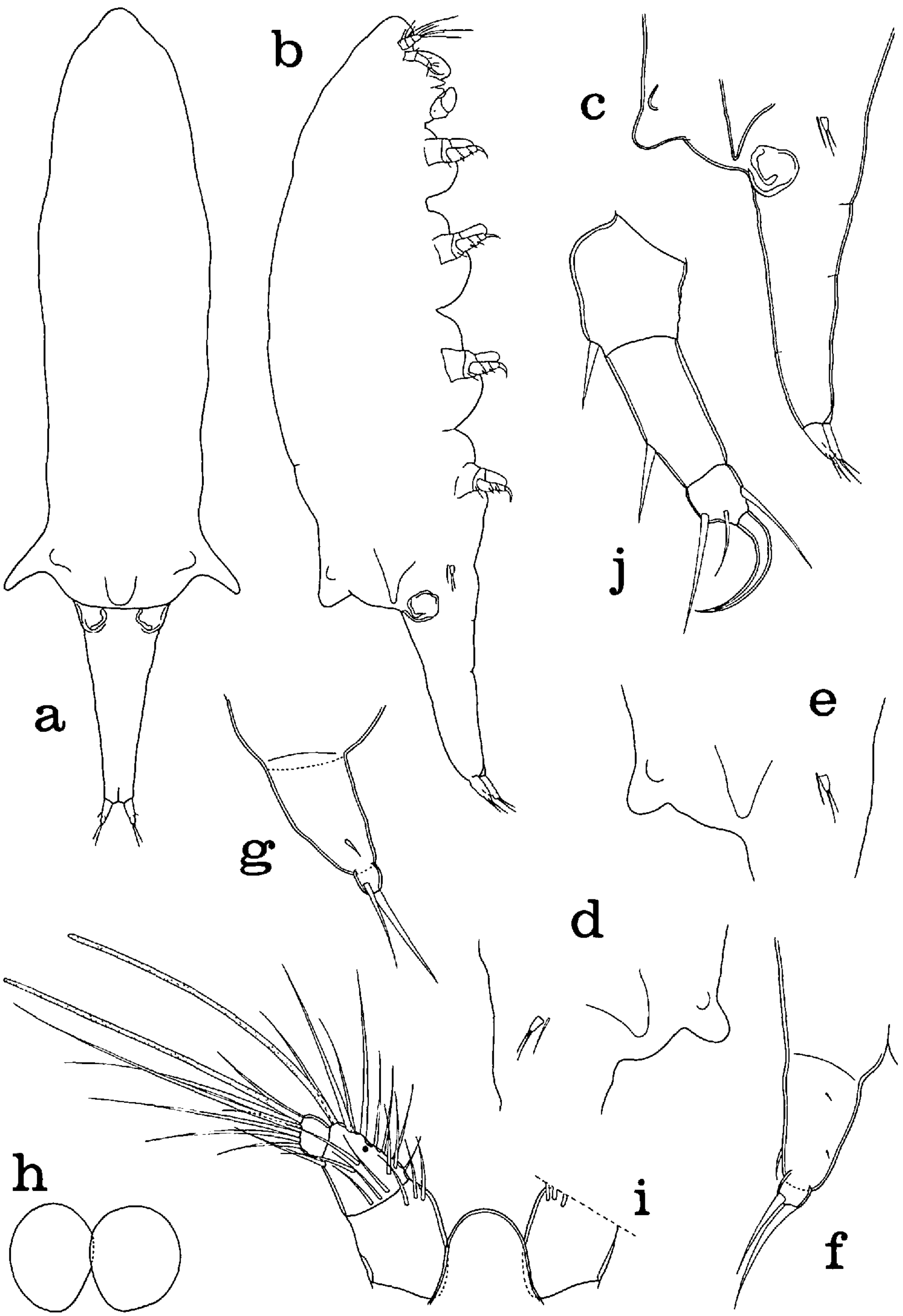


Figure 55. *Xarifia umbonata* new species, female: a, dorsal (scale B); b, lateral (B); c, processes and urosome, lateral (H); d, processes and leg 5, lateral (H); e, processes and leg 5, lateral (H); f, caudal ramus, dorsal (D); g, caudal ramus, lateral (D); h, egg sac, lateral (B); i, rostrum and first antenna, with dot indicating position of aesthete in male, dorsal (D); j, second antenna, anterior (F).

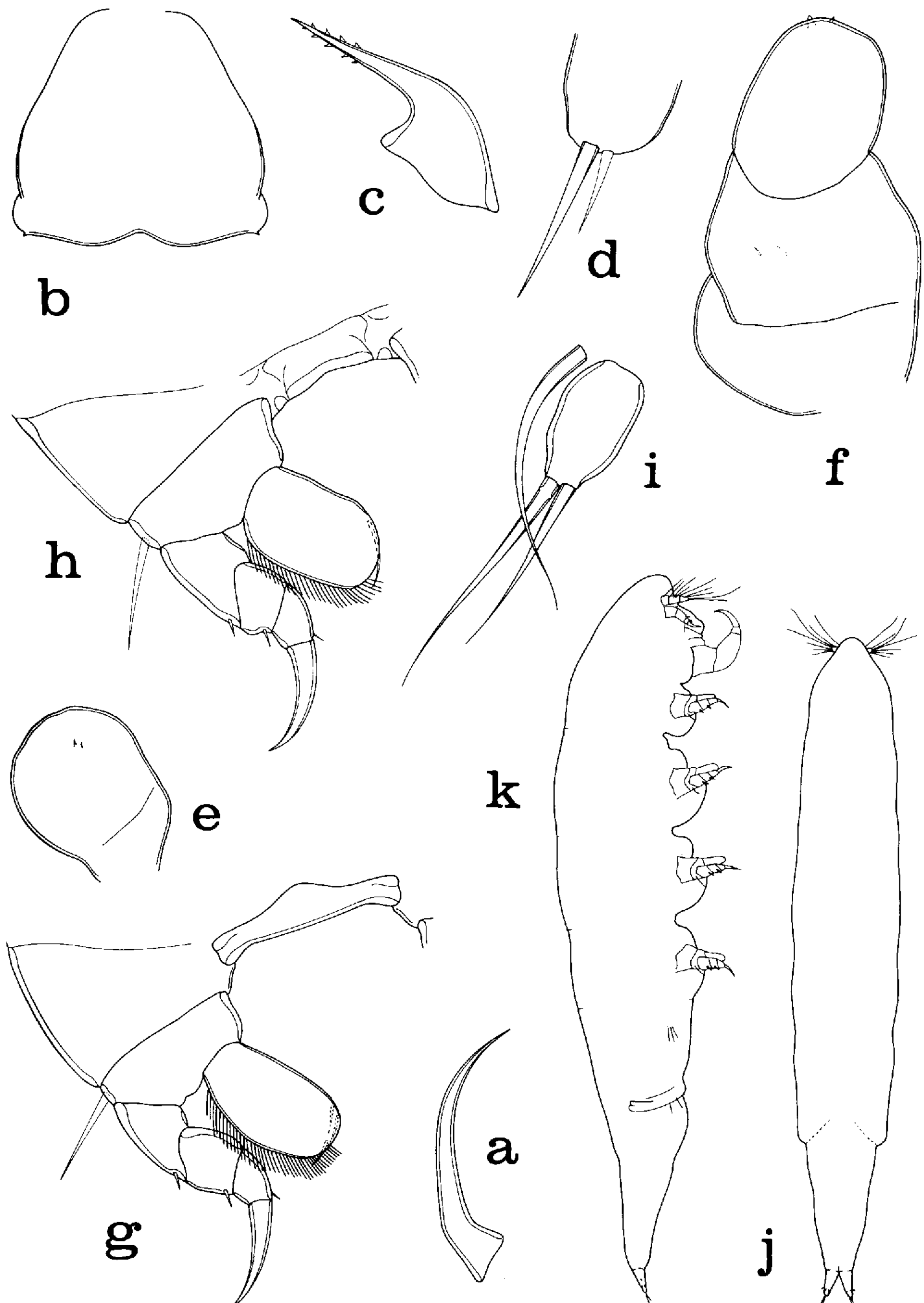


Figure 56. *Xarifia umbonata* new species. Female: a, claw of second antenna, outer (scale E); b, labrum, ventral (D); c, mandible, ventral (E); d, first maxilla, posterior (E); e, second maxilla, ventral (E); f, maxilliped, posterior (F); g, leg 1 and intercoxal plate, anterior (D); h, leg 3 and intercoxal plate, anterior (D); i, leg 5, lateral (F). Male: j, dorsal (B); k, lateral (B).

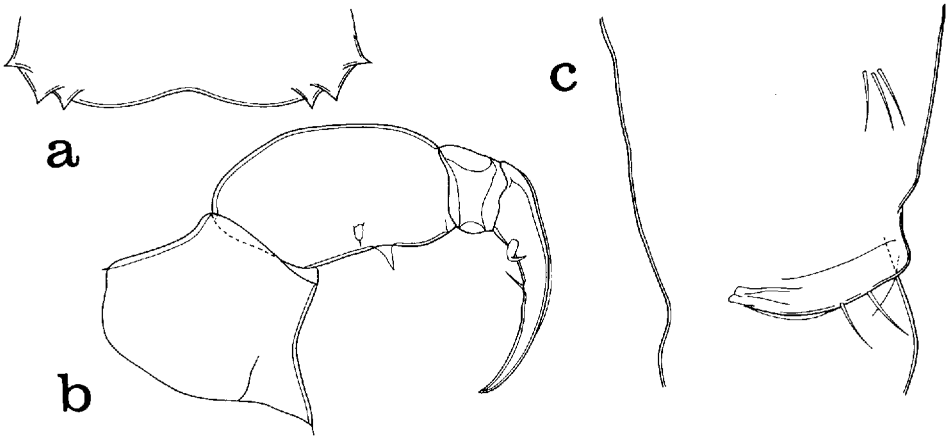


Figure 57. *Xarifia umbonata* new species, male: a, edge of labrum, ventral (scale F); b, maxilliped, inner (D); c, legs 5 and 6, lateral (I).

Setae (rather than spines) on first and second segments of exopods very small, approximately 5 μm long. Otherwise legs in general resembling those of *Xarifia obesa* Humes and Ho, 1968. Formula for terminal armature of endopods 3, 3, 1, 1.

Leg 5 (Fig. 56i) with small unornamented free segment 17 × 12 μm. Two terminal setae 28 μm and 35 μm. Adjacent dorsal seta 40 μm.

Color in life in transmitted light opaque gray, eye red.

Male.—Body (Fig. 56j, k) more slender than in female, about 6.13 times longer than wide. Length 0.97 mm (0.92–1.06 mm) and greatest width 0.17 mm (0.17–0.20 mm), based on 10 specimens. Caudal ramus as in female.

Rostrum like that of female. First antenna similar to that of female, but 1 long aesthete added (at point indicated by dot in Fig. 55i). Second antenna resembling that of female.

Labrum (Fig. 57a) sexually dimorphic, having 3 spiniform processes on outer corners. Mandible, paragnath, first maxilla, and second maxilla like those of female. Maxilliped (Fig. 57b) 4-segmented. First segment unarmed. Second segment with 2 inner setae, 1 broad-based and hyaline, other with stout proximal part and aristate tip. Third segment unarmed. Claw (fourth segment) 52 μm long, with narrow lamella on convex side, and bearing 2 setae in proximal half.

Legs 1–4 as in female.

Leg 5 (Fig. 57c) lacking free segment and represented only by 3 setae.

Leg 6 (Fig. 57c) represented by 2 setae on posteroventral flap on genital segment.

Spermatophore not seen.

Color as in female.

Etymology.—The specific name *umbonata* is a combination of Latin *umbo,* a knob, and the suffix *-atus,* provided with, alluding to the pair of small knobs between the processes dorsal to the fifth legs in the female.

Remarks.—*Xarifia umbonata* differs from all other species in the genus except *X. fimbriata* Humes, 1960, and *X. torigera* new species, described above, in having a small seta instead of a spine on both first and second segments of the exopods of legs 1–4. *X. umbonata* differs from *X. torigera*, however, in having 1-segmented endopods in legs 1–4 and in having a 3-segmented second antenna, and from *X. fimbriata* in leg 5 in the female having a free segment and in the second antenna being 3-segmented.

Xarifia uncinata new species

Figures 58a–l, 59a–i, 60a–e

Type Material.—85 ♀♀, 43 ♂♂ from *Turbinaria danae* Bernard, in 3 m, southwestern shore of Goenoeng Api, Banda Islands, Moluccas, 04°31′45″S, 129°51′55″E, 2 May 1975. Holotype ♀ (USNM 210365), allotype (USNM 210366), and 112 paratypes (76 ♀♀, 36 ♂♂) (USNM 210367) deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C.

Female.—Body (Fig. 58a, b) moderately stout, about 5.5 times longer than wide. Length 1.56 mm (1.50–1.65 mm) and greatest width 0.31 mm (0.26–0.35 mm), based on 10 specimens. External segmentation very weak. Region dorsal to fifth legs with 3 posteriorly directed processes (Fig. 58c), all of nearly same length. Genital and postgenital segments together about 32 percent of body length. Genital areas located dorsolaterally. Caudal ramus (Fig. 58d) elongate, 130 × 39 μm (greatest width), ratio 3.33:1, bearing 1 lateral seta and 4 terminal setae (3 short and 1 long). Surface of body smooth. Egg sac (Fig. 58e–g) with 4–7 eggs, sac containing 7 eggs 418 × 242 μm, each egg about 125–132 μm in diameter.

Rostrum (Fig. 58h) tapered toward rounded posteroventral tip. First antenna (Fig. 58i) 66 μm long and 5-segmented. Lengths of segments (measured along posterior side): 11, 11, 7, 11, and 9 μm, respectively. Armature: 3, 14, 5, 2 + 1 aesthete, and 7 + 1 aesthete. All setae naked. Second antenna (Fig. 58j) 4-segmented, 109 μm long without terminal setae. Formula: 1, 1, 2, and 2 + 2 setules (without distinct claw, but 1 seta slightly stouter than other).

Labrum (Fig. 58k) broadly triangular with posteroventral margin only slightly lobed, no medial indentation. Mandible (Fig. 58l) fairly stout, without lamellae but with rounded process on concave margin. Paragnath a smooth lobe. First maxilla (Fig. 59a) with 2 setae and small spiniform process. Second maxilla (Fig. 59b) 2-segmented, first segment unarmed, second segment lamellate with 2 inner setae and small terminal setiform process. Maxilliped (Fig. 59c, d) apparently 3-segmented but second and third segments not clearly separated. First segment unarmed, second segment with 2 setae, and third segment with 1 subterminal seta and 2 terminal spiniform processes.

Legs 1–4 (Fig. 59e–h) with 3-segmented exopods and 2-segmented endopods. Spine and setal formula as follows:

P_1	coxa	0-0	basis	1-0	exp	I-0;	I-0;	I,3
					enp	0-0;	3	
P_2	coxa	0-0	basis	1-0	exp	I-0;	I-0;	I,3
					enp	0-0;	2,I	
P_{3+4}	coxa	0-0	basis	1-0	exp	I-0;	I-0;	I,2
					enp	0-0;	I	

Spines on exopods with very small terminal filament. Exopod of leg 1 61 μm long, its spines 15, 19, and 23 μm, respectively. Outer margins of both segments of endopods with long hairs in all 4 legs. Single spine on second segment of endopod of legs 3 and 4 well developed and recurved. Terminal armature of endopods 3, (2,I), I, I. One endopod of leg 1 seen with only 2 setae instead of 3.

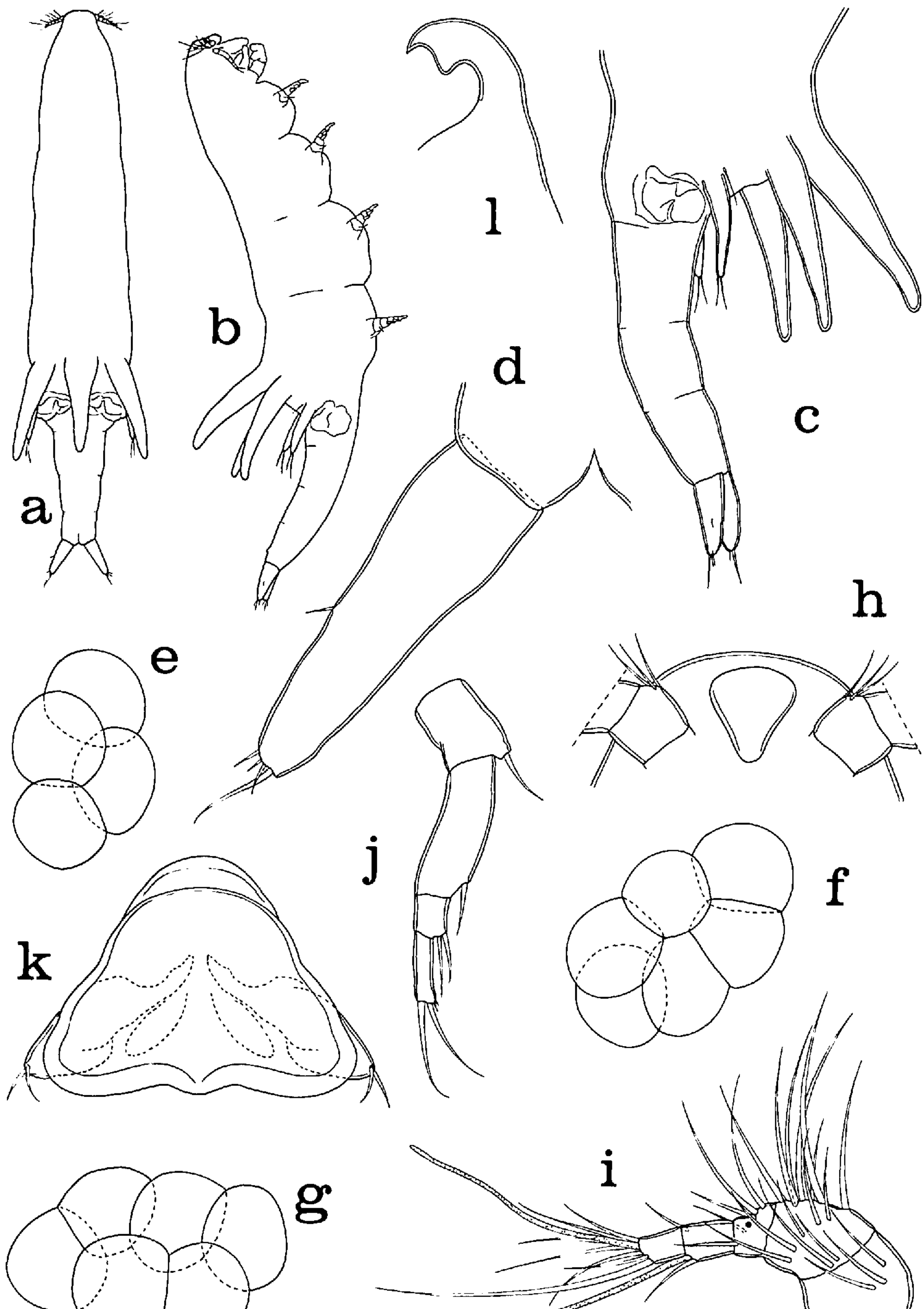


Figure 58. *Xarifia uncinata* new species, female: a, dorsal (scale A); b, lateral (A); c, processes and urosome, lateral (B); d, caudal ramus, ventral (C); e, f, g, egg sacs, lateral (B); h, rostrum, ventral (C); i, first antenna, with dot indicating position of aesthete in male, anterodorsal (D); j, second antenna, ventral (C); k, labrum, with position of mandibles, paragnaths, and first maxillae indicated by broken lines, ventral (C); l, mandible, anterior (F).

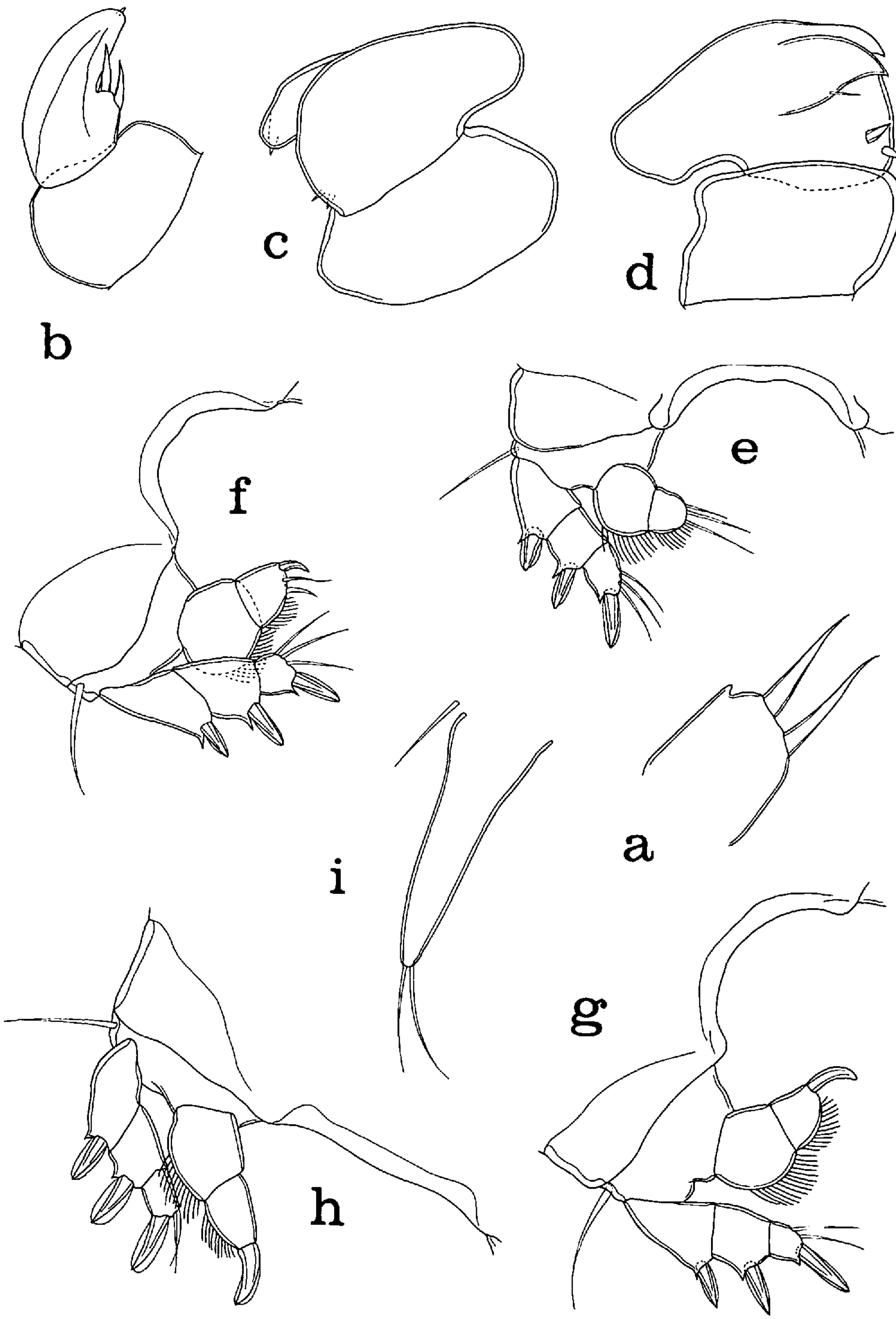


Figure 59. *Xarifia uncinata* new species, female: a, second maxilla, anterior (scale F); b, second maxilla, antero-inner (D); c, maxilliped, posterior (D); d, maxilliped, antero-inner (D); e, leg 1 and intercoxal plate, anterior (C); f, leg 2 and intercoxal plate, posterior (C); g, leg 3 and intercoxal plate, anterior (C); h, leg 4 and intercoxal plate, posterior (C); i, leg 5, lateral (I).

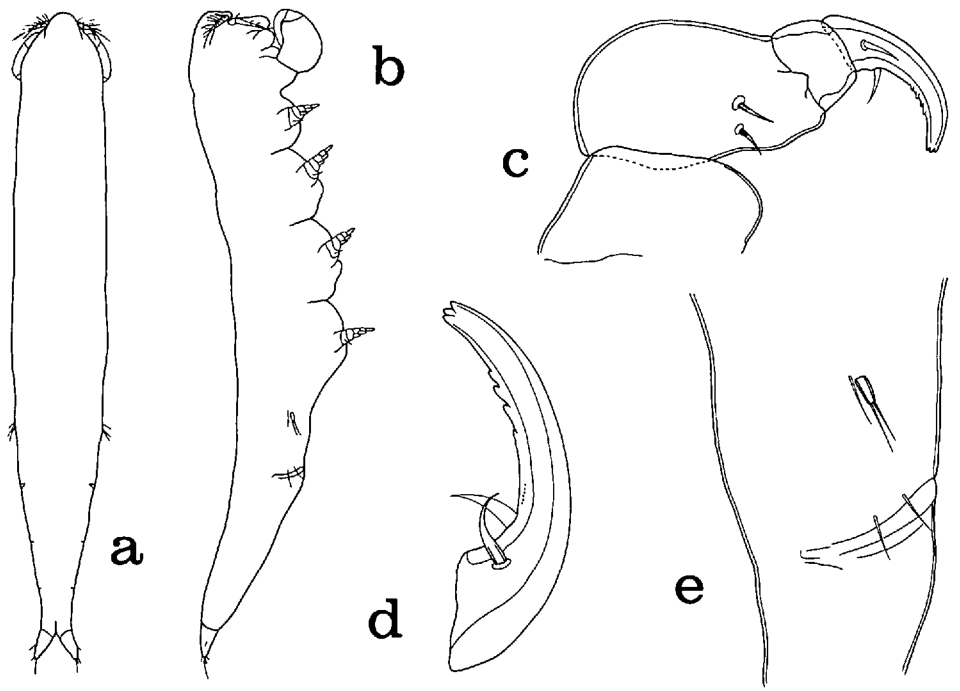


Figure 60. *Xarifia uncinata* new species, male: a, dorsal (scale A); b, lateral (A); c, maxilliped, inner (J); d, claw of maxilliped, inner (C); e, legs 5 and 6, lateral (H).

Leg 5 (Fig. 59i) elongate, 122 μm long, its 2 terminal setae 40 and 48 μm; adjacent seta on body 39 μm.

Color in life in transmitted light opaque gray, intestine slightly orange-red, eye red, egg sacs reddish gray.

Male.—Body (Fig. 60a, b) more slender than in female, about 6.8 times longer than wide. Length 1.76 mm (1.63–1.84 mm) and greatest width 0.27 mm (0.21–0.30 mm), based on 10 specimens. Caudal ramus resembling that of female but shorter, 104 μm long.

Rostrum as in female. First antenna like that of female but 1 aesthete added on third segment (at point indicated by dot in Fig. 58i). Second antenna, labrum, mandible, paragnath, first maxilla, and second maxilla resembling those of female. Maxilliped (Fig. 60c) 4-segmented. First segment unarmed. Second segment with 2 inner setae and having small anterior protuberance. Small third segment unarmed. Claw (Fig. 60d) (fourth segment) relatively short, 117 μm, with 2 proximal setae, having trifid tip, and bearing on concave surface proximal row of very minute refractile points followed distally by row of 4 denticles.

Legs 1–4 resembling those of female. Exopod of leg 1 69 μm long, its 3 spines 15, 22, and 27.5 μm, respectively. Apparent larger size of these spines probably reflection of larger body size in male rather than true sexual dimorphism.

Leg 5 (Fig. 60e) with small rectangular free segment 21 × 9 μm, its 2 terminal setae 36 μm and 32 μm; dorsal seta on body 33 μm.

Leg 6 (Fig. 60e) represented by 2 slender setae 30 μm long on posteroventral flap on genital segment.

Spermatophore not seen.
Color as in female.

Etymology.—The specific name *uncinata,* Latin meaning furnished with hooks, refers to the hooklike spines on the endopods of legs 3 and 4.

Remarks.—Terminal spines on the endopods of legs 2–4 occur only in one other species of *Xarifia, Xarifia hamata* Humes and Ho, 1968. (Terminal spines occur on the 1-segmented endopods of *Xarifia lacerans* new species, described above, but on the endopods of legs 3 and 4 only.) This Madagascan species and *Xarifia uncinata* differ, however, in easily observed features. In *X. hamata* the second segment of the exopod of legs 1–4 bears a seta rather than a spine as in the new species. Furthermore, in *X. hamata* the caudal ramus of the female is approximately 41 × 17 μm, while in *X. uncinata* it is much longer, 130 × 39 μm.

Xarifia varilabrata new species
Figures 61a–n, 62a–i

Type Material.—64 ♀♀, 82 ♂♂ from *Seriatopora hystrix* Dana, in 18 m, south of Bandanaira, Banda Islands, Moluccas, 04°32′12″S, 129°53′40″E, 2 May 1975. Holotype ♀ (USNM 210368), allotype (USNM 210369), and 119 paratypes (52 ♀♀, 67 ♂♂) (USNM 210370) deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C.

Other Specimens (all from *Seriatopora hystrix*).—40 ♀♀, 24 ♂♂, in 10 m, southwestern shore of Goenoeng Api, Banda Islands, Moluccas, 04°31′45″S, 129°51′55″E, 28 April 1975; 18 ♀♀, 21 ♂♂, in 3 m, west of Isle Mando, near Noumea, New Caledonia, 22°18′59″S, 166°09′33″E, 26 June 1971; 6 ♀♀, 7 ♂♂, in 2 m, west of Isle Maître, near Noumea, 22°20′05″S, 166°24′05″E, 21 June 1971.

Female.—Body (Fig. 61a, b) about 4.14 times longer than wide, with stout prosome. Length 0.82 mm (0.78–0.88 mm) and greatest width 0.19 mm (0.19–0.22 mm), based on 10 specimens. External segmentation obscure. Region dorsal to fifth legs bearing 2 long posteriorly directed lateral processes (Fig. 61c), median process absent. Median area between 2 processes sometimes raised angularly (Fig. 61d). Genital and postgenital segments together about 27 percent of body length. Genital areas located dorsolaterally. Caudal ramus (Fig. 61e) elongate, 27 × 11 μm, bearing 1 small lateral seta and 2 terminal setae. Body surface unornamented. Egg sac in most specimens with 2 eggs (Fig. 61f), 151 × 101 μm, 134 × 100 μm, occasionally only a single egg, or in 1 specimen 3 eggs.

Rostrum (Fig. 61g) rounded. First antenna (Fig. 61g) short, 43 μm long, 3-segmented. Lengths of segments (measured along posterior side): 15, 17, and 5 μm, respectively. Armature: 3, 14 + 1 aesthete, and 6 + 1 aesthete. All setae smooth. Second antenna (Fig. 61h) 3-segmented, 50 μm long without claw. Armature: 1, 1, and 2 + I + 1. Claw (Fig. 61i) 18 μm long, slightly angular proximally.

Labrum (Fig. 61j) with posteroventral margin nearly straight and having 2 smooth hyaline lateral lobes. Mandible (Fig. 61k) about 23 μm long, slender, with few small marginal spines. Paragnath a small lobe. First maxilla (Fig. 61l) with 2 setae. Second maxilla (Fig. 61m) small, 1-segmented, lobate, bearing only 1 minute spinule. Maxilliped (Fig. 61n) 3-segmented, first segment unarmed, second segment with 2 setae, and third segment with 3 small setae and spiniform process.

Legs 1–4 (Fig. 62a, b) with 3-segmented exopods and 1-segmented endopods. Spine and setal formula as follows:

P_{1+2}	coxa	0-0	basis	1-0	exp	I-0; 1-0; I,1
					enp	3
P_{3+4}	coxa	0-0	basis	1-0	exp	I-0; 1-0; I,1
					enp	1

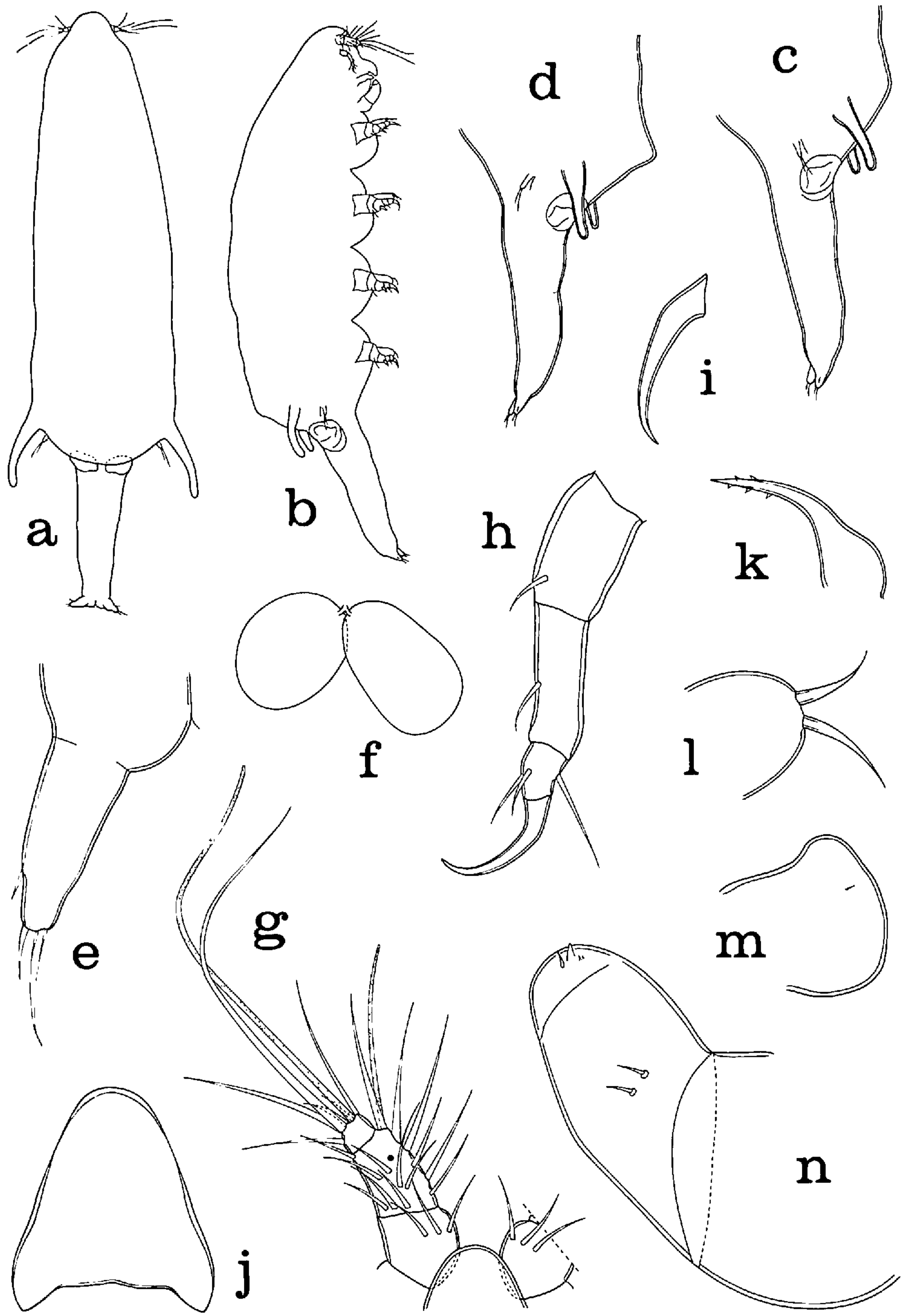


Figure 61. *Xarifia varilabrata* new species, female: a, dorsal (scale B); b, lateral (B); c, processes and urosome, lateral (H); d, processes and urosome, lateral (H); e, caudal ramus, dorsal (F); f, egg sac, lateral (H); g, rostrum and first antenna, with dot indicating position of aesthete in male, dorsal (D); h, second antenna, anterior (F); i, claw of second antenna, anterior (E); j, labrum, ventral (D); k, mandible, anterior (E); l, first maxilla, ventral (E); m, second maxilla, ventral (E); n, maxilliped, inner (E).

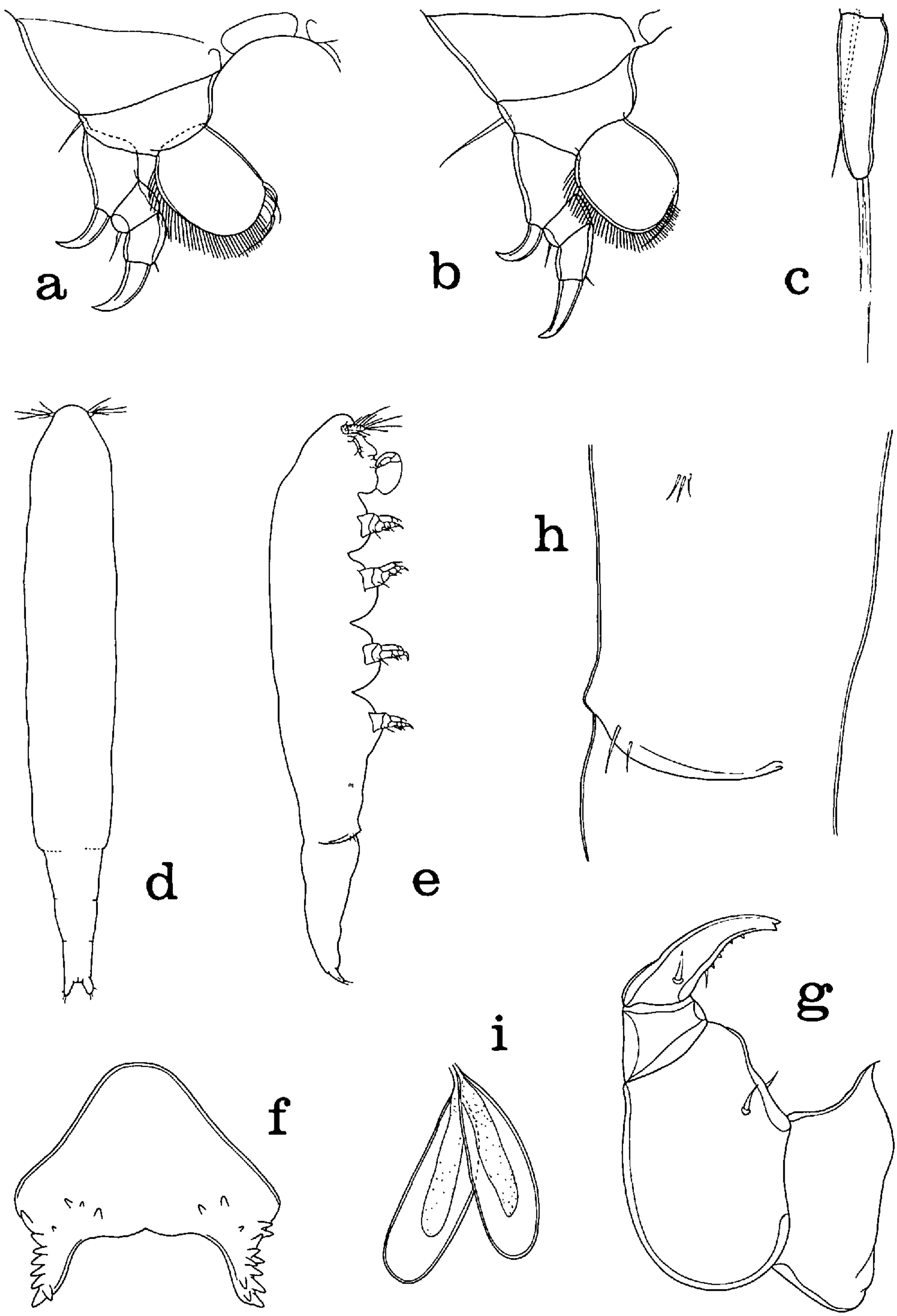


Figure 62. *Xarifia varilabrata* new species. Female: a, leg 1 and intercoxal plate, anterior (scale D); b, leg 3, anterior (D); c, leg 5, ventral (F). Male: d, dorsal (B); e, lateral (B); f, labrum, ventral (F); g, maxilliped, inner (D); h, legs 5 and 6, lateral (C); i, spermatophores, attached to female, lateral (H).

Second segment of exopod in all 4 legs with seta instead of spine. Terminal armature of endopods 3, 3, 1, 1. In general, legs closely resembling those of *Xarifia obesa* Humes and Ho, 1968.

Leg 5 (Fig. 62c) with elongate unornamented free segment 22 × 7 μm. Two terminal setae 20 μm and 28 μm. Adjacent dorsal seta 22 μm.

Color in life in transmitted light pale brown, gut dark brown, eye red, eggs orange-red.

Male.—Body (Fig. 62d, e) more slender than in female, about 6.3 times longer than wide. Length 0.85 mm (0.77–0.90 mm) and greatest width 0.14 mm (0.13–0.14 mm), based on 10 specimens. Caudal ramus 19 × 11 μm, shorter than in female.

Rostrum as in female. First antenna like that of female but 1 long aesthete added (at point shown by dot in Fig. 61g). Second antenna as in female.

Labrum (Fig. 62f) very different from that of female, having numerous dentiform spines, especially on lateral lobes. Mandible, paragnath, first maxilla, and second maxilla as in female. Maxilliped (Fig. 62g) 4-segmented. First segment unarmed. Second segment with 2 small inner setae. Third segment unarmed. Claw (fourth segment) 43 μm long, having on convex side small proximal lamella and marginal notch, on concave side several denticles, and bearing proximally 2 small setae; tip of claw bifid.

Legs 1–4 as in female.

Leg 5 (Fig. 62h) without free segment and represented only by 3 small setae.

Leg 6 (Fig. 61h) represented by 2 small setae on posteroventral flap on genital segment.

Spermatophore (Fig. 62i) elongate, 200 × 64 μm not including neck, attached to female in pairs.

Color as in female.

Etymology.—The specific name *varilabrata* is a combination of Latin *varius,* different, and *labrata,* derived from labrum, lip, alluding to the sexually dimorphic labrum.

Remarks.—In many ways *Xarifia varilabrata* resembles *Xarifia obesa* Humes and Ho, 1968, but may be distinguished from that species which is smaller in size, has an angular claw on the second antenna, and shows pronounced sexual dimorphism in the labrum.

Xarifia villosa Humes and Dojiri, 1982

Host.—*Cyphastrea chalcidicum* (Forskål).

Locality.—New Caledonia.

Features for Recognition.—Length of female 1.09 mm (1.09–1.12 mm) and male 1.23 mm (1.20–1.26 mm). Ratio of length to width of female about 5.6:1. Female with area above fifth legs having 3 moderately long processes, middle process shorter than other two. Caudal ramus in both sexes set off from anal segment. Second antenna 4-segmented. Body surface covered with tufts of delicate branched setules. Legs 1–4 with exopods having outer armature I,I,I and 2-segmented endopods with terminal armature 3, 3, 1, 1. Leg 5 in female with long segment, 78 μm. Leg 5 in male with minute segment.

Xarifia sp.

Members of the genus *Xarifia* were found in small numbers, too few for adequate study, in 12 species of corals, including 5 genera that are reported as hosts for the first time: *Fungia, Leptoria, Oxypora, Parahalomitra,* and *Tubastraea.*

Specimens Collected.—From *Acropora gemmifera* (Brook): 3 specimens, in 2 m, Bowl Reef, Great Barrier Reef, northeastern Australia, 18°30′00″S, 147°34′00″E, 2 November 1982. From *Acropora syringodes* (Brook): 2 specimens in 2 m, western end of Isle Maître, near Noumea, New Caledonia, 22°20′05″S, 166°24′05″E, 21 June 1971. From *Fungia (Ctenactis) echinata* (Pallas): 1 specimen, in 5 m, Poelau Gomumu, south of Obi, Moluccas, 01°50′00″S, 127°30′45″E, 30 May 1975. From *Galaxea astreata* (Lamarck): 14 specimens, in 1 m, Pte. de Tafondro, Nosy Bé, Madagascar, 19 September 1963. From *Leptoria phrygia* (Ellis and Solander): 1 specimen, in 2 m, west of Isle Mando, near Noumea, New Caledonia, 22°18′59″S, 166°09′30″E, 5 July 1971. From *Merulina ampliata* (Ellis and Solander): 1 specimen, in 3 m, Big Broadhurst Reef, Great Barrier Reef, northeastern Australia, 18°58′03″S, 147°45′04″E, 1 November 1982. From *Montipora* sp. cf. *M. stellata* Bernard: 6 specimens, in 2 m, off Ampombilava, Nosy Bé, Madagascar, 26 September 1964. From *Oxypora* sp.; 1 specimen, in 3 m, Ampombilava, Nosy Bé, Madagascar, 5 June 1967. From *Parahalomitra robusta* (Quelch): 1 specimen, in 3 m, Karang Mie, eastern central Halmahera, Moluccas, 00°20′07″N, 128°25′00″E, 19 May 1975. From *Platygyra sinensis* (Milne Edwards and Haime): 4 specimens, in 2 m, Poelau Parang, eastern Ceram, Moluccas, 03°17′00″S, 130°44′48″E, 23 May 1975. From *Porites lutea* Milne Edwards and Haime, in 2 m, west of Isle Mando, near Noumea, New Caledonia, 22°18′59″S, 166°44′48″E, 5 July 1971. From *Tubastrea* sp.: 1 specimen, in 5 m, southwestern shore of Goenoeng Api, Banda Islands, Moluccas, 04°31′45″S, 129°51′55″E, 30 April 1975.

KEY TO FEMALES OF THE GENUS *XARIFIA*

[In *X. sabiuraensis* the exopod formula in legs 2–4 is I,0,I. However, the second segment of these exopods has a minute outer spine (?), suggesting the formula I,I,I. Therefore, *X. sabiuraensis* is included twice, to allow for either interpretation of the formula. See Humes and Dojiri (1982, p. 202).]

Except for *X. radians,* with a lateral view of the body only, all species are illustrated with both a lateral view and a dorsal view of the posterior part of the prosome and the urosome.

For convenience in printing, the illustrations to accompany the key are grouped together at the end of the key, numbered according to their respective couplets.

1a. Region dorsal to fifth legs smooth, without processes of knobs (*X. serrata* may show transverse ridge) 2
1b. Region dorsal to fifth legs with 1, 2, 3, or 5 processes of knobs 10
2a. Legs 1–4 with armature of exopod I,I,I 3
2b. Legs 1–4 with exopod formula having other arrangement 6
3a. Caudal ramus fused with anal segment; endopods of legs 1–4 1-segmented .... *X. anopla*
3b. Caudal ramus not fused with anal segment; endopods of legs 1–4 2-segmented 5
4a. Leg 5 represented only by 2 small setae .... *X. acicularis*
4b. Leg 5 with prominent large segment .... *X. rasilis*
5a. Leg 1 with exopod formula different than in legs 2–4; body greatly elongated (10–15 times longer than wide); urosome very short 6
5b. Leg 1 with same exopod formula in all 4 legs; body not greatly elongated (less than 8:1); urosome not unusually short 7
6a. Length of body 2.48 mm (2.26–2.72 mm); leg 5 lacking segment and represented only by 2 setae .... *X. extensa*
6b. Length of body 1.52 mm (1.47–1.65 mm); leg 5 with small lobe 5 μm long (segment?) bearing 2 setae .... *X. temnura*
7a. Legs 1–4 with exopod formula I,1,I; second antenna with fourth segment more than 2.5 times longer than third segment and with very short terminal claw (7 μm) .... *X. levis*
7b. Legs 1–4 with exopod formula I,0,I; second antenna with fourth segment shorter than or equal to third segment and with terminal claw nearly as long as or longer than fourth segment 8
8a. Legs 1–4 with second segment of exopod having slight outer knob; endopod of leg 1 with 2 terminal setae .... *X. reducta*
8b. Legs 1–4 with second segment of exopod smooth, without outer knob; endopod of leg 1 with 3 terminal setae 9
9a. Leg 5 with segment 122 μm long; endopod of leg 2 with 2 terminal setae .... *X. serrata*
9b. Leg 5 with segment 73 μm long; endopod of leg 2 with 3 terminal setae .... *X. lissa*

10a. Region dorsal to fifth legs with only single median process or lobe 11
10b. Region dorsal to fifth legs with other arrangement of processes or knobs 13
11a. Region dorsal to fifth legs with median lobe; leg 5 present 12
11b. Region dorsal to fifth legs with slender erect process; leg 5 absent ..... *X. eminula*
12a. Region dorsal to fifth legs with stout median lobe directed posteriorly; endopods of legs 1–4 2-segmented ..... *X. mediolobata*
12b. Region dorsal to fifth legs with small lobe; endopods of legs 1–4 1-segmented ..... *X. exuta*
13a. Region dorsal to fifth legs with 2 slender lateral processes (some specimens showing low median ridge) 14
13b. Region dorsal to fifth legs with at least 3 processes or knobs 16
14a. Legs 1–4 with exopod formula I,1,I (seta easily seen); leg 5 with segment; second segment of exopod in legs 1–4 without inner group of setules 15
14b. Legs 1–4 with exopod formula 1,1,I (seta very small); leg 5 represented only by 3 setae; second segment of exopod in legs 1–4 with inner group of setules ..... *X. fimbriata*
15a. Length of body 1.34 mm (1.21–1.48 mm); caudal ramus 70 μm long; claw of second antenna smoothly recurved ..... *X. obesa*
15b. Length of body 0.82 mm (0.78–0.88 mm); caudal ramus 27 μm long; claw of second antenna angular ..... *X. varilabrata*
16a. Region dorsal to fifth legs with 3 processes and 2 knobs 17
16b. Region dorsal to fifth legs with 3 processes or knobs only 21
17a. Postgenital area with pronounced middorsal hump ..... *X. gibberula*
17b. Postgenital area smooth, without middorsal hump 18
18a. Caudal ramus with inner side greatly expanded ..... *X. tenta*
18b. Caudal ramus with inner side not greatly expanded 19
19a. Legs 1–4 with exopod formula 1,1,I ..... *X. umbonata*
19b. Legs 1–4 with exopod formula I,1,I 20
20a. Median and 2 lateral processes above fifth legs slender, elongate, and nearly equal in length ..... *X. maldivensis*
20b. Median process broad and shorter than lateral processes ..... *X. quinaria*
21a. Median process greatly swollen; legs 1–4 with exopod formula 1,1,I ..... *X. torigera*
21b. Median process not greatly swollen; legs 1–4 with different exopod formula 22
22a. Legs 1–4 with exopod formula 0,0,I (but with minute outer process on first segment) ..... *X. tenuis*
22b. Legs 1–4 with exopod formula otherwise 23
23a. Legs 1–4 with exopod formula 1,I,I ..... *X. ablusa*
23b. Legs 1–4 with exopod formula otherwise 24
24a. Legs 1–4 with exopod formula I,0,I 25
24b. Legs 1–4 with exopod formula otherwise 28
25a. Leg 5 represented only by 3 setae; endopod of leg 1 with 3 terminal setae ..... *X. dissona*
25b. Leg 5 with segment; endopod of leg 1 with number of setae otherwise 26
26a. Region above fifth legs with 3 short blunt processes; second antenna 3-segmented ..... *X. exserens*
26b. Region above fifth legs with at least one of 3 processes elongate; second antenna 4-segmented (though separation of third and fourth segments indistinct) 27
27a. Median process about 2 times length of lateral processes; endopod of leg 1 without terminal setae ..... *X. infrequens*
27b. Three elongate processes nearly equal in length or median process slightly shorter; endopod of leg 1 with 2 terminal setae ..... *X. comata*
28a. Legs 1–4 with exopod formula I,1,I 29
28b. Legs 1–4 with exopod formula otherwise 31
29a. Second antenna 3-segmented; endopods of legs 3 and 4 with 1 terminal seta ..... *X. imparilis*
29b. Second antenna 4-segmented; endopods of legs 3 and 4 with 1 terminal spine 30
30a. Endopod of leg 2 with terminal armature 1,I; leg 5 much shorter than lateral processes ..... *X. hamata*
30b. Endopod of leg 2 with terminal armature consisting of 1 seta; leg 5 much longer (nearly 2×) than lateral processes ..... *X. lacerans*
31a. Exopod formula for leg 1 different from formula for legs 2–4 32
31b. Exopod formula I,I,I in all 4 legs 36
32a. Body long and slender, 10–13 times longer than wide; middle process distinctly longer than lateral processes (nearly 2× or more); exopods of legs 2–4 with I,0,I; endopod of leg 1 without terminal setae 33
32b. Body not unusually elongate, less than 8 times longer than wide; 3 processes of nearly equal length; exopods of legs 2–4 with I,1,I; endopod of leg 1 with terminal setae 34

33a. Body 10 times longer than wide; length of caudal ramus 95 μm; second antenna 4-segmented, but third and fourth segments indistinctly separated .... *X. sabiuraensis*
33b. Body 13 times longer than wide; length of caudal ramus 43 μm; second antenna 3-segmented .... *X. rosariae*
34a. Spines on first 2 segments of exopod of leg 1 small and of about equal length (2 μm) .... *X. jugalis*
34b. Spines on first 2 segments of exopod of leg 1 very unequal, spine on first segment more than twice length of spine on second segment 35
35a. Endopod of leg 1 with 3 terminal setae; length of body 1.49 mm (1.45–1.53 mm); segment of leg 5 about 150 μm long .... *X. decorata*
35b. Endopod of leg 1 with 2 terminal setae; length of body 1.84 mm (1.78–1.93 mm); segment of leg 5 about 240–255 μm long .... *X. fissilis*
36a. Leg 5 represented only by 2 or 3 setae 37
36b. Leg 5 with segment 38
37a. Genital and postgenital segments together short, about 15 percent of length of body; endopod of leg 1 with 1 terminal seta .... *X. syntoma*
37b. Genital and postgenital segments together about 26 percent of length of body; endopod of leg 1 with 3 terminal setae .... *X. sectilis*
38a. Caudal ramus fused with anal segment 39
38b. Caudal ramus separated partly or completely from anal segment 43
39a. Region above fifth legs with 3 long slender processes .... *X. bullifera*
39b. Region above fifth legs with 3 short knobs or processes 40
40a. Region above fifth legs with 3 short knoblike processes, median process a little shorter than lateral processes; endopod of leg 1 with 2 terminal setae .... *X. gerlachi*
40b. Region above fifth legs with knobs or processes arranged otherwise; endopod of leg 1 with 3 terminal setae 41
41a. Region above fifth legs with 3 short drop-shaped processes; endopods of legs 1–4 with terminal armature 3, 3, 0, 0 .... *X. guttulifera*
41b. Region above fifth legs with 3 small round knobs or lobes; endopods of legs 1–4 with terminal armature 3, 2, 1, 1 42
42a. Length of body 2.53 mm (2.23–2.88 mm); median knob larger than 2 lateral knobs .... *X. basilica*
42b. Length of body 1.50 mm (1.49–1.53 mm); 3 knobs subequal .... *X. trituberata*
43a. Segment of leg 5 with 1 terminal seta 44
43b. Segment of leg 5 with 2 terminal setae 45
44a. Legs 1–4 with 1-segmented endopods, having terminal armature 1, 1, 0, 0; 3 long processes nearly equal .... *X. heteromeles*
44b. Legs 1–4 with 2-segmented endopods, having terminal armature 2, 3, 0, 0; middle process nearly twice length of lateral processes .... *X. minax*
45a. Leg 5 with free segment large, 288 × 259 μm, nearly round, flat, and shieldlike .... *X. scutipes*
45b. Leg 5 with free segment elongate, not round 46
46a. Endopods of legs 1–4 with terminal armature 3, (2,I), I, I .... *X. uncinata*
46b. Endopods of legs 1–4 with terminal armature consisting only of setae 47
47a. First 2 postgenital segments with posterolateral lobelike expansions .... *X. tumorisa*
47b. First 2 postgenital segments without expansions 48
48a. Region above fifth legs with 3 long processes, middle process twice or more length of lateral processes 49
48b. Region above fifth legs with 3 long processes of equal or nearly equal length (though middle process may be a little shorter than lateral processes) 51
49a. Legs 1–4 with endopods 1-segmented; second antenna 4-segmented (though third and fourth segments weakly separated in some) 50
49b. Legs 1, 3, and 4 with endopods 1-segmented, but leg 2 with endopod 2-segmented; second antenna 3-segmented .... *X. mucronata*
50a. Length of body 1.59 mm (1.56–1.66 mm), 10 times longer than wide; endopods of legs 1–4 with terminal armature 0, 0, 0, 0; 3 long processes lacking terminal filaments .... *X. sabiuraensis*
50b. Length of body 0.92 mm (0.90–0.95 mm), 7.8 times longer than wide; endopods of legs 1–4 with terminal armature 2, 2, 0, 0; each of 3 long processes with terminal filament .... *X. filata*
51a. Legs 1–4 with exopods slender and unusually elongate, second segment set obliquely on first segment .... *X. gracilipes*
51b. Legs 1–4 with exopods shorter and stouter, second segment set terminally on first segment 52

52a. Second antenna 3-segmented .... *X. breviramea*
52b. Second antenna 4-segmented (though separation of third and fourth segments in *X. pectinea* may be weak) 53
53a. Endopod of leg 1 without terminal armature .... *X. anomala*
53b. Endopod of leg 1 with 1 or more setae 54
54a. Endopod of leg 1 with 1 terminal seta 55
54b. Endopod of leg 1 with more than 1 terminal seta 58
55a. First antenna with aesthetes club-shaped, with swollen tips; endopods of legs 1–4 with terminal armature 1, 1, 1, 1 .... *X. clavellata*
55b. First antenna with aesthetes not swollen; endopods of legs 1–4 with terminal armature otherwise 56
56a. Caudal ramus 104 μm long (ratio 2.9:1); endopods of legs 1–4 with terminal armature 1, 2, 0, 1 .... *X. simplex*
56b. Caudal ramus less than 60 μm (ratio less than 2.6:1); endopods with terminal armature 1, 2, 0, 0 57
57a. Length of body 1.30 mm (1.26–1.33 mm); endopods of legs 1–4 2-segmented; intercoxal plates of legs 1–4 narrow, semilunar .... *X. gradata*
57b. Length of body 1.00 (0.95–1.09 mm); endopods of legs 1–4 1-segmented (though slight breaks in sclerotization may indicate subdivision); intercoxal plates of legs 1–4 broad, only slightly curved or nearly straight .... *X. finitima*
58a. Endopod of leg 1 with 2 terminal setae 59
58b. Endopod of leg 1 with 3 terminal setae 69
59a. Leg 5 345 μm long, distinctly longer than any of 3 processes; endopods of legs 1–4 with terminal armature 2, 2, 0, 0 .... *X. hadra*
59b. Leg 5 less than 210 μm long, not distinctly longer than processes; legs 1–4 with terminal armature otherwise 60
60a. Endopods of legs 1–4 with terminal armature 2, 3, 0, 1 61
60b. Endopods of legs 1–4 with terminal armature otherwise 62
61a. Length of body 0.97 mm (0.94–1.01 mm), ratio 6.6:1; caudal ramus 33 μm long, ratio 1.74: 1; first and second segments of maxilliped each with only 1 lobe .... *X. imitans*
61b. Length of body 1.15 mm (1.10–1.19 mm), ratio 5.2:1; caudal ramus 55 μm long, ratio 3:1; first and second segments of maxilliped each with 2 lobes .... *X. formosa*
62a. Endopods of legs 1–4 with terminal armature 2, 2, 0, 2 .... *X. diminuta*
62b. Endopods of legs 1–4 with terminal armature otherwise 63
63a. Endopods of legs 1–4 with terminal armature 2, 2, 0, 0 .... *X. brevicauda*
63b. Endopods of legs 1–4 with terminal armature 2, 2, 1, 1 64
64a. Endopods of legs 1–4 2-segmented 65
64b. Endopods of legs 1–4 1-segmented (though slight breaks in sclerotization may indicate subdivision) 68
65a. Legs 1–4 with spines on first 2 segments of exopod slender and almost setiform .... *X. dispar*
65b. Legs 1–4 with spines on first 2 segments of exopod stouter and distinctly spiniform 66
66a. Caudal ramus 51 μm long, ratio 1.8:1; second antenna stout; mandible toothed .... *X. lamellispinosa*
66b. Caudal ramus at least 70 μm long, ratio at least 3.4:1; second antenna slender; mandible without teeth 67
67a. Caudal ramus 73 μm long, ratio 4.6:1; legs 1–4 with first segment of exopod having stout outer spine with large lamella extending far beyond tip of spine, this spine flanked by large hooked process; endopods of legs 1–4 with terminal armature 2, 2, 1, 1 .... *X. plectrata*
67b. Caudal ramus 92 μm long, ratio 3.4:1; legs 1–4 with spine on first segment of exopod not enlarged, lacking large lamella, and not flanked by large hooked process; endopods of legs 1–4 with terminal armature 2, 1, 1, 1 .... *X. apertipes*
68a. Length of body 1.48 mm (1.43–1.56 mm); leg 5 170 μm long; caudal ramus 110 μm, ratio 3.7:1 .... *X. longipes*
68b. Length of body 0.75 mm (0.71–0.80 mm); leg 5 100 μm long; caudal ramus 41 μm, ratio 4:1 .... *X. exigua*
69a. Endopods of legs 1–4 with terminal armature 3, 3, 0, 0; first antenna extremely short, 19 μm long .... *X. resex*
69b. Endopods of legs 1–4 with terminal armature otherwise; first antenna not unusually short, at least 47 μm long 70
70a. Endopods of legs 1–4 with terminal armature 3, 3, 0, 1; length of body 3.12 mm (2.99–3.19 mm) .... *X. curtata*
70b. Endopods of legs 1–4 with terminal armature 3, 3, 1, 1; length of body less than 2.5 mm .. 71
71a. Length of segment of leg 5 299 μm or more 72

71b. Length of segment of leg 5 less than 210 μm 74
72a. Segment of leg 5 460 μm long, caudal ramus 259 μm .... *X. radians*
72b. Segment of leg 5 less than 325 μm long; caudal ramus less than 135 μm 73
73a. Segment of leg 5 322 μm long; caudal ramus 130 μm .... *X. comptula*
73b. Segment of leg 5 299 μm long, caudal ramus 76 μm .... *X. echinoporae*
74a. Segment of leg 5 184 μm or more in length; body surface with minute simple setules or spinules 75
74b. Segment of leg 5 78 μm long; body covered with tufts of branched setules .... *X. villosa*
75a. Three processes above fifth legs nearly equal in length; leg 5 185 μm long; caudal ramus 78 μm .... *X. fastigiata*
75b. Middle process a little shorter than lateral processes; leg 5 200 μm long; caudal ramus 103 μm .... *X. pectinea*

Genus *Zazaranus* Humes and Dojiri, 1983

Diagnosis.—Body elongate, segmentation weak in prosome but stronger in urosome. Region dorsal to fifth legs in female without processes or knobs. First antenna 7-segmented. Second antenna 4-segmented with terminal claw. Legs 1 and 2 with 2-segmented rami (but segments of endopods incompletely separated). Legs 3 and 4 with 2-segmented exopods but endopods absent. Leg 5 represented only by 3 setae.

Zazaranus fungicolus Humes and Dojiri, 1983

Host.—*Fungia* sp.

Locality.—Madagascar.

Features for Recognition.—Length of female 1.17 mm (1.12–1.22 mm) and male 1.13 mm (1.06–1.20 mm). Ratio of length to width in female about 4:1. Leg 1 with exopod having formula I-0; III,I,1; exopod of leg 2 with I-0; II,I,1. Endopods of these legs with single terminal seta. Leg 5 in both sexes lacking free segment and represented by 3 setae.

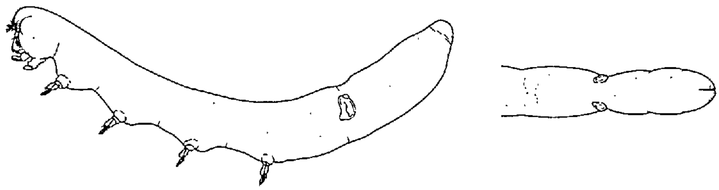
Key to the Genera of the Xarifiidae
(from Humes and Dojiri, 1983)

1a. Leg 1 with 3-segmented exopod 2
1b. Leg 1 with 2-segmented exopod 3
2a. Legs 1–4 with endopods 1- or 2-segmented .... *Xarifia*
2b. Legs 1–4 with endopods rudimentary or absent .... *Lipochrus*
3a. Mandible absent; first antenna with numerous short obtuse setae and first segment with anterior process; second segment of exopod in legs 1–4 with only 1 spine .... *Orstomella*
3b. Mandible present; first antenna with attenuate setae and first segment lacking process; second segment of exopod in legs 1–4 with 4 spines .... *Zazaranus*

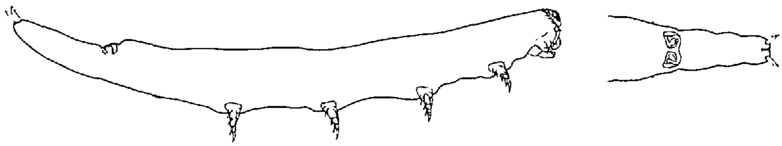
Synonyms of Coral Hosts

Several species of corals, reported in the literature as hosts for xarifiids, are now regarded as synonymous with other species. These instances have been indicated above for each xarifiid mentioned in this review. The accepted names of the corals and their synonyms are as follows:

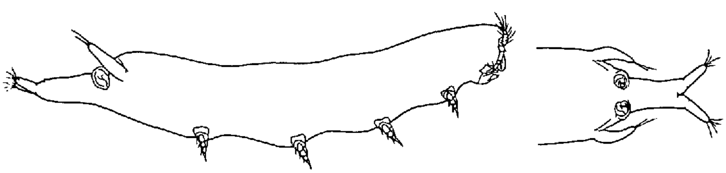
Accepted name	Synonym
Acropora abrotanoides (Lamarck)	*Acropora danai* (Milne Edwards and Haime)
Acropora elseyi (Brook)	*Acropora exilis* (Brook)
Acropora florida (Dana)	*Acropora affinis* (Brook)
Acropora florida (Dana)	*Acropora gravida* (Dana)



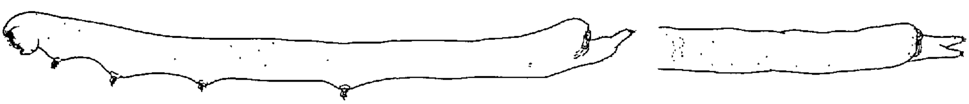
3a. *X. anopla*.



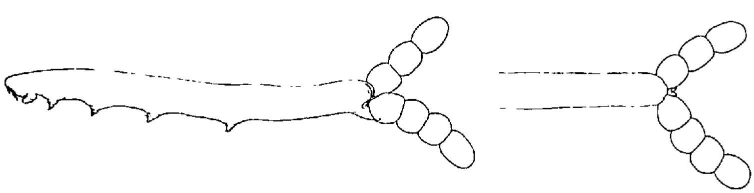
4a. *X. acicularis*.



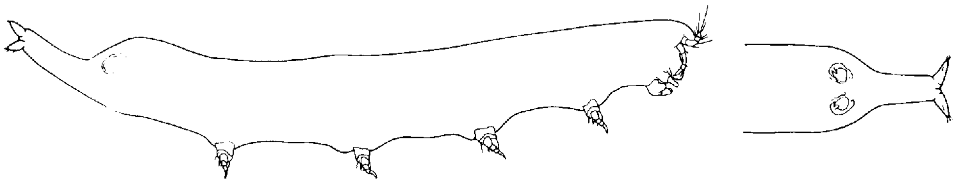
4b. *X. rasilis*.



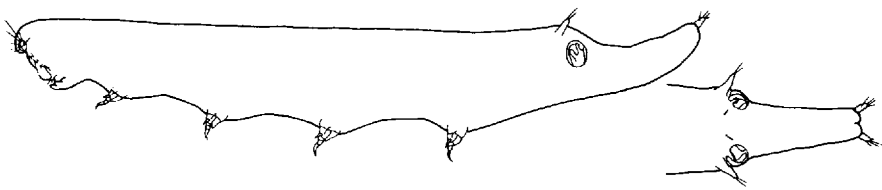
6a. *X. extensa*.



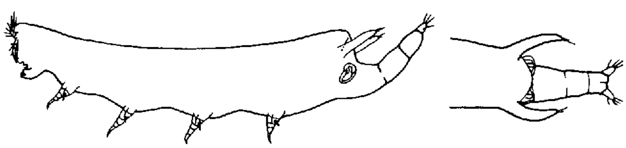
6b. *X. temnura*.



7a. X. levis.

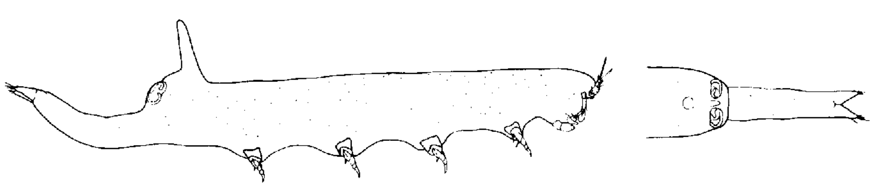


8a. X. reducta.

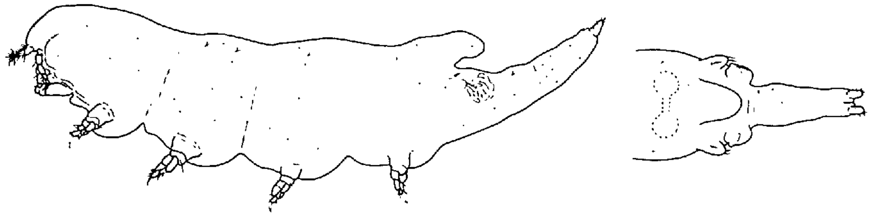


9a. X. serrata.

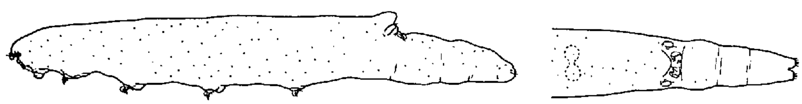
9b. X. lissa.



11b. X. eminula.

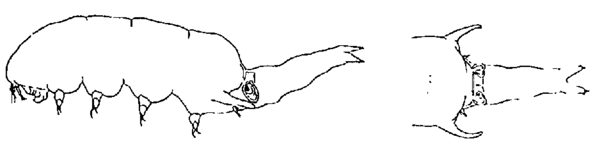


12a. *X. mediolobata*.

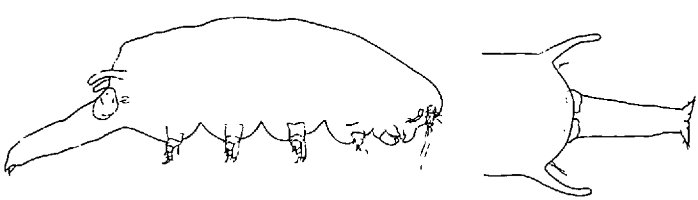


12b. *X. exuta*.

14b. *X. fimbriata*.

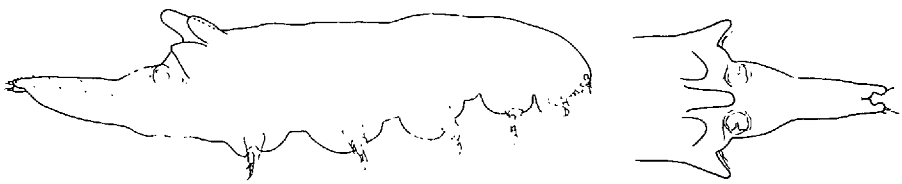


15a. *X. obesa*.

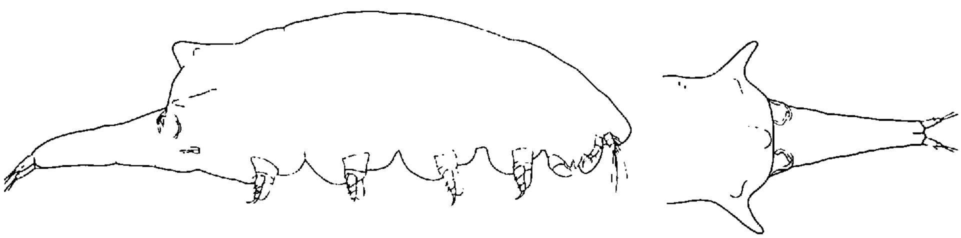


15b. *X. varilabrata*.

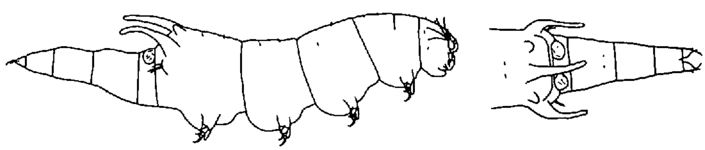
17a. X. gibberula.



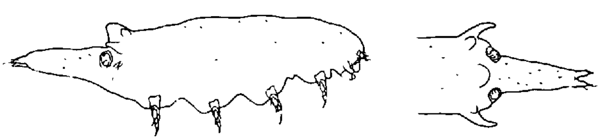
18a. X. tenta.



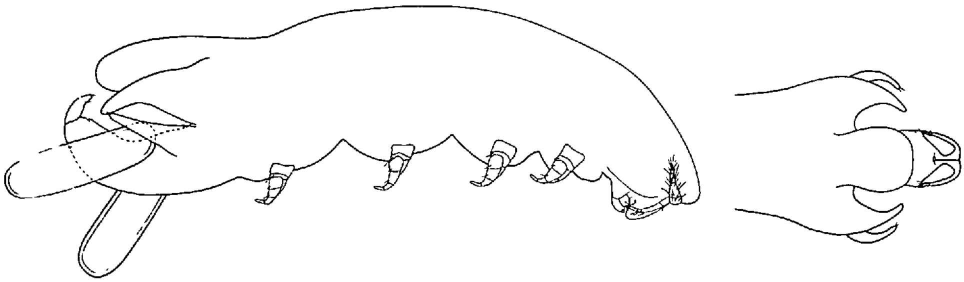
19a. X. umbonata.



20a. X. maldivensis.

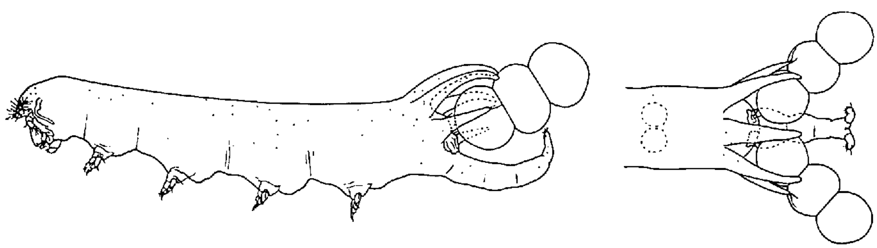


20b. X. quinaria.

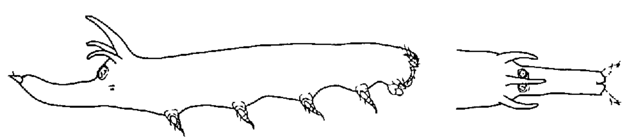


21a. *X. torigera.*

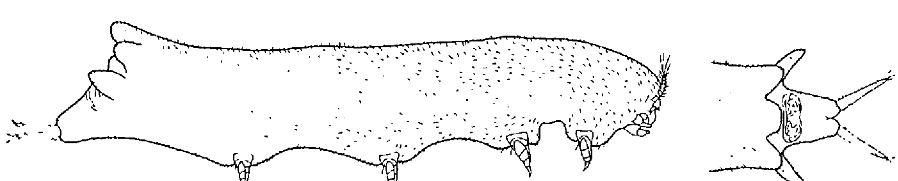
22a. *X. tenuis.*



23a. *X. ablusa.*

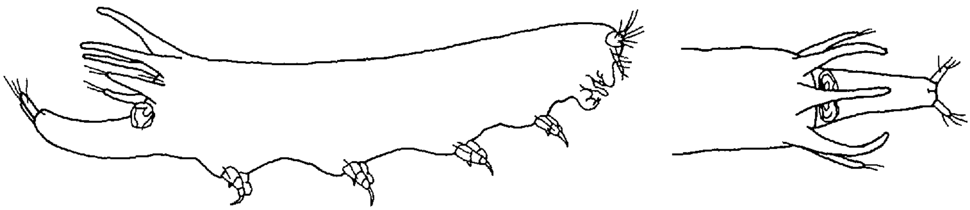


25a. *X. dissona.*

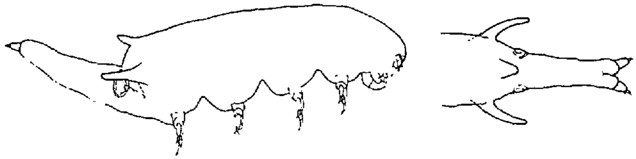


26a. *X. exserens.*

27a. X. infrequens.

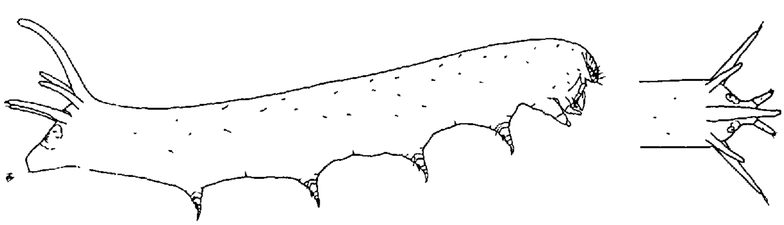


27b. X. comata.

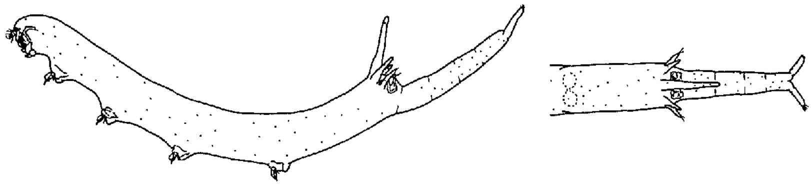


29a. X. imparilis.

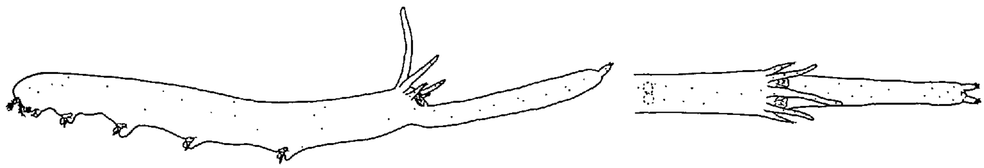
30a. X. hamata.



30b. X. lacerans.



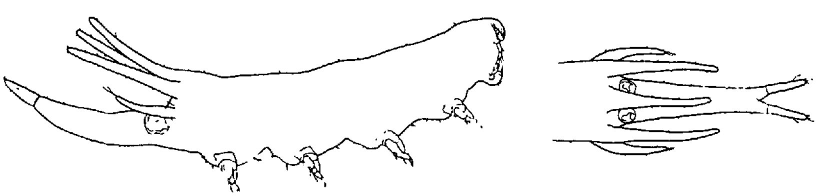
33a. X. sabiuraensis.



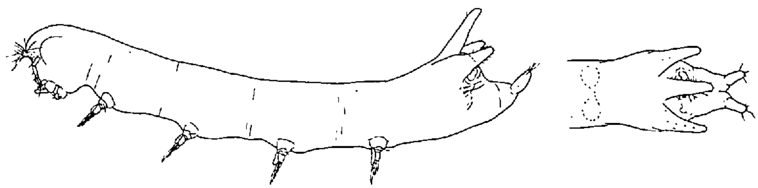
33b. X. rosariae.

34a. X. jugalis.

35a. X. decorata.



35b. X. fissilis.

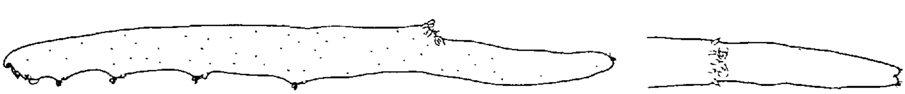


37a. *X. syntoma*.

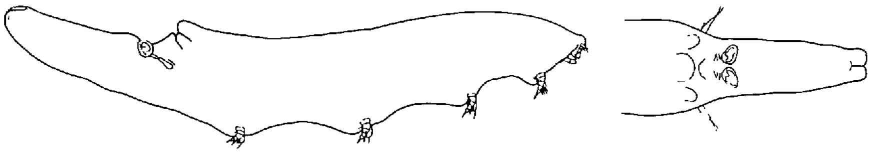
37b. *X. sectilis*.

39a. *X. bullifera*.

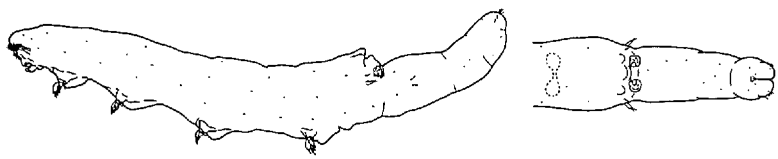
40a. *X. gerlachi*.



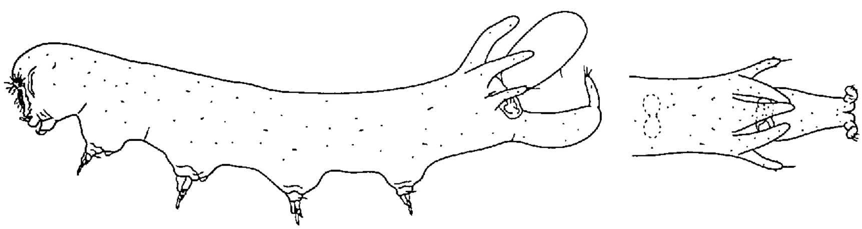
41a. *X. guttulifera*.



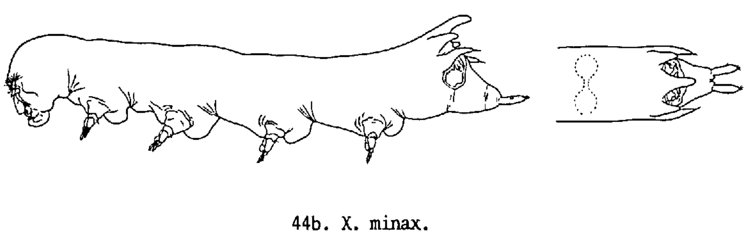
42a. *X. basilica*.



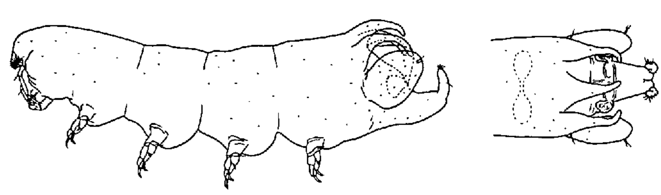
42b. *X. trituberata*.



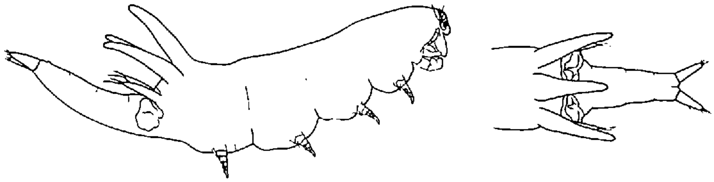
44a. *X. heteromeles*.



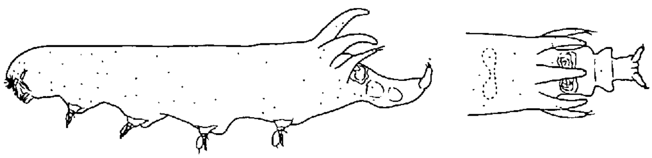
44b. *X. minax*.



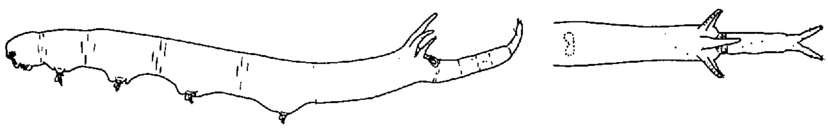
45a. *X. scutipes*.



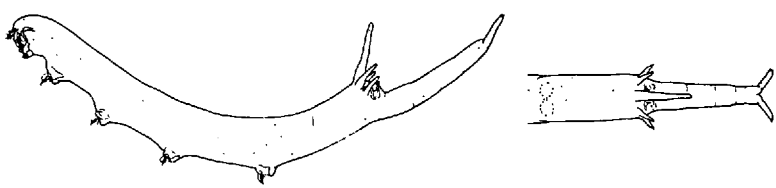
46a. _X_. _uncinata_.



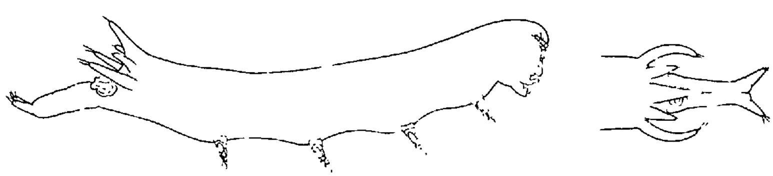
47a. _X_. _tumorisa_.



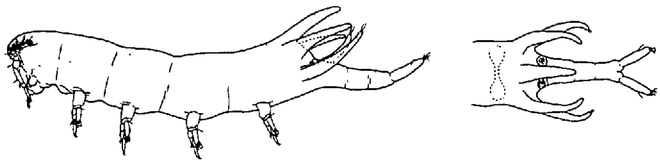
49b. _X_. _mucronata_.



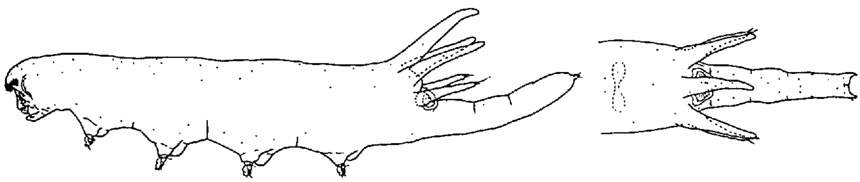
50a. _X_. _sabiuraensis_.



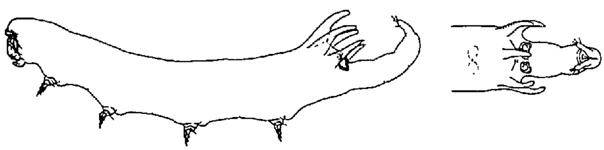
50b. _X_. _filata_.



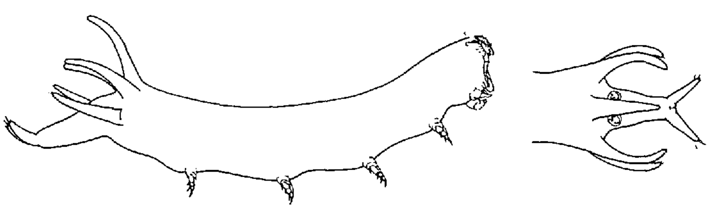
51a. X. gracilipes.



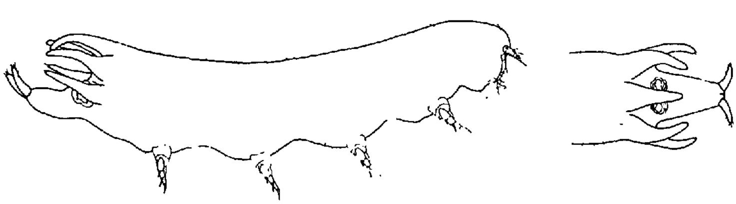
52a. X. breviramea.



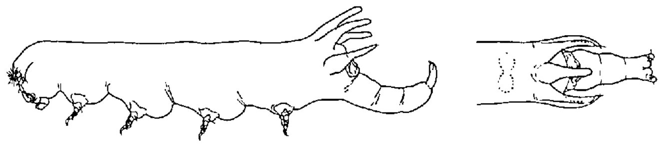
53a. X. anomala.



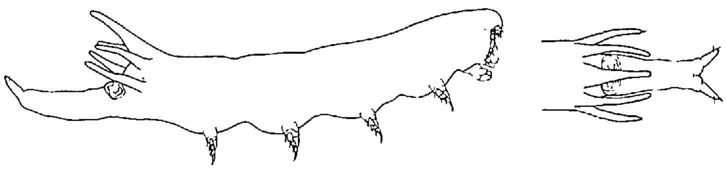
55a. X. clavellata.



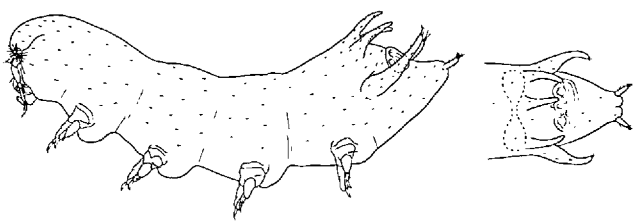
56a. X. simplex.



57a. *X. gradata*.

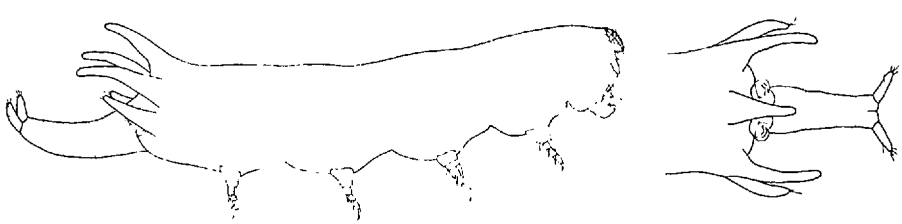


57b. *X. finitima*.

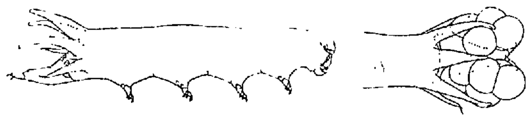


59a. *X. hadra*.

61a. *X. imitans*.

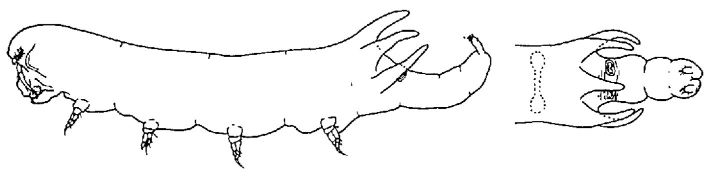


61b. *X. formosa*.

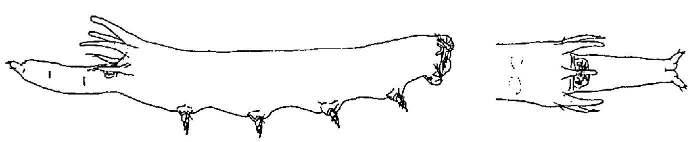


62b. X. diminuta.

63a. X. brevicauda.

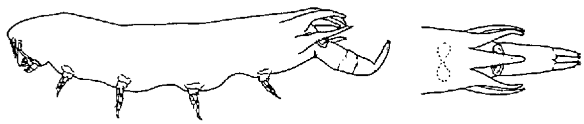


65a. X. dispar.

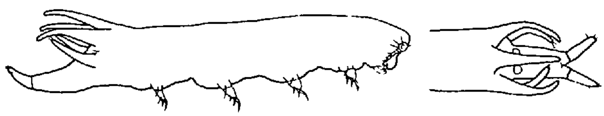


66a. X. lamellispinosa.

67a. X. plectrata.

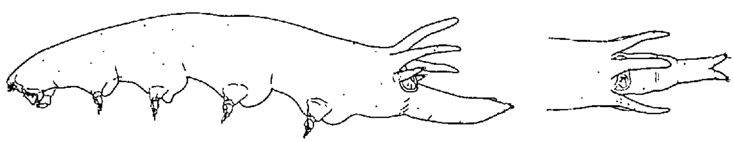


67b. X. apertipes.



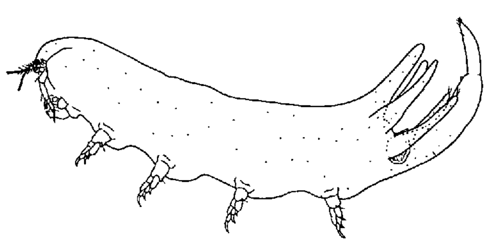
68a. X. longipes.

68b. X. exigua.

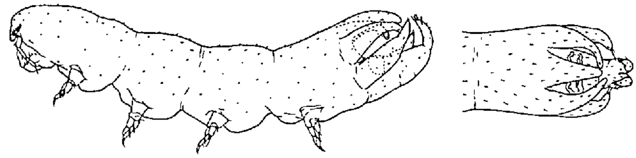


69a. X. resex.

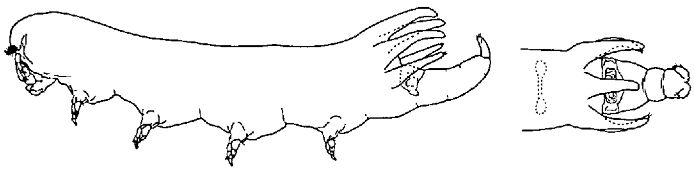
70a. X. curtata.



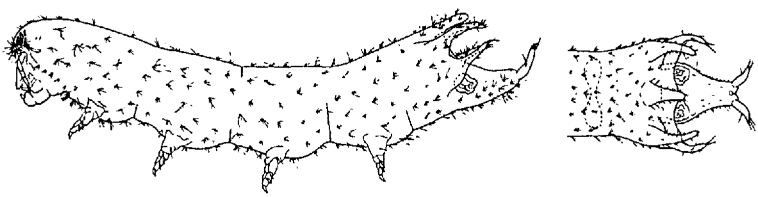
72a. X. radians.



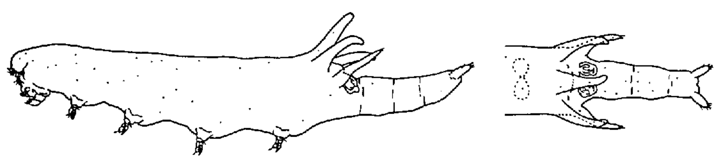
73a. X. comptula.



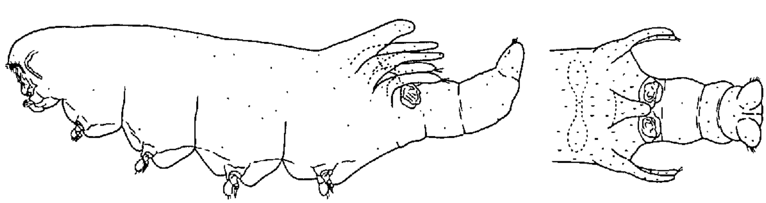
73b. X. echinoporae.



74b. X. villosa.



75a. X. fastigiata.



75b. X. pectinea.

Table 2. Corals examined, localities in the Gulf of Panama and the Gulf of Chiriqui, and number of collections made

Corals	Uraba I.	Chapera I.	Contadora I.	Saboga I.	Uva I.	Contreras I.
Poritidae						
Porites lobata Dana	7	—	—	—	1	—
Porites panamensis Verrill	2	2	—	—	1	—
Pocilloporidae						
Pocillopora damicornis (Linnaeus)	3	—	—	—	1	1
Pocillopora capitata Verrill	2	2	—	—	—	—
Pocillopora robusta Verrill	—	4	—	—	1	—
Dendrophyliidae						
Tubastraea tenuilamellosa (Milne Edwards and Haime)	3	—	—	—	—	—
Agariciidae						
Pavona clavus (Dana)	—	—	1	—	1	—
Pavona gigantea Verrill	5	1	—	—	1	—
Pavona varians Verrill	—	—	10	1	—	1
Gardineroseris planulata (Dana)	—	—	6	—	1	—
Thamnasteriidae						
Psammocora stellata (Verrill)	—	—	1	—	1	—
Total	22	9	18	1	8	2

Acropora hyacinthus (Dana)	*Acropora pectinata* (Brook)
Acropora millepora (Ehrenberg)	*Acropora squamosa* (Brook)
Echinopora gemmacea (Lamarck)	*Echinopora carduus* Klunzinger
Favites flexuosa (Dana)	*Favites virens* (Dana)
Hydnophora exesa (Pallas)	*Hydnophora tenella* Quelch
Leptoria phrygia (Ellis and Solander)	*Leptoria tenuis* (Dana)
Pavona cactus (Forskål)	*Pavona praetorta* Dana
Pocillopora damicornis (Linnaeus)	*Pocillopora bulbosa* Ehrenberg
Pocillopora verrucosa Ellis and Solander	*Pocillopora meandrina* Dana, var. *nobilis* Verrill
Psammocora digitata Milne Edwards and Haime	*Psammocora togianensis* Umbgrove
Seriatopora octoptera Ehrenberg	*Seriatopora* sp.
Stylophora subseriata (Ehrenberg)	*Seriatopora subseriata* Ehrenberg

Search for Xarifiidae in Corals of the Central and Eastern Pacific

The extent to which xarifiid copepods occur in the Pacific Ocean east of 166° is not known. New Caledonia represents the easternmost distribution of the family. With the aim of determining whether or not these copepods extend farther eastward, corals were examined in Panama, Moorea, and Hawaii. The field and laboratory techniques used were the same as those previously employed successfully for the collection of xarifiids in the Indo-Pacific. Possible errors due to variation in technique were thus largely eliminated.

Shallow-water corals were collected by the author during 20 October–14 November 1981 in the Gulf of Panama (Uraba Island, near Taboga Island, approximately 08°47′N, 79°32′W, and at Chapera, Contadora, and Saboga Islands, Archipielago de las Perlas, and from 6–8 December 1981 by Peter Glynn at Contreras Island and Uva Island in the Gulf of Chiriqui. No xarifiids were found in these corals.

The corals, localities, and number of collections are shown in Table 2.

Table 3. Corals examined in Moorea and number of collections made

Corals	No. collections
Poritidae	
Porites lutea Milne Edwards and Haime	4
Porites lobata Dana	5
Porites stephensoni Crossland	1
Pocilloporidae	
Pocillopora verrucosa (Ellis and Solander)	1
Total	11

Several shallow-water corals (Table 3) were collected 14–20 October 1982 off Pointe Tehau, east of Ilot Tiahura, northwestern Moorea, Society Islands, 17°28.7′S, 149°54′W. No xarifiid copepods were found in these corals, although other poecilostomatoids were recovered, some of them modified and apparently living inside the polyps.

In Hawaii several shallow-water corals (Table 4) were collected 7–14 November 1982 in Kaneohe Bay, Oahu, approximately 21°26′N, 157°47.5′W. No xarifiid copepods were found in these corals, nor were any other poecilostomatoids living internally recovered.

Distribution of *Xarifia*

Hermatypic corals are widely distributed in the Indo-Pacific region, where their areal occurrence is controlled by temperature, the greatest number of genera being found within the 25° isotherm (Wells, 1954). The Celebes-Palau Islands region has a large number of genera, more than 65 (Pichon, pers. comm.). The generic composition of various geographic areas is similar and variations are controlled

Table 4. Corals examined at Oahu, Hawaii, and number of collections made

Corals	No. collections
Poritidae	
Porites lobata Dana	3
Porites compressa Dana	3
Pocilloporidae	
Pocillopora damicornis (Linnaeus)	9
Pocillopora meandrina Dana	4
Fungiidae	
Fungia scutaria Lamarck	6
Faviidae	
Cyphastrea ocellina (Dana)	7
Agariciidae	
Pavona varians Verrill	2
Acroporidae	
Montipora verrucosa (Lamarck)	4
Montipora dilatata Studer	2
Total	40

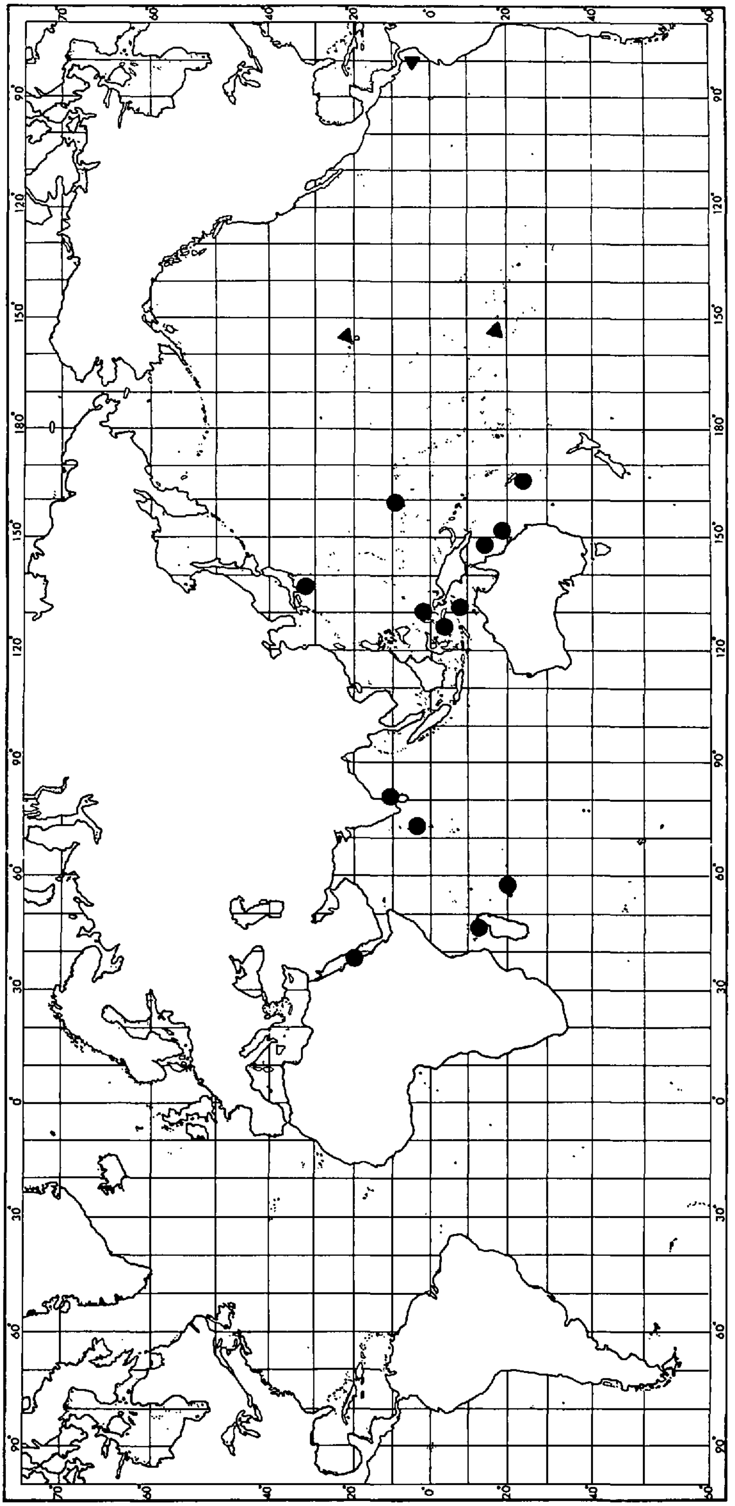


Figure 63. Distribution of the genus *Xarifia*, with circles indicating localities where corals are known to be parasitized and triangles showing areas where corals have been examined but no *Xarifia* found.

Table 5. Xarifiid copepods occurring in various localities in the Indo-Pacific (type-localities indicated by *)

Madagascar (vicinity of Nosy Bé)
**Orstomella faviae, *O. lobophylliae, *Xarifia anomala, X. anopla, *X. apertipes, *X. brevicauda, *X. comata, X. comptula, *X. decorata, *X. diminuta, *X. dispar, *X. exigua, *X. extensa, *X. gerlachi, *X. gradata, *X. hamata, *X. infrequens, *X. lamellispinosa, *X. lissa, *X. longipes, *X. minax, *X. obesa, *X. reducta, X. resex, *X. serrata, *X. temnura, *X. tenuis, *Zazaranus fungicolus*
Mauritius
Xarifia decorata, X. diminuta, X. finitima, X. lamellispinosa, X. lissa, X. obesa, X. serrata
Maldive Islands
**Xarifia fimbriata, *X. maldivensis*
Japan (southern Honshu)
**Xarifia sabiuraensis, *X. tumorisa*
Enewetak Atoll
*Xarifia breviramea, X. formosa, X. imitans, X. imparilis, X. sabiuraensis, X. sectilis, *X. tenta*
Halmahera (Karang Mie)
*Xarifia anomala, *X. breviramea, X. echinoporae, *X. exserens, *X. hadra, X. jugalis, *X. mediolobata, X. obesa, *X. pectinea, *X. radians, *X. resex, X. sabiuraensis, *X. scutipes, *X. trituberata, X. tumorisa*
Poelau Gomumu (south of Obi)
*Xarifia anomala, *X. exuta, *X. gracilipes, *X. mucronata*
Ceram (Poelau Marsegoe)
**Xarifia comptula, *X. curtata, X. fimbriata, X. obesa*
Ceram (Poelau Parang)
Lipochrus sp., **Xarifia ablusa, X. anomala, *X. anopla, X. breviramea, *X. heteromeles, X. obesa, X. pectinea, X. sabiuraensis, *X. syntoma, X. temnura, X. trituberata*
Banda Islands
*Xarifia comata, X. fimbriata, *X. fissilis, *X. lacerans, X. levis, *X. torigera, *X. uncinata, *X. varilabrata*
Great Barrier Reef (Lizard Island)
*Xarifia anopla, *X. basilica, *X. bullifera, X. heteromeles, X. infrequens, X. obesa, X. pectinea, X. tumorisa*
Great Barrier Reef (Big Broadhurst Reef)
**Xarifia clavellata, X. comata, *X. dissona, *X. filata, X. imparilis, *X. plectrata, *X. rasilis, X. sectilis*
Great Barrier Reef (Bowl Reef)
**Xarifia gibberula, X. obesa*
New Caledonia (vicinity of Noumea)
**Lipochrus acroporinus, Xarifia ablusa, *X. acicularis, X. anomala, X. breviramea, X. diminuta, *X. echinoporae, *X. eminula, *X. fastigiata, X. fimbriata, *X. finitima, *X. formosa, X. gerlachi, *X. guttulifera, *X. imitans, *X. imparilis, *X. jugalis, *X. levis, X. mucronata, X. obesa, X. pectinea, *X. quinaria, *X. rosariae, X. sabiuraensis, *X. sectilis, *X. simplex, X. temnura, X. trituberata, X. tumorisa, *X. umbonata, X. varilabrata, *X. villosa*

by temperature gradients. The number of genera of hermatypic corals is high throughout the tropical Indian Ocean, but drops noticeably east of the New Caledonia, Fiji-Tonga, Samoa, Marshall Islands, Bonin Islands arc, to 15 genera in Hawaii, 6 in Panama, 24 in the Tuamotu Archipelago, and 27 in Tahiti (Pichon, pers. comm.).

On the basis of present records it seems probable that *Xarifia* occurs wherever

Table 6. Geographical distribution and coral hosts of the Xarifiidae

	Red Sea	Madagascar	Mauritius	Maldives	SE India	Japan	Enewetak	Moluccas	Great Barrier Reef	New Caledonia	
Xarifia											
X. ablusa	—	—	—	—	—	—	—	X	—	—	*Acropora rambleri*
	—	—	—	—	—	—	—	—	—	X	*Acropora "corymbosa"*
	—	—	—	—	—	—	—	—	—	X	*Acropora rosaria*
	—	—	—	—	—	—	—	—	—	X	*Acropora elseyi*
X. acicularis	—	—	—	—	—	—	—	—	—	X	*Pachyseris rugosa*
X. anomala	—	X	—	—	—	—	—	X	—	X	*Acropora palifera*
	—	—	—	—	—	—	—	—	—	X	*Acropora "corymbosa"*
	—	—	—	—	—	—	—	—	—	X	*Acropora abrotanoides*
	—	—	—	—	—	—	—	—	—	X	*Acropora humilis*
	—	—	—	—	—	—	—	—	—	X	*Acropora convexa*
	—	—	—	—	—	—	—	X	—	X	*Acropora hyacinthus*
	—	—	—	—	—	—	—	X	—	—	*Acropora intermedia*
	—	—	—	—	—	—	—	—	—	X	*Acropora florida*
	—	X	—	—	—	—	—	—	—	—	*Acropora* sp.
X. anopla	—	—	—	—	—	—	—	X	—	—	*Montipora* sp. cf. *M. undata*
	—	X	—	—	—	—	—	—	—	—	*Montipora* sp.
	—	—	—	—	—	—	—	—	X	—	*Montipora composita*
X. apertipes	—	X	—	—	—	—	—	—	—	—	*Gyrosmilia interrupta*
	—	X	—	—	—	—	—	—	—	—	*Montipora verrucosa*
X. basilica	—	—	—	—	—	—	—	—	X	—	*Acropora hyacinthus*
	—	—	—	—	—	—	—	—	X	—	*Acropora formosa*
X. brevicauda	—	X	—	—	—	—	—	—	—	—	*Alveopora* sp.
X. breviramea	—	—	—	—	—	—	—	X	—	—	*Acropora intermedia*
	—	—	—	—	—	—	—	X	—	—	*Acropora rambleri*
	—	—	—	—	—	—	—	—	—	X	*Acropora hyacinthus*
	—	—	—	—	—	—	—	—	—	X	*Acropora abrotanoides*
	—	—	—	—	—	—	—	—	—	X	*Acropora valida*
	—	—	—	—	—	—	X	—	—	X	*Acropora florida*
	—	—	—	—	—	—	—	—	—	X	*Acropora exigua*
	—	—	—	—	—	—	—	—	—	X	*Acropora millepora*
	—	—	—	—	—	—	—	—	—	X	*Acropora "corymbosa"*
X. bullifera	—	—	—	—	—	—	—	—	X	—	*Acropora formosa*
X. clavellata	—	—	—	—	—	—	—	—	X	—	*Gardineroseris planulata*

Table 6. Continued

	Red Sea	Mada-gascar	Mauritius	Maldives	SE India	Japan	Enewetak	Moluccas	Great Barrier Reef	New Caledonia	
X. comata	—	X	—	—	—	—	—	—	X	—	*Pocillopora verrucosa*
	—	X	—	—	—	—	—	—	—	—	*Pocillopora* sp. cf. *P. verrucosa*
	—	—	—	—	—	—	—	X	—	—	*Pocillopora eydouxi*
X. comptula	—	X	—	—	—	—	—	X	—	—	*Hydnophora exesa*
X. curtata	—	—	—	—	—	—	—	X	—	—	*Hydnophora exesa*
X. decorata	—	X	—	—	—	—	—	—	—	—	*Stylophora pistillata*
	—	X	—	—	—	—	—	—	—	—	*Stylophora mordax*
	—	X	X	—	—	—	—	—	—	—	*Stylophora* sp.
X. diminuta	—	X	—	—	—	—	—	—	—	—	*Psammocora contigua*
	—	—	X	—	—	—	—	—	—	X	*Psammocora* sp.
	—	X	—	—	—	—	—	—	—	—	*Pavona* sp.
X. dispar	—	X	—	—	—	—	—	—	—	—	*Echinopora gemmacea*
	—	X	—	—	—	—	—	—	—	—	*Echinopora lamellosa*
	—	X	—	—	—	—	—	—	—	—	*Echinopora* sp.
	—	X	—	—	—	—	—	—	—	—	*Platygyra* sp.
X. dissona	—	—	—	—	—	—	—	—	X	—	*Stylophora pistillata*
X. echinoporae	—	—	—	—	—	—	—	—	—	X	*Echinopora horrida*
	—	—	—	—	—	—	—	X	—	—	*Echinopora lamellosa*
X. eminula	—	—	—	—	—	—	—	—	—	X	*Seriatopora hystrix*
X. exigua	—	X	—	—	—	—	—	—	—	—	*Pachyseris speciosa*
X. exserens	—	—	—	—	—	—	—	X	—	—	*Galaxea fascicularis*
X. extensa	—	X	—	—	—	—	—	—	—	—	*Montipora* sp.
X. exuta	—	—	—	—	—	—	—	X	—	—	*Acropora palifera*
X. fastigiata	—	—	—	—	—	—	—	—	—	X	*Acropora rosaria*
	—	—	—	—	—	—	—	—	—	X	*Acropora elseyi*
X. filata	—	—	—	—	—	—	—	—	X	—	*Gardineroseris planulata*
X. fimbriata	—	—	—	X	—	—	—	—	—	—	*Pocillopora* sp.
	—	—	—	—	—	—	—	X	—	X	*Pocillopora damicornis*
	—	—	—	—	—	—	—	—	—	X	*Pocillopora damicornis* var. *caespitosa*
	—	—	—	—	—	—	—	X	—	—	*Pocillopora eydouxi*
X. finitima	—	—	X	—	—	—	—	—	—	X	*Pavona cactus*
X. fissilis	—	—	—	—	—	—	—	X	—	—	*Pocillopora damicornis*
X. formosa	—	—	—	—	—	—	X	—	—	X	*Psammocora digitata*

Table 6. Continued

	Red Sea	Madagascar	Mauritius	Maldives	SE India	Japan	Enewetak	Moluccas	Great Barrier Reef	New Caledonia	
X. gerlachi	—	X	—	—	—	—	—	—	—	—	*Acropora* "*corymbosa*"
	—	X	—	—	—	—	—	—	—	—	*Acropora* sp. cf. *A. teres*
	—	X	—	—	—	—	—	—	—	—	*Acropora cytherea*
	—	—	—	—	—	—	—	—	—	X	*Acropora hyacinthus*
	—	—	—	—	—	—	—	—	—	X	*Acropora florida*
	—	X	—	—	—	—	—	—	—	—	*Acropora* sp.
X. gibberula	—	—	—	—	—	—	—	—	X	—	*Pocillopora verrucosa*
X. gracilipes	—	—	—	—	—	—	—	X	—	—	*Euphyllia glabrescens*
X. gradata	—	X	—	—	—	—	—	—	—	—	*Physogyra* sp.
X. guttulifera	—	—	—	—	—	—	—	—	—	X	*Acropora palifera* forma *alpha*
X. hadra	—	—	—	—	—	—	—	X	—	—	*Goniopora tenuidens*
	—	—	—	—	—	—	—	X	—	—	*Goniopora pedunculata*
X. hamata	—	X	—	—	—	—	—	—	—	—	*Turbinaria* sp. (near *T. elegans*)
X. heteromeles	—	—	—	—	—	—	—	X	—	—	*Montipora* sp. cf. *M. undata*
	—	—	—	—	—	—	—	—	X	—	*Montipora composita*
X. imitans	—	—	—	—	—	—	X	—	—	X	*Psammocora digitata*
	—	—	—	—	—	—	—	—	—	X	*Psammocora contigua*
X. imparilis	—	—	—	—	—	—	—	—	—	X	*Pocillopora damicornis* var. *caespitosa*
	—	—	—	—	—	—	X	—	—	—	*Pocillopora eydouxi*
	—	—	—	—	—	—	—	—	X	—	*Pocillopora verrucosa*
X. infrequens	—	X	—	—	—	—	—	—	—	—	*Acropora* "*corymbosa*"
	—	X	—	—	—	—	—	—	—	—	*Acropora cytherea*
	—	—	—	—	—	—	—	—	X	—	*Acropora hyacinthus*
	—	—	—	—	—	—	—	—	X	—	*Acropora formosa*
X. jugalis	—	—	—	—	—	—	—	—	—	X	*Pocillopora damicornis* var. *caespitosa*
	—	—	—	—	—	—	—	X	—	—	*Pocillopora damicornis*
	—	—	—	—	—	—	—	X	—	—	*Pocillopora eydouxi*
X. lacerans	—	—	—	—	—	—	—	X	—	—	*Turbinaria danae*
X. lamellispinosa	—	X	X	—	—	—	—	—	—	—	*Pachyseris speciosa*
X. levis	—	—	—	—	—	—	—	X	—	X	*Seriatopora hystrix*
X. lissa	—	X	—	—	—	—	—	—	—	—	*Stylophora pistillata*
	—	X	X	—	—	—	—	—	—	—	*Stylophora* sp.

Table 6. Continued

	Red Sea	Madagascar	Mauritius	Maldives	SE India	Japan	Enewetak	Moluccas	Great Barrier Reef	New Caledonia	
X. longipes	—	X	—	—	—	—	—	—	—	—	*Pavona angulata*
X. maldivensis	—	—	—	X	—	—	—	—	—	—	*Pocillopora* sp.
	—	—	—	—	—	—	—	X	—	—	*Pocillopora eydouxi*
X. mediolobata	—	—	—	—	—	—	—	X	—	—	*Alveopora mortenseni*
X. minax	—	X	—	—	—	—	—	—	—	—	*Physogyra lichtensteini*
X. mucronata	—	—	—	—	—	—	—	X	—	—	*Acropora palifera*
	—	—	—	—	—	—	—	—	—	X	*Acropora palifera* forma *alpha*
X. obesa	—	X	X	—	—	—	—	—	X	—	*Pocillopora verrucosa*
	—	—	—	—	—	—	—	X	X	—	*Pocillopora damicornis*
	—	—	—	—	—	—	—	X	X	—	*Pocillopora eydouxi*
	—	—	—	—	—	—	—	X	—	—	*Stylophora pistillata*
	—	—	—	—	—	—	—	—	—	X	*Stylophora pistillata* var. *palmata*
	—	—	—	—	—	—	—	—	X	—	*Seriatopora hystrix*
X. pectinea	—	—	—	—	—	—	—	X	—	—	*Acropora intermedia*
	—	—	—	—	—	—	—	X	—	—	*Acropora rambleri*
	—	—	—	—	—	—	—	X	—	X	*Acropora hyacinthus*
	—	—	—	—	—	—	—	—	—	X	*Acropora humilis*
	—	—	—	—	—	—	—	—	—	X	*Acropora patula*
	—	—	—	—	—	—	—	—	—	X	*Acropora florida*
	—	—	—	—	—	—	—	—	X	—	*Acropora sarmentosa*
	—	—	—	—	—	—	—	—	—	X	*Montipora ramosa*
X. plectrata	—	—	—	—	—	—	—	—	X	—	*Acrhelia horrescens*
X. quinaria	—	—	—	—	—	—	—	—	—	X	*Pocillopora damicornis* var. *caespitosa*
X. radians	—	—	—	—	—	—	—	X	—	—	*Alveopora mortenseni*
X. rasilis	—	—	—	—	—	—	—	—	X	—	*Gardineroseris planulata*
X. reducta	—	X	—	—	—	—	—	—	—	—	*Seriatopora caliendrum*
	—	X	—	—	—	—	—	—	—	—	*Seriatopora* sp.
X. resex	—	—	—	—	—	—	—	X	—	—	*Goniopora tenuidens*
	—	X	—	—	—	—	—	—	—	—	*Goniopora* sp.
X. rosariae	—	—	—	—	—	—	—	—	—	X	*Acropora rosaria*

Table 6. Continued

	Red Sea	Mada-gascar	Mauritius	Maldives	SE India	Japan	Enewetak	Moluccas	Great Barrier Reef	New Caledonia	
X. sabiuraensis	—	—	—	—	—	—	—	X	—	—	*Acropora intermedia*
	—	—	—	—	—	—	—	X	—	—	*Acropora rambleri*
	—	—	—	—	—	—	X	—	—	X	*Acropora florida*
	—	—	—	—	—	—	—	—	—	X	*Acropora convexa*
	—	—	—	—	—	X	—	X	—	X	*Acropora hyacinthus*
	—	—	—	—	—	—	—	—	—	X	*Acropora patula*
	—	—	—	—	—	—	—	—	—	X	*Acropora abrotanoides*
X. scutipes	—	—	—	—	—	—	—	X	—	—	*Goniopora tenuidens*
	—	—	—	—	—	—	—	X	—	—	*Goniopora pedunculata*
X. sectilis	—	—	—	—	—	—	—	—	—	X	*Pocillopora damicornis*
	—	—	—	—	—	—	X	—	—	—	*Pocillopora eydouxi*
	—	—	—	—	—	—	—	—	X	—	*Stylophora pistillata*
X. serrata	—	X	X	—	—	—	—	—	—	—	*Pocillopora damicornis*
	—	X	—	—	—	—	—	—	—	—	*Pocillopora verrucosa*
	—	X	—	—	—	—	—	—	—	—	*Pocillopora* sp. cf. *P. verrucosa*
	—	—	X	—	—	—	—	—	—	—	*Pocillopora* sp.
	—	X	—	—	—	—	—	—	—	—	*Stylophora subseriata*
X. simplex	—	—	—	—	—	—	—	—	—	X	*Scapophyllia cylindrica*
X. syntoma	—	—	—	—	—	—	—	X	—	—	*Montipora* sp. cf. *M. undata*
X. temnura	—	X	—	—	—	—	—	—	—	—	*Montipora sinensis*
	—	—	—	—	—	—	—	X	—	—	*Montipora* sp. cf. *M. undata*
	—	—	—	—	—	—	—	—	—	X	*Montipora ramosa*
X. tenta	—	—	—	—	—	—	X	—	—	—	*Pocillopora elegans*
	—	—	—	—	—	—	X	—	—	—	*Pocillopora ligulata*
X. tenuis	—	X	—	—	—	—	—	—	—	—	*Acropora cytherea*
X. torigera	—	—	—	—	—	—	—	X	—	—	*Favites flexuosa*
X. trituberata	—	—	—	—	—	—	—	X	—	—	*Acropora intermedia*
	—	—	—	—	—	—	—	X	—	—	*Acropora rambleri*
	—	—	—	—	—	—	—	X	—	X	*Acropora hyacinthus*
	—	—	—	—	—	—	—	—	—	X	*Acropora "corymbosa"*
	—	—	—	—	—	—	—	—	—	X	*Acropora abrotanoides*
	—	—	—	—	—	—	—	—	—	X	*Acropora humilis*
	—	—	—	—	—	—	—	—	—	X	*Acropora patula*
	—	—	—	—	—	—	—	—	—	X	*Acropora florida*

Table 6. Continued

	Red Sea	Madagascar	Mauritius	Maldives	SE India	Japan	Enewetak	Moluccas	Great Barrier Reef	New Caledonia	
X. tumorisa	—	—	—	—	—	X	—	—	—	X	*Acropora hyacinthus*
	—	—	—	—	—	—	—	—	—	X	*Acropora "corymbosa"*
	—	—	—	—	—	—	—	—	—	X	*Acropora florida*
	—	—	—	—	—	—	—	X	—	—	*Acropora intermedia*
	—	—	—	—	—	—	—	—	—	X	*Acropora elseyi*
	—	—	—	—	—	—	—	—	X	—	*Acropora sarmentosa*
	—	—	—	—	—	—	—	—	X	—	*Acropora formosa*
	—	—	—	—	—	—	—	—	X	—	*Acropora squarrosa*
X. umbonata	—	—	—	—	—	—	—	—	—	X	*Seriatopora hystrix*
X. uncinata	—	—	—	—	—	—	—	X	—	—	*Turbinaria danae*
X. varilabrata	—	—	—	—	—	—	—	X	—	X	*Seriatopora hystrix*
X. villosa	—	—	—	—	—	—	—	—	—	X	*Cyphastrea chalcidicum*
X. sp.	—	—	—	—	—	—	—	—	X	—	*Acropora gemmifera*
X. sp.	—	—	—	—	—	—	—	—	—	X	*Acropora syringodes*
X. sp.	—	—	—	—	—	—	—	X	—	—	*Fungia echinata*
X. sp.	—	X	—	—	—	—	—	—	—	—	*Galaxea astreata*
X. sp.	—	—	—	—	—	—	—	—	—	X	*Leptoria phrygia*
X. sp.	—	X	—	—	—	—	—	—	—	—	*Montipora* sp. cf. *M. stellata*
X. sp.	—	X	—	—	—	—	—	—	—	—	*Oxypora* sp.
X. sp.	—	—	—	—	—	—	—	X	—	—	*Parahalomitra robusta*
X. sp.	—	—	—	—	—	—	—	X	—	—	*Platygyra sinensis*
X. sp.	—	—	—	—	—	—	—	—	—	X	*Porites lutea*
X. sp.	—	—	—	—	—	—	—	X	—	—	*Tubastraea* sp.
X. sp.	—	—	—	—	—	—	—	—	X	—	*Merulina ampliata*
X. sp.	X	—	—	—	—	—	—	—	—	—	*Stylophora* sp.
X. sp.	—	—	—	X	—	—	—	—	—	—	*Acropora* sp.
X. sp. unpublished	—	—	—	—	X	—	—	—	—	—	*Montipora* sp.
X. sp. unpublished	—	—	—	—	X	—	—	—	—	—	*Montipora foliosa*
Lipochrus											
L. acroporinus	—	—	—	—	—	—	—	—	—	X	*Acropora rosaria*
	—	—	—	—	—	—	—	X	—	—	*Acropora patula*
L. sp.	—	—	—	—	—	—	—	X	—	—	*Acropora rambleri*

Table 6. Continued

	Red Sea	Madagascar	Mauritius	Maldives	SE India	Japan	Enewetak	Moluccas	Great Barrier Reef	New Caledonia	
Orstomella											
O. faviae	—	X	—	—	—	—	—	—	—	—	*Favia* sp.
O. lobophylliae	—	X	—	—	—	—	—	—	—	—	*Lobophyllia corymbosa*
	—	X	—	—	—	—	—	—	—	—	*Lobophyllia costata*
Zazaranus											
Z. fungicolus	—	X	—	—	—	—	—	—	—	—	*Fungia* sp.

its coral hosts occur, with the exception of the eastern Pacific. Figure 63 shows 13 localities where species of *Xarifia* have been found, and indicates the absence of these copepods in Panama, Moorea, and Hawaii. The species of Xarifiidae found at various localities in the Indo-Pacific are listed in Table 5.

Corals spread from one region to another by free-swimming planulae carried in the plankton (Vaughan and Wells, 1943; Endean, 1976). After the settlement of the planulae and the development of the colony, infestation by xarifiids apparently occurs, but the manner in which this is brought about is unknown. The eggs of *Xarifia* contain developing nauplii, but developmental stages have not been reared. We can only guess how *Xarifia* spreads from one coral colony to another, presumably at times over very long distances.

The same species of *Xarifia* may occur in a single species of coral in widely separated localities (Table 6). Six instances are known where the same species of *Xarifia* has been found in the same species of coral in regions separated by several thousand kilometers: the region of Madagascar and Mauritius, and the area of New Caledonia, the Great Barrier Reef, and the Moluccas. The six species of *Xarifia* showing this extremely wide distribution are as follows: *anomala* in *Acropora palifera, comata* in *Pocillopora verrucosa, comptula* in *Hydnophora exesa, diminuta* in *Psammocora* sp., *finitima* in *Pavona cactus,* and *obesa* in *Pocillopora verrucosa.*

Comments on the External Anatomy of the Genus *Xarifia*

Certain external features of *Xarifia* are useful for the determination of species. Six such features are shown in Table 7. The identification of females is generally easier than males, since females often possess processes or knobs on the posterior part of the prosome above the fifth legs, a character lacking in males. Female *Xarifia* show a wide variety of processes or knobs above the fifth legs in the various species, ranging from none, a single median process or knob, two lateral processes, three processes or knobs, to three processes and two knobs.

The second antenna is either 3-segmented or 4-segmented, although in several species the third and fourth segments are incompletely separated.

The arrangement of spines or setae on the three segments of the exopods of legs 1–4 takes different form in various species, either I,I,I; I,1,I; 1,I,I; 1,1,I; I,0,I; or 0,0,I. In most species the formula for the exopods is the same in all four legs, but in several species the formula for leg 1 may differ from that in legs 2–4.

The number of segments in the endopods of legs 1–4 is either 1 or 2. In several species the segments are incompletely separated, however, and in these species it is sometimes difficult to determine whether there are 1 or 2 segments. In one species, *Xarifia mucronata,* the number of segments of the endopods is different in the female than in the male.

The terminal armature of the endopods of legs 1–4 is characteristic of a species. This armature may show various patterns of setae, from 3, 3, 2, 2 to 0, 0, 0, 0, with several intermediate combinations. A few species have spines on the endopods of legs 2–4 or on legs 3 and 4.

Leg 5 in the female usually has a free segment, which in most species carries 2 terminal setae, but in a few species bears only 1 seta. In some species, however, there is no free segment and the leg is represented only by 2 or 3 setae. In two species leg 5 is entirely absent.

Other features of external anatomy have been discussed by Humes and Dojiri (1982).

Table 7. Selected features of *Xarifia* useful in the determination of species

Species of *Xarifia*	No. knobs or processes above fifth legs in ♀	No. segments in second antenna	Outer armature of exopods of legs 1–4 in ♀	No. segments in endopods of legs 1–4	Terminal armature of endopods of legs 1–4	No. setae on free segment of leg 5 ♀
ablusa	3	4	1,I,I	2	3,3,0,1	2
acicularis	none	4	I,I,I	2	2,2,1,1	no free segment
anomala	3	4	I,I,I	2	0,3,0,0	2
anopla	none	4 (not distinct)	I,I,I	1	2,2,0,0	leg 5 absent
apertipes	3	4	I,I,I	2	2,1,1,1	2
basilica	3	4	I,I,I	1	3,2,1,1	2
brevicauda	3	4	I,I,I	2	2,2,0,0	2
breviramea	3	3	I,I,I	1 (2 ?)	3,3,1,1	2
bullifera	3	4	I,I,I	1 (2 ?)	3,3,1,1	2
clavellata	3	4	I,I,I	1	1,1,1,1	2
comata	3	4	I,0,I	2	2,2,1,1	2
comptula	3	4	I,I,I	2	3,3,1,1	2
curtata	3	4	I,I,I	2	3,3,0,1	2
decorata	3	4	P_1 = I,I,I P_{2-4} = I,1,I	2	3,3,1,1	2
diminuta	3	4	I,I,I	2	2,2,0,2	2
dispar	3	4	I,I,I	2	2,2,1,1	2
dissona	3	4	1,0,I	2	3,2,1,1	no free segment
echinoporae	3	4	I,I,I	2	3,3,1,1	2
eminula	1	4	P_{1+2} = I,1,I P_{3+4} = I,0,I	2	3,3,2,2	leg 5 absent
exigua	3	4	I,I,I	1	2,2,1,1	2
exserens	3	3	I,0,I	2	2,2,1,1	2
extensa	none	4	P_1 = I,I,I P_{2-4} = I,0,I	1	1,1,0,0	no free segment
exuta	1	4 (not distinct)	I,I,I	1	3,3,1,1	1
fastigiata	3	4 (not distinct)	I,I,I	2	3,3,1,1	2
filata	3	4	I,I,I	1	2,2,0,0	2
fimbriata	2	3 (4 ?)	1,1,I	1	2,2,2,2	no free segment
finitima	3	4	I,I,I	1	1,2,0,0	2
fissilis	3	4	P_1 = I,I,I P_{2-4} = I,1,I	2	2,2,1,1	2
formosa	3	4	I,I,I	2	2,3,0,1	2
gerlachi	3	4 (not distinct)	I,I,I	1	2,2,1,1	2
gibberula	5	3	I,1,I	1	3,3,1,1	2
gracilipes	3	4	I,I,I	2	2,2,1,1	2
gradata	3	4	I,I,I	2	1,2,0,0	2
guttulifera	3	4	I,I,I	1	3,3,0,0	1
hadra	3	4	I,I,I	1	2,2,0,0	2
hamata	3	4	I,1,I	2	2,1 + I,I,I	2
heteromeles	3	3	I,I,I	1	1,1,0,0	1
imitans	3	4	I,I,I	2	2,3,0,1	2
imparilis	3	3	I,1,I	1	3,3,1,1	2
infrequens	3	4 (not distinct)	I,0,I	1	0,0,0,0	2
jugalis	3	4	P_1 = I,I,I P_{2-4} = I,1,I	2	2,2,1,1	2
lacerans	3	4	I,1,I	1	1,1,I,I	2
lamellispinosa	3	4	I,I,I	2	2,2,1,1	2
levis	none	4	I,1,I	2	3,2,1,1	no free segment

Table 7. Continued

Species of *Xarifia*	No. knobs or processes above fifth legs in ♀	No. segments in second antenna	Outer armature of exopods of legs 1–4 in ♀	No. segments in endopods of legs 1–4	Terminal armature of endopods of legs 1–4	No. setae on free segment of leg 5 ♀
lissa	none	4	I,0,I	1	3,3,1,1	2
longipes	3	4	I,I,I	1	2,1,1,1	2
maldivensis	5	3	I,1,I	1	3,3,1,1	2
mediolobata	1	4	I,I,I	2	3,3,0,0	2
minax	3	4	I,I,I	2	2,3,0,0	1
mucronata	3	3	I,I,I	♀ = 1,2,1,1 ♂ = 2,2,1,2	3,3,1,1	2
obesa	2	3	I,1,I	1	3,3,1,1	2
pectinea	3	4	I,I,I	1	3,3,1,1	2
plectrata	3	4	I,I,I	2	2,2,1,1	2
quinaria	3	3	I,1,I	1	3,3,1,1	2
radians	3	4	I,I,I	2	3,3,1,1	2
rasilis	none	4	I,I,I	2	1,1,0,0	2
reducta	none	4	I,0,I	1	2,2,1,1	2
resex	3	4	I,I,I	2	3,3,0,0	2
rosariae	3	3	P_1 = I,I,I P_{2-4} = I,0,I	1	0,0,0,0	2
sabiuraensis	3	4	P_1 = I,I,I P_{2-4} = I,0,I	1	0,0,0,0	2
scutipes	3	4	I,I,I	2	2,2,0,0	2
sectilis	3	4	I,I,I	2	3,2,1,1	2
serrata	1 (ridge)	4	I,0,I	1	3,2,1,1	2
simplex	3	4	I,I,I	2	1,2,0,1	2
syntoma	3	4	I,I,I	1	1,2,0,0	no free segment
temnura	none	4	P_1 = I,I,I P_{2-4} = I,0,I	1	1,1,0,0	2
tenta	5	3	I,1,I	1	3,3,1,1	2
tenuis	3	4 (not distinct)	0,0,I	1	0,0,0,0	2
torigera	3	4	1,1,I	2	1,1,0,0	2
trituberata	3	4	I,I,I	1	3,2,1,1	2
tumorisa	3	4	I,I,I	1	3,3,1,1	2
umbonata	5	3	1,1,I	1	3,3,1,1	2
uncinata	3	4	I,I,I	2	3,2 + I,I,I	2
varilabrata	2	3	I,1,I	1	3,3,1,1	2
villosa	3	4	I,I,I	2	3,3,1,1	2

Host Specificity

For nearly half of the 75 species of *Xarifia,* only a single species of coral is known to serve as host (Table 6). Since, in these cases, collections are limited in number, it is impossible to determine whether or not these associations represent true host specificity on the species level.

At the generic level, however, there is indication of host preference. Seventeen species of *Xarifia* occur only in various species of *Acropora* (Table 8). (The occurrence of one male *Xarifia pectinea* in *Montipora ramosa* should probably be considered as accidental.) *Xarifia breviramea* occurs in 9 species of *Acropora*; *X. anomala, X. tumorisa,* and *X. trituberata* in 8 species; and *X. sabiuraensis* in 7 species (Table 9). These copepods live only in *Acropora.*

The number of species of *Xarifia* occurring in a single coral species may be large: 9 species in *Acropora hyacinthus,* 7 in *Acropora* "*corymbosa*" and *Acropora florida,* and 6 in *Acropora intermedia, Pocillopora eydouxi,* and *Pocillopora verrucosa.*

Table 8. Genera of Scleractinia, arranged by families, and their species of Xarifiidae

Pocilloporidae	
Pocillopora	*Xarifia comata, fimbriata, fissilis, gibberula, imparilis, jugalis, maldivensis, obesa, quinaria, sectilis, serrata, tenta*
Seriatopora	*X. eminula, levis, obesa, reducta, umbonata, varilabrata*
Stylophora	*X. decorata, dissona, lissa, obesa, sectilis, serrata, X.* sp.
Acroporidae	
Acropora	*X. ablusa, anomala, basilica, breviramea, bullifera, exuta, fastigiata, gerlachi, guttulifera, infrequens, mucronata, pectinea, rosariae, sabiuraensis, tenuis, trituberata, tumorisa, X.* sp., *Lipochrus acroporinus*
Montipora	*X. anopla, apertipes, extensa, heteromeles, pectinea, syntoma, temnura, X.* sp.
Thamnasteriidae	
Psammocora	*X. diminuta, formosa, imitans*
Agariciidae	
Gardineroseris	*X. clavellata, filata, rasilis*
Pachyseris	*X. acicularis, exigua, lamellispinosa*
Pavona	*X. diminuta, finitima, longipes*
Fungiidae	
Fungia	*X.* sp., *Zazaranus fungicolus*
Parahalomitra	*X.* sp.
Poritidae	
Alveopora	*X. brevicauda, mediolobata, radians*
Goniopora	*X. hadra, resex, scutipes*
Porites	*X.* sp.
Faviidae	
Cyphastrea	*X. villosa*
Echinopora	*X. dispar, echinoporae*
Favia	*Orstomella faviae*
Favites	*X. torigera*
Hydnophora	*X. comptula, curtata*
Leptoria	*X.* sp.
Platygyra	*X. dispar, X.* sp.
Oculinidae	
Acrhelia	*X. plectrata*
Galaxea	*X. exserens, X.* sp.
Merulinidae	
Merulina	*X.* sp.
Scapophyllia	*X. simplex*
Pectiniidae	
Oxypora	*X.* sp.
Mussidae	
Lobophyllia	*Orstomella lobophylliae*
Caryophylliidae	
Euphyllia	*X. gracilipes*
Gyrosmilia	*X. apertipes*
Physogyra	*X. gradata, minax*
Dendrophyliidae	
Tubastrea	*X.* sp.
Turbinaria	*X. hamata, lacerans, uncinata*

Acropora and *Pocillopora* seems to be most often parasitized. Sixteen species of *Xarifia* live in 22 species of *Acropora* and 13 species of *Xarifia* inhabit 5 species of *Pocillopora.*

Several species of *Xarifia* may coexist in a single coral colony, though it is not known whether individuals of more than one species of *Xarifia* may live in a single polyp. Seven species of *Xarifia* (*anomala, breviramea, gerlachi, pectinea, sabiuraensis, trituberata,* and *tumorisa*) have been recovered from a single colony of *Acropora florida* in New Caledonia. Six species of *Xarifia* (*anomala, breviramea, pectinea, sabiuraensis, trituberata,* and *tumorisa*) have been found in one colony of *Acropora hyacinthus* in New Caledonia. The same six species of *Xarifia* were collected from one colony of *Acropora intermedia* at Karang Mie, Halmahera, in the Moluccas.

Morphological Variation in the Xarifiidae

For three genera, *Orstomella, Lipochrus,* and *Zazaranus,* little can be said concerning variability, since the number of specimens known is relatively small.

In the large genus *Xarifia,* however, a few species show considerable intraspecific variation. Probably the most striking example is *Xarifia sabiuraensis,* where variation in the lengths of the three processes above the fifth legs, the length of leg 5, and the length and width of the caudal ramus in the female has been described in specimens from several coral hosts (Humes and Dojiri, 1982).

As pointed out above, *Xarifia obesa* may show variation in the degree of development of a median knob between the two lateral processes above the fifth legs in the female (Fig. 40a–d).

Occasionally minor differences may be seen in specimens of the same species from different hosts or from widely separated localities, as in *Xarifia gerlachi, Xarifia anomala,* and *Xarifia temnura* (Humes and Dojiri, 1982).

Usually specimens of the same species from the same host and locality are remarkably consistent in most characters. For example, the segmentation and armature of the appendages seldom varies. However, at times minor abnormalities or variations may be observed, as in abnormal endopods in *Xarifia finitima* (Fig. 19d), the variable form of leg 5 in the female of *Xarifia imparilis* (Fig. 32g–i), the shape and size of the median process in *Xarifia quinaria* (Fig. 42e–g), and differences in shape of the two lateral processes in *Xarifia obesa* (Fig. 40e).

Variations such as these emphasize the necessity for the study of a large number of specimens from all hosts of the species from different geographical locations. The possibility exists that there may in some species be more plasticity than a small number of specimens would suggest. Therefore, descriptive studies should if possible be broadly based.

Evolution within the Xarifiidae

Evolutionary lines within the family Xarifiidae are difficult to discover. The two genera *Lipochrus* and *Zazaranus* are distinct from *Xarifia.* Within the large genus *Xarifia* there is considerable variability among species. However, the value of various characters in determining relationships is largely uncertain. Nevertheless, selected characters appear to have significance, e.g., the appearance of processes or knobs above the fifth legs in the female, the segmentation of the second antenna, the armature of the exopods of legs 1–4, the segmentation of the endopods in legs 1–4 and their terminal armature, and the nature of leg 5. On the basis of such shared external morphological features and on host preference, certain species

Table 9. Scleractinia and their xarifiid copepods

Acrhelia horrescens	*Xarifia plectrata*
Acropora abrotanoides	*Xarifia anomala, breviramea, sabiuraensis, trituberata*
Acropora convexa	*Xarifia anomala, sabiuraensis*
Acropora "corymbosa"	*Xarifia ablusa, anomala, breviramea, gerlachi, infrequens, trituberata, tumorisa*
Acropora cytherea	*Xarifia gerlachi, infrequens, tenuis*
Acropora exigua	*Xarifia breviramea*
Acropora elseyi	*Xarifia ablusa, fastigiata, tumorisa*
Acropora florida	*Xarifia anomala, breviramea, gerlachi, pectinea, sabiuraensis, trituberata, tumorisa*
Acropora formosa	*Xarifia basilica, bullifera, infrequens, tumorisa*
Acropora gemmifera	*Xarifia* sp.
Acropora humilis	*Xarifia anomala, pectinea, trituberata*
Acropora hyacinthus	*Xarifia anomala, basilica, breviramea, gerlachi, infrequens, pectinea, sabiuraensis, trituberata, tumorisa*
Acropora intermedia	*Xarifia anomala, breviramea, pectinea, sabiuraensis, trituberata, tumorisa*
Acropora millepora	*Xarifia breviramea*
Acropora palifera	*Xarifia anomala, exuta, mucronata*
Acropora palifera forma *alpha*	*Xarifia guttulifera, mucronata*
Acropora patula	*Lipochrus acroporinus, Xarifia pectinea, sabiuraensis, trituberata*
Acropora rambleri	*Lipochrus* sp., *Xarifia ablusa, breviramea, pectinea, sabiuraensis, trituberata*
Acropora rosaria	*Lipochrus acroporinus, Xarifia ablusa, fastigiata, rosariae*
Acropora sarmentosa	*Xarifia pectinea, tumorisa*
Acropora squarrosa	*Xarifia tumorisa*
Acropora sp. cf. *A. teres*	*Xarifia gerlachi*
Acropora syringodes	*Xarifia* sp.
Acropora valida	*Xarifia breviramea*
Acropora sp.	*Xarifia anomala, gerlachi*
Alveopora mortenseni	*Xarifia mediolobata, radians*
Alveopora sp.	*Xarifia brevicauda*
Cyphastrea chalcidicum	*Xarifia villosa*
Echinopora gemmacea	*Xarifia dispar*
Echinopora horrida	*Xarifia echinoporae*
Echinopora lamellosa	*Xarifia dispar, echinoporae*
Echinopora sp.	*Xarifia dispar*
Euphyllia glabrescens	*Xarifia gracilipes*
Favia sp.	*Orstomella faviae*
Favites flexuosa	*Xarifia torigera*
Fungia echinata	*Xarifia* sp.
Fungia sp.	*Zazaranus fungicolus*
Galaxea astreata	*Xarifia* sp.
Galaxea fascicularis	*Xarifia exserens*
Gardineroseris planulata	*Xarifia clavellata, filata, rasilis*
Goniopora pedunculata	*Xarifia hadra, scutipes*
Goniopora tenuidens	*Xarifia hadra, resex, scutipes*
Goniopora sp.	*Xarifia resex*
Gyrosmilia interrupta	*Xarifia apertipes*
Hydnophora exesa	*Xarifia comptula, curtata*
Leptoria phrygia	*Xarifia* sp.
Lobophyllia corymbosa	*Orstomella lobophylliae*
Lobophyllia costata	*Orstomella lobophylliae*
Merulina ampliata	*Xarifia* sp.
Montipora composita	*Xarifia anopla, heteromeles*
Montipora foliosa	*Xarifia* sp.
Montipora ramosa	*Xarifia pectinea, temnura*
Montipora sinensis	*Xarifia temnura*
Montipora sp. cf. *M. stellata*	*Xarifia* sp.

Table 9. Continued

Montipora sp. cf. *M. undata*	*Xarifia anopla, heteromeles, syntoma, temnura*
Montipora verrucosa	*Xarifia apertipes*
Montipora sp.	*Xarifia anopla, extensa, Xarifia* sp.
Oxypora sp.	*Xarifia* sp.
Pachyseris rugosa	*Xarifia acicularis*
Pachyseris speciosa	*Xarifia exigua, lamellispinosa*
Parahalomitra robusta	*Xarifia* sp.
Pavona angulata	*Xarifia longipes*
Pavona cactus	*Xarifia finitima*
Pavona varians	*Xarifia finitima*
Pavona sp.	*Xarifia diminuta*
Physogyra lichtensteini	*Xarifia gradata, minax*
Platygyra sinensis	*Xarifia* sp.
Platygyra sp.	*Xarifia dispar*
Pocillopora damicornis	*Xarifia fimbriata, fissilis, jugalis, obesa, sectilis, serrata*
Pocillopora damicornis var. *caespitosa*	*Xarifia fimbriata, imparilis, jugalis, quinaria*
Pocillopora danae	*Xarifia obesa*
Pocillopora eydouxi	*Xarifia comata, fimbriata, imparilis, jugalis, maldivensis, obesa, sectilis*
Pocillopora ligulata	*Xarifia tenta*
Pocillopora verrucosa	*Xarifia comata, gibberula, imparilis, obesa, serrata, tenta*
Pocillopora sp. cf. *P. verrucosa*	*Xarifia comata, obesa, serrata*
Pocillopora sp.	*Xarifia fimbriata, maldivensis, obesa, serrata*
Porites lutea	*Xarifia* sp.
Psammocora contigua	*Xarifia diminuta, imitans*
Psammocora sp. cf. *P. contigua*	*Xarifia diminuta*
Psammocora digitata	*Xarifia formosa, imitans*
Psammocora sp.	*Xarifia diminuta*
Scapophyllia cylindrica	*Xarifia simplex*
Seriatopora caliendrum	*Xarifia reducta*
Seriatopora hystrix	*Xarifia eminula, levis, obesa, reducta, umbonata, varilabrata*
Seriatopora sp.	*Xarifia reducta*
Stylophora mordax	*Xarifia decorata, lissa*
Stylophora pistillata	*Xarifia decorata, dissona, lissa, obesa, sectilis*
Stylophora pistillata var. *palmata*	*Xarifia obesa*
Stylophora subseriata	*Xarifia serrata*
Stylophora sp.	*Xarifia decorata, lissa, Xarifia* sp.
Tubastraea sp.	*Xarifia* sp.
Turbinaria danae	*Xarifia lacerans, uncinata*
Turbinaria sp. (near *T. elegans*)	*Xarifia hamata*

of *Xarifia* may be grouped, either in triplets or pairs. The broad view of relationships of such groups to each other remains obscure, however.

GROUP: *maldivensis, gibberula, quinaria.* These three species possess several characters that suggest their close relationship: (1) the region above the fifth legs in the female bears 3 processes and 2 knobs; (2) the second antenna is 3-segmented; (3) the 1-segmented endopods in legs 1–4 have a terminal armature of 3, 3, 1, 1; (4) the exopods of legs 1–4 are armed with I,1,I; and (5) leg 5 has a small free segment 16–23 μm long. These five characters give a strong impression of mutual relationship. The common affinity of the three species is further suggested by host preference, with all of them living in *Pocillopora.*

GROUP: *infrequens, sabiuraensis, tenuis.* These three species share the following characters and appear to be related: (1) the body is long and slender; (2) the eggs are arranged serially; (3) there are 3 processes (the middle process twice as long as the other two) above the fifth legs in the female; (4) the caudal ramus is elongate; (5) the second antenna is 4-segmented, but the third and fourth segments are indistinctly separated; (6) the exopods of legs 1–4 have the formula I,0,I (perhaps 0,0,I in *X. tenuis,* but the first segment has an extremely minute process that might be considered a spine); (7) the 1-segmented endopods of legs 1–4 have a terminal armature of 0, 0, 0, 0; and (8) leg 5 in the female has an elongate free segment. All three species live in *Acropora.*

GROUP: *basilica, gerlachi, trituberata.* These species are strikingly similar. All have the following characters: (1) there are 3 short knobs or processes above the fifth legs in the female; (2) the caudal ramus is fused with the anal segment; (3) the second antenna is 4-segmented; (4) the exopods of legs 1–4 have the formula I,I,I; (5) the endopods of legs 1–4 are 1-segmented, but with a slight indication of subdivision on the inner margin, and with the terminal armature 3, 2, 1, 1 (but 2, 2, 1, 1 in *X. gerlachi*); and (6) leg 5 in the female has a moderately long free segment. All three species occur in *Acropora.*

GROUP: *hamata, lacerans, uncinata.* In these three species the terminal armature of the endopods of legs 3 and 4 consists of a well-developed spine, a feature not seen in other species of *Xarifia.* The affinity of these species is further suggested by the following shared characters: (1) the terminal claw on the second antenna is slender and setiform; (2) the mandible has a lobelike expansion on the concave edge; and (3) the first maxilla has 2 setae and a spiniform process. However, the mutual relationship of the three species is disrupted by differences in the formula for the armature of legs 1–4, this formula in *X. hamata* and *X. lacerans* being I,1,I, but in *X. uncinata* being I,I,I. Furthermore, the endopods of legs 1–4 are distinctly 2-segmented in *X. hamata* and *X. uncinata,* but are 1-segmented in *X. lacerans* with only a very slight indication of subdivision. The terminal armature of these endopods is 2, (1,I), I, I in *X. hamata,* but 1, 1, I, I in *X. lacerans,* and 3, (2,I), I, I in *X. uncinata.* Since little is known about the evolutionary significance of such characters in *Xarifia,* the meaning of these differences in the armature of the legs is difficult to assess. The view that the three species are related, with *X. uncinata* somewhat removed from the other two species, may be reinforced by the fact that all three species live in *Turbinaria.*

GROUP: *decorata, fissilis, jugalis.* The affinity of these species is indicated by the following shared features: (1) the body form of the female is similar; (2) there are 3 long slender processes above the fifth legs in the female; (3) the eggs are serially arranged; (4) the slender 4-segmented second antenna has a long recurved terminal claw; (5) the formula for the armature of the exopod of leg 1 is I,I,I, but in legs 2–4 this formula is I,1,I; (6) the 2-segmented endopods in legs 1–4 have the terminal armature 2, 2, 1, 1, except 3, 3, 1, 1 in *X. decorata*; and (7) leg 5 in the female has an elongate free segment. The three species occur in Pocilloporidae, *X. decorata* in *Stylophora,* and *X. fissilis* and *X. jugalis* in *Pocillopora.*

GROUP: *comptula, echinoporae.* These two species have several features in common: (1) the body form of the female is similar; (2) there are 3 long processes above the fifth legs in the female; (3) the second antenna is 4-segmented; (4) the exopods of legs 1–4 have the formula I,I,I; (5) the 2-segmented endopods of legs 1–4 have the terminal armature 3, 3, 1, 1; and (6) leg 5 in the female has a greatly elongated free segment. Both species parasitize Faviidae, *X. echinoporae* in *Echinopora,* and *X. comptula* in *Hydnophora.*

GROUP: *extensa, temnura.* These xarifiids have several shared features: (1) the long slender body; (2) the eggs arranged serially; (3) the caudal ramus mostly fused with the anal segment; (4) the region above the fifth legs in the female without processes or knobs; (5) the 4-segmented second antenna with the second and third segments having small outer spines and the fourth segment terminally with a very short claw and a long seta; (6) the exopod of leg 1 with the formula I,I,I, but this formula in legs 2–4 with I,0,I; (7) the 1-segmented endopods of legs 1–4 with the terminal armature 1, 1, 0, 0; and (8) leg 5 in the female reduced to setae only (*X. extensa*) or a minute lobe bearing setae (*X. temnura*). Both species live in *Montipora.*

GROUP: *lissa, serrata.* The relationship of these two species is indicated by the following shared features: (1) the body form in the female is similar; (2) the eggs are arranged serially; (3) the region above the fifth legs in the female lacks processes or knobs, though slightly raised middorsally; (4) the second antenna is 4-segmented; (5) the exopods of legs 1–4 have the formula I,0,I; (6) the 1-segmented endopods of legs 1–4 (with slight indication of subdivision) have the terminal armature 3, 3, 1, 1 (*X. lissa*) or 3, 2, 1, 1 (*X. serrata*); (7) leg 5 in the female is elongate; and (8) the maxilliped of the male has a serrate claw. Both species live in Pocilloporidae, *X. serrata* in *Pocillopora* and *Stylophora,* and *X. lissa* in *Stylophora.*

GROUP: *obesa, varilabrata.* These two species have a similar general appearance and may easily be confused without careful observation. Both show the following characters: (1) the female has a stout prosome; (2) the region above the fifth legs in the female has 2 lateral processes only; (3) the second antenna is 3-segmented; (4) the second maxilla is much modified; (5) the exopods of legs 1–4 have the formula I,1,I; (6) the 1-segmented endopods of legs 1–4 have the terminal armature 3, 3, 1, 1; and (7) leg 5 in the female has a short free segment. Both species occur in Pocilloporidae, *X. varilabrata* in *Seriatopora,* and *X. obesa* in *Pocillopora, Seriatopora,* and *Stylophora.*

GROUP: *exigua, longipes.* These two species seem to be related. Both have shared features as follows: (1) the body form in the female is similar; (2) there are 3 long slender processes above the fifth leg in the female; (3) the caudal ramus is elongate; (4) the second antenna is 4-segmented; (5) the exopods of legs 1–4 have the formula I,I,I; (6) the 1-segmented endopods of legs 1–4 have the terminal armature 2, 2, 1, 1 in *X. exigua,* 2, 1, 1, 1 in *X. longipes*; and (7) leg 5 in the female has a long free segment. Both species inhabit Agariciidae, *X. longipes* in *Pavona,* and *X. exigua* in *Pachyseris.*

GROUP: *exuta, guttulifera.* These species have certain features in common: (1) the body is elongate; (2) the caudal ramus is fused with the anal segment; (3) the 4-segmented first antenna is very short; (4) the 4-segmented second antenna lacks setae on the first and second segments; (5) the exopods of legs 1–4 have the formula I,I,I; (6) the 1-segmented endopods of legs 1–4 have the terminal armature 3, 3, 1, 1 in *X. exuta* and 3, 3, 0, 0 in *X. guttulifera*; and (7) leg 5 in the female has a free segment bearing only 1 seta. Although the region above the fifth legs in the female differs in the two species (with a small dorsomedial lobe in *X. exuta,* with 3 short drop-shaped processes in *X. guttulifera*), the numerous other points of similarity convey an impression of affinity. Both species live in *Acropora palifera.*

GROUP: *diminuta, lamellispinosa.* The probable affinity of these two species is indicated by several features: (1) the body form is similar; (2) the eggs are in a cluster; (3) there are 3 long processes above the fifth legs in the female; (4) the second antenna is 4-segmented; (5) the exopods of legs 1–4 have the formula I,I,I; (6) the 2-segmented endopods of legs 1–4 have the terminal armature 2, 2, 0, 2

Table 10. Occurrence of Xarifiidae among genera of the five suborders of the Scleractinia. Figures in parentheses represent the number of species of xarifiids, both those described and those new but undescribed for lack of material. Suborders are those recognized by Wells (1956)

Astrocoeniina (55)	Fungiina (19)	Faviina (17)	Caryophylliina (4)	Dendrophylliina (4)
Acropora (19)	*Alveopora* (3)	*Acrhelia* (1)	*Euphyllia* (1)	*Tubastrea* (1)
Montipora (8)	*Fungia* (2)	*Cyphastrea* (1)	*Gyrosmilia* (1)	*Turbinaria* (3)
Pocillopora (12)	*Gardineroseris* (3)	*Echinopora* (2)	*Physogyra* (2)	
Psammocora (3)	*Goniopora* (3)	*Favia* (1)		
Seriatopora (6)	*Pachyseris* (3)	*Favites* (1)		
Stylophora (7)	*Parahalomitra* (1)	*Galaxea* (2)		
	Pavona (3)	*Hydnophora* (2)		
	Porites (1)	*Leptoria* (1)		
		Lobophyllia (1)		
		Merulina (1)		
		Oxypora (1)		
		Platygyra (2)		
		Scapophyllia (1)		

in *X. diminuta*, 2, 2, 1, 1 in *X. lamellispinosa*; and (7) leg 5 in the female has an elongate free segment. *Xarifia diminuta* occurs in both *Psammocora* (family Thamnasteriidae) and *Pavona* (family Agariciidae), and *X. lamellispinosa* lives in *Pachyseris* (family Agariciidae).

Xarifiidae and the Evolutionary History of Corals

Members of the family Xarifiidae occur in corals belonging to each of the five suborders of Scleractinia. Although I have examined many other zoantharians (Actiniaria, Antipatharia, and Zoanthidea), I have never found xarifiids. On the basis of information available the largest number of species of xarifiids occurs in the isolated suborder Astrocoeniina (Table 10). In this suborder there are more species of xarifiids than in the other four suborders combined. The significance of this apparent preference for astrocoeniine corals is not clear at present. The number of corals in which xarifiid copepods are known to live is still relatively small (about 90 species; see Table 9). In the entire Indo-Pacific area the number of species of hermatypic corals is not less than 500 (Vaughan and Wells, 1943). It is probable that future investigations will reveal many more coral hosts.

Sampling of corals for copepods has been carried out at relatively few localities in the Indo-Pacific and then with very different thoroughness. A synopsis of cyclopoid copepods living with corals, including xarifiids, has been published by Humes (1979). Comparisons of the incidence of copepods associated with corals in various regions (see Vermeij, 1983, p. 324), based on sampling of unequal character, have at present only minor significance. The apparent absence of xarifiids in particular species of corals may not be meaningful. Negative searches may result from inadequate samples of corals or from failure to use the proper technique as mentioned above in Materials and Methods.

The evolutionary history of scleractinian corals is not thoroughly known, and the origin of the different groups is uncertain (Vaughan and Wells, 1943). The oldest scleractinians have been found in the Middle Triassic, but many Recent families did not appear until the Late Eocene, when such families as the Acroporidae, Seriatoporidae, Poritidae, and Fungiidae joined the Faviidae in predominating reef faunas (Vaughan and Wells, 1943).

Table 11. List of characters of *Xarifia* used in cluster analysis

	Plesiomorphic (primitive)—0	Apomorphic (derived)—1
Urosome	without middorsal hump (+)	with middorsal hump (−)
Sides of first 2 postgenital segments	smooth, without lobes (+)	with lobelike expansions (−)
Region dorsal to fifth legs	without processes or knobs (1)	with 1 median process (2), with 2 processes (3), with 3 processes or knobs (4), with 3 processes and 2 knobs (5)
Three processes above fifth legs	without terminal filaments (+)	with terminal filaments (−)
Median process of 3 processes above fifth legs	not swollen (+)	greatly swollen (−)
Arrangement of eggs in egg sac	in cluster (+)	seriate (−)
Rostrum	rounded or nearly so (+)	with median cleft (0), pointed (−)
Second antenna	4-segmented (+)	with 3rd and 4th segments indistinctly separated (0), 3-segmented (−)
Second segment of second antenna	without posterodistal bulge (+)	with prominent bulge (−)
First 2 segments of 2nd antenna	both with 1 seta (+)	both without setae (−)
Labrum	same in both sexes (+)	sexually dimorphic (−)
Terminal armature of endopod of leg 1	3 setae (1)	2 setae (2), 1 seta (3), no setae (4)
Terminal armature of endopods of legs 3 and 4	2,2 (1)	0,2 (2), 1,1 (3), 0,1 (4), I,I (5), 0,0 (6)
Terminal armature of endopods of legs 1–4	same in both sexes (+)	sexually dimorphic (−)
Number of segments in endopods of legs 1–4 in both sexes	2 (+)	indistinctly 2 or 1 (0), 1 (−)
Number of segments in endopods of legs 1–4	same in both sexes (+)	different in two sexes (−)
Armature of 1st 2 segments of exopod of leg 1 in female	I,I (1)	I,1 (2), 1,I (3), 1,1 (4), I,0 or 1,0 (5), 0,0 (6)
Outer and terminal armature of exopods of legs 1–4	same in all 4 legs (+)	different in leg 1 than in legs 2–4 (−)
Free segment of leg 5 in female	present (+)	represented only by 1 or 2 setae (0), absent (−)
Armature of free segment of leg 5 in female	2 setae (+)	1 seta (−)
Shape of free segment of leg 5 in female	rectangular, oval, or elongate (+)	nearly round, flattened, and shieldlike (−)
Caudal ramus in female	boundary with anal segment clearly identifiable (+)	boundary with anal segment indistinct (0), completely fused with anal segment (−)
Caudal ramus	with setae (+)	without setae (−)
Inner margin of caudal ramus when present	not greatly expanded (+)	greatly expanded (−)
Caudal ramus	distinct in both sexes (+)	distinct in one sex but fused with anal segment in other (0), fused with anal segment in both sexes (−)
Ratio of length to width in female	$<10:1$ (+)	$\geq 10:1$ (−)

Table 12. Data matrix of species of *Xarifia* versus characters. Left entry is character from Table 11. Right entry indicates plesiomorphy (0) or apomorphy (1). NC = no comparison.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
ablusa	+/0	+/0	4/1	+/0	+/0	-/1	+/0	+/0	+/0	+/0	+/0	1/0	4/1	+/0	+/0	+/0	3/1	+/0	+/0	+/0	+/0	+/0	+/0	+/0	0/1	+/0
acicularis	+/0	+/0	1/0	NC	NC	NC	+/0	+/0	+/0	+/0	+/0	2/1	3/1	+/0	0/1	+/0	1/0	+/0	0/1	NC	NC	+/0	+/0	+/0	+/0	+/0
anomala	+/0	+/0	4/1	+/0	+/0	NC	+/0	+/0	+/0	+/0	+/0	4/1	6/1	+/0	+/0	+/0	1/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	0/1	+/0
anopla	+/0	+/0	1/0	NC	NC	NC	+/0	0/1	+/0	+/0	-/1	2/1	6/1	+/0	-/1	+/0	1/0	+/0	-/1	NC	NC	-/1	-/1	NC	-/1	+/0
apertipes	+/0	+/0	4/1	+/0	+/0	NC	+/0	+/0	+/0	+/0	+/0	2/1	3/1	+/0	+/0	+/0	1/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0
basilica	+/0	+/0	4/1	+/0	+/0	NC	+/0	+/0	+/0	+/0	+/0	1/0	3/1	+/0	0/1	+/0	1/0	+/0	+/0	+/0	+/0	-/1	+/0	NC	-/1	+/0
brevicauda	+/0	+/0	4/1	+/0	+/0	-/1	+/0	+/0	+/0	+/0	+/0	2/1	6/1	+/0	+/0	+/0	1/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0
breviramea	+/0	+/0	4/1	+/0	+/0	-/1	+/0	-/1	+/0	+/0	-/1	1/0	3/1	+/0	0/1	+/0	1/0	+/0	+/0	+/0	+/0	0/1	+/0	+/0	+/0	+/0
bullifera	+/0	+/0	4/1	+/0	+/0	NC	+/0	+/0	+/0	+/0	+/0	1/0	3/1	+/0	0/1	+/0	1/0	+/0	+/0	+/0	+/0	-/1	+/0	NC	-/1	+/0
clavellata	+/0	+/0	4/1	+/0	+/0	NC	+/0	+/0	+/0	+/0	+/0	3/1	3/1	+/0	0/1	+/0	1/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0
comata	+/0	+/0	4/1	+/0	+/0	-/1	+/0	+/0	+/0	+/0	+/0	2/1	3/1	+/0	0/1	+/0	5/1	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0
comptula	+/0	+/0	4/1	+/0	+/0	+/0	+/0	+/0	+/0	+/0	-/1	1/0	3/1	+/0	+/0	+/0	1/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0
curtuta	+/0	+/0	4/1	+/0	+/0	NC	+/0	+/0	+/0	+/0	-/1	1/0	4/1	+/0	+/0	+/0	1/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0
decorata	+/0	+/0	4/1	+/0	+/0	-/1	+/0	+/0	+/0	+/0	-/1	1/0	3/1	+/0	+/0	+/0	1/0	-/1	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0
diminuta	+/0	+/0	4/1	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	2/1	2/1	+/0	+/0	+/0	1/0	+/0	+/0	+/0	+/0	0/1	+/0	+/0	+/0	+/0
dispar	+/0	+/0	4/1	+/0	+/0	NC	+/0	+/0	+/0	+/0	+/0	2/1	3/1	+/0	+/0	+/0	1/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0
dissona	+/0	+/0	4/1	+/0	+/0	NC	+/0	+/0	+/0	+/0	NC	1/0	3/1	NC	NC	NC	5/1	+/0	0/1	NC	NC	+/0	+/0	+/0	NC	+/0
echinoporae	+/0	+/0	4/1	+/0	+/0	NC	+/0	+/0	+/0	+/0	+/0	1/0	3/1	+/0	+/0	+/0	1/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0
eminula	+/0	+/0	2/1	NC	NC	NC	+/0	+/0	+/0	+/0	-/1	1/0	1/0	+/0	0/1	+/0	2/1	+/0	-/1	NC	NC	0/1	+/0	+/0	+/0	+/0
exigua	+/0	+/0	4/1	+/0	+/0	NC	+/0	+/0	+/0	+/0	+/0	2/1	3/1	+/0	-/1	+/0	1/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0
exserens	+/0	+/0	4/1	+/0	+/0	NC	+/0	-/1	-/1	+/0	+/0	2/1	3/1	+/0	+/0	+/0	5/1	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0
extensa	+/0	+/0	1/0	NC	NC	-/1	+/0	+/0	+/0	+/0	+/0	3/1	6/1	+/0	-/1	+/0	1/0	-/1	0/1	NC	NC	+/0	+/0	+/0	0/1	-/1
exuta	+/0	+/0	2/1	NC	NC	NC	+/0	0/1	+/0	-/1	+/0	1/0	3/1	+/0	-/1	+/0	1/0	+/0	+/0	-/1	+/0	-/1	+/0	NC	-/1	+/0
fastigiata	+/0	+/0	4/1	+/0	+/0	-/1	-/1	0/1	+/0	+/0	+/0	1/0	3/1	+/0	+/0	+/0	1/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0
filata	+/0	+/0	4/1	-/1	+/0	NC	+/0	+/0	+/0	+/0	+/0	2/1	6/1	+/0	-/1	+/0	1/0	+/0	+/0	+/0	+/0	0/1	+/0	+/0	+/0	+/0
fimbriata	+/0	+/0	3/1	+/0	NC	-/1	+/0	+/0	+/0	+/0	+/0	2/1	1/0	+/0	0/1	+/0	4/1	+/0	0/1	NC	NC	+/0	+/0	+/0	+/0	+/0
finitima	+/0	+/0	4/1	+/0	+/0	-/1	+/0	+/0	+/0	+/0	+/0	3/1	6/1	+/0	0/1	+/0	1/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0
fissilis	+/0	+/0	4/1	+/0	+/0	-/1	0/1	+/0	+/0	+/0	-/1	2/1	3/1	+/0	+/0	+/0	1/0	-/1	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0
formosa	+/0	+/0	4/1	+/0	+/0	-/1	+/0	+/0	+/0	+/0	+/0	2/1	4/1	+/0	+/0	+/0	1/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0
gerlachi	+/0	+/0	4/1	+/0	+/0	+/0	+/0	0/1	+/0	+/0	+/0	2/1	3/1	+/0	0/1	+/0	1/0	+/0	+/0	+/0	+/0	-/1	+/0	NC	-/1	+/0
gibberula	-/1	+/0	5/1	+/0	+/0	+/0	+/0	-/1	+/0	+/0	+/0	1/0	3/1	+/0	-/1	+/0	2/1	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0
gracilipes	+/0	+/0	4/1	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	2/1	3/1	+/0	+/0	+/0	1/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0
gradata	+/0	+/0	4/1	+/0	+/0	NC	+/0	+/0	+/0	+/0	-/1	3/1	6/1	+/0	+/0	+/0	1/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0
guttulifera	+/0	+/0	4/1	+/0	+/0	NC	+/0	+/0	+/0	-/1	+/0	1/0	6/1	+/0	-/1	+/0	1/0	+/0	+/0	-/1	+/0	-/1	+/0	NC	-/1	+/0
hadra	+/0	+/0	4/1	+/0	+/0	+/0	+/0	+/0	+/0	+/0	-/1	2/1	6/1	+/0	0/1	+/0	1/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0
hamata	+/0	+/0	4/1	+/0	+/0	+/0	+/0	+/0	+/0	+/0	-/1	2/1	5/1	+/0	+/0	+/0	2/1	+/0	+/0	+/0	+/0	0/1	+/0	+/0	+/0	+/0
heteromeles	+/0	+/0	4/1	+/0	+/0	NC	+/0	0/1	+/0	+/0	+/0	3/1	6/1	-/1	-/1	+/0	1/0	+/0	+/0	-/1	+/0	+/0	+/0	+/0	0/1	+/0
imitans	+/0	+/0	4/1	+/0	+/0	NC	+/0	+/0	+/0	+/0	+/0	2/1	4/1	+/0	+/0	+/0	1/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0
imparilis	+/0	+/0	4/1	+/0	+/0	+/0	+/0	-/1	+/0	+/0	+/0	1/0	3/1	+/0	-/1	+/0	2/1	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0
infrequens	+/0	+/0	4/1	+/0	+/0	-/1	+/0	0/1	+/0	+/0	NC	4/1	6/1	+/0	-/1	+/0	5/1	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	-/1
jugalis	+/0	+/0	4/1	+/0	+/0	-/1	0/1	+/0	+/0	+/0	-/1	2/1	3/1	+/0	+/0	+/0	1/0	-/1	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0
lacerans	+/0	+/0	4/1	+/0	+/0	-/1	+/0	+/0	+/0	+/0	+/0	3/1	5/1	+/0	0/1	+/0	2/1	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0
lamellispinosa	+/0	+/0	4/1	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	2/1	3/1	+/0	+/0	+/0	1/0	+/0	+/0	+/0	+/0	0/1	+/0	+/0	+/0	+/0
levis	+/0	+/0	1/0	NC	NC	NC	+/0	+/0	+/0	+/0	+/0	1/0	3/1	+/0	+/0	+/0	2/1	+/0	0/1	NC	NC	0/1	+/0	+/0	+/0	+/0
lissa	+/0	+/0	1/0	NC	NC	-/1	+/0	+/0	+/0	+/0	+/0	1/0	3/1	+/0	0/1	+/0	5/1	-/1	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0
longipes	+/0	+/0	4/1	+/0	+/0	NC	+/0	+/0	+/0	+/0	+/0	2/1	3/1	+/0	0/1	+/0	1/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0
maldivensis	+/0	+/0	5/1	+/0	+/0	NC	+/0	-/1	+/0	+/0	+/0	1/0	3/1	+/0	-/1	+/0	2/1	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0
mediolobata	+/0	+/0	2/1	NC	NC	+/0	+/0	+/0	+/0	+/0	+/0	1/0	6/1	+/0	+/0	+/0	1/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0
minax	+/0	+/0	4/1	+/0	+/0	NC	+/0	+/0	+/0	+/0	-/1	2/1	6/1	+/0	+/0	+/0	1/0	+/0	+/0	-/1	+/0	+/0	+/0	+/0	+/0	+/0
mucronata	+/0	+/0	4/1	+/0	+/0	NC	+/0	-/1	+/0	+/0	+/0	1/0	3/1	+/0	NC	-/1	1/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	-/1
obesa	+/0	+/0	3/1	+/0	NC	+/0	0/1	-/1	+/0	+/0	+/0	1/0	3/1	+/0	-/1	+/0	2/1	+/0	+/0	+/0	+/0	0/1	+/0	+/0	+/0	+/0
pectinea	+/0	+/0	4/1	+/0	+/0	NC	+/0	0/1	+/0	+/0	+/0	1/0	3/1	+/0	0/1	+/0	1/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0
plectrata	+/0	+/0	4/1	+/0	+/0	-/1	0/1	+/0	+/0	+/0	+/0	2/1	3/1	+/0	+/0	+/0	1/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0
quinaria	+/0	+/0	5/1	+/0	+/0	+/0	+/0	-/1	+/0	+/0	+/0	1/0	3/1	+/0	-/1	+/0	2/1	+/0	+/0	+/0	+/0	0/1	+/0	+/0	+/0	+/0
radians	+/0	+/0	4/1	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	1/0	3/1	+/0	+/0	+/0	1/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0
rasilis	+/0	+/0	1/0	NC	NC	NC	+/0	+/0	+/0	+/0	NC	3/1	6/1	NC	NC	NC	1/0	+/0	+/0	+/0	+/0	0/1	+/0	+/0	NC	+/0
reducta	+/0	+/0	1/0	NC	NC	-/1	+/0	+/0	+/0	+/0	+/0	2/1	3/1	+/0	0/1	+/0	5/1	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0
resex	+/0	+/0	4/1	+/0	+/0	NC	+/0	+/0	+/0	+/0	-/1	1/0	6/1	-/1	0/1	+/0	1/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0
rosariae	+/0	+/0	4/1	+/0	+/0	NC	+/0	-/1	+/0	+/0	+/0	4/1	6/1	+/0	-/1	+/0	1/0	-/1	+/0	+/0	+/0	+/0	+/0	+/0	+/0	-/1
sabiuraensis	+/0	+/0	4/1	+/0	+/0	-/1	+/0	0/1	+/0	+/0	NC	4/1	6/1	+/0	-/1	+/0	1/0	-/1	+/0	+/0	+/0	+/0	+/0	+/0	+/0	-/1
scutipes	+/0	+/0	4/1	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	2/1	6/1	+/0	0/1	+/0	1/0	+/0	+/0	+/0	-/1	+/0	+/0	+/0	0/1	+/0
sectilis	+/0	+/0	4/1	+/0	+/0	-/1	+/0	+/0	+/0	+/0	+/0	1/0	3/1	+/0	0/1	+/0	1/0	+/0	0/1	NC	NC	+/0	+/0	+/0	+/0	+/0
serrata	+/0	+/0	1/0	NC	NC	-/1	+/0	+/0	+/0	+/0	-/1	1/0	3/1	+/0	0/1	+/0	5/1	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0
simplex	+/0	+/0	4/1	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	3/1	4/1	+/0	+/0	+/0	1/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0
syntoma	+/0	+/0	4/1	+/0	+/0	NC	+/0	+/0	+/0	+/0	-/1	3/1	6/1	+/0	-/1	+/0	1/0	+/0	0/1	NC	NC	+/0	+/0	+/0	+/0	+/0
temnura	+/0	+/0	1/0	NC	NC	-/1	+/0	+/0	+/0	+/0	-/1	3/1	6/1	+/0	-/1	+/0	1/0	-/1	+/0	+/0	+/0	-/1	+/0	NC	-/1	-/1
tenta	+/0	+/0	5/1	+/0	+/0	+/0	+/0	-/1	+/0	+/0	+/0	1/0	3/1	+/0	-/1	+/0	2/1	+/0	+/0	+/0	+/0	-/1	+/0	-/1	-/1	+/0
tenuis	+/0	+/0	4/1	+/0	+/0	-/1	+/0	0/1	+/0	+/0	NC	4/1	6/1	+/0	-/1	+/0	6/1	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	-/1
torigera	+/0	+/0	4/1	+/0	-/1	+/0	+/0	+/0	+/0	+/0	NC	3/1	6/1	NC	+/0	NC	4/1	+/0	+/0	+/0	+/0	+/0	+/0	+/0	NC	+/0
trituberata	+/0	+/0	4/1	NC	NC	NC	+/0	+/0	+/0	+/0	+/0	1/0	3/1	+/0	0/1	+/0	1/0	+/0	+/0	+/0	+/0	-/1	+/0	NC	-/1	+/0
tumorisa	+/0	-/1	4/1	+/0	+/0	-/1	+/0	+/0	+/0	+/0	+/0	1/0	3/1	+/0	0/1	+/0	1/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0
umbonata	+/0	+/0	5/1	+/0	+/0	NC	+/0	-/1	+/0	+/0	-/1	1/0	3/1	+/0	-/1	+/0	4/1	+/0	+/0	+/0	+/0	0/1	+/0	+/0	+/0	+/0
uncinata	+/0	+/0	4/1	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	1/0	5/1	+/0	+/0	+/0	1/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0
varilabrata	+/0	+/0	3/1	+/0	NC	NC	+/0	-/1	+/0	+/0	-/1	1/0	3/1	+/0	-/1	+/0	2/1	+/0	+/0	+/0	+/0	0/1	+/0	+/0	+/0	+/0
villosa	+/0	+/0	4/1	+/0	+/0	NC	+/0	+/0	+/0	+/0	+/0	1/0	3/1	+/0	+/0	+/0	1/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0

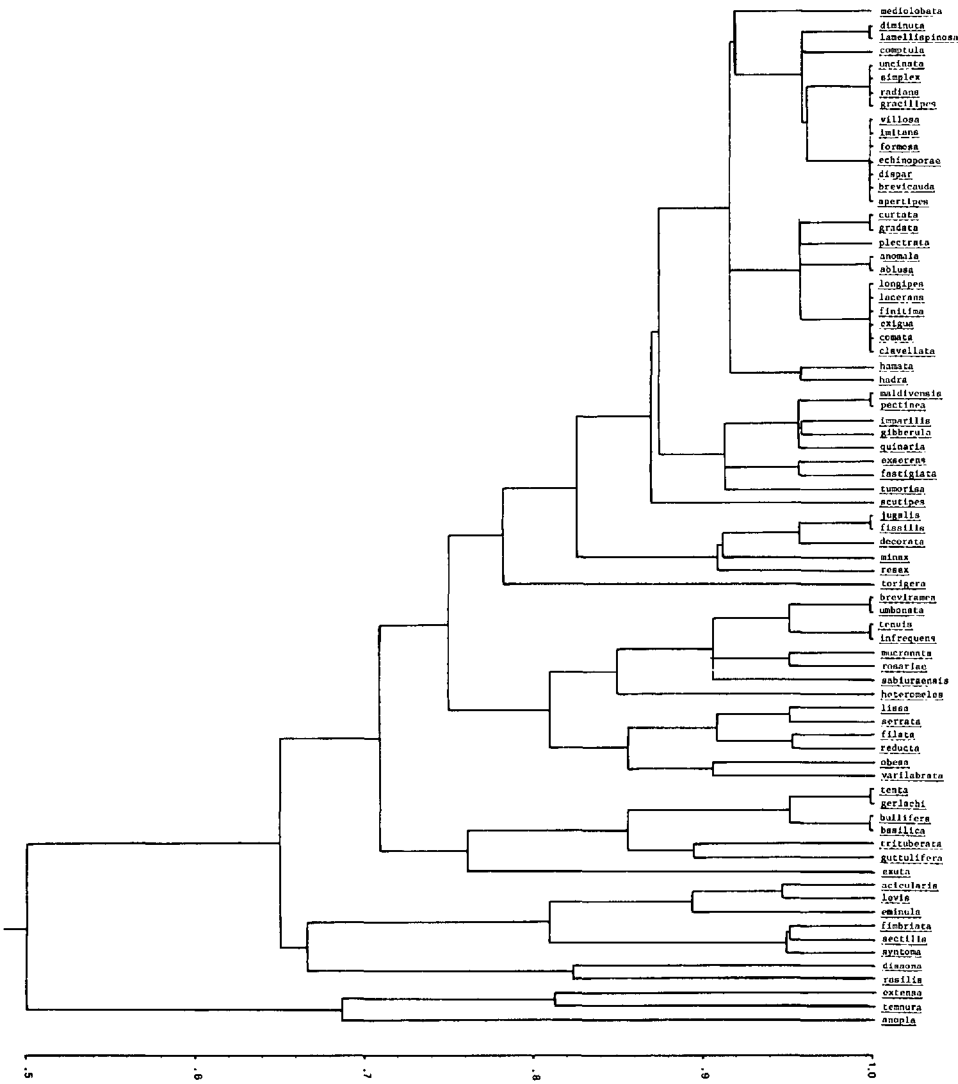


Figure 64. Dendrogram showing relationships among 75 species of *Xarifia*.

In the West Indies four genera of corals known to be parasitized by *Xarifia* in the Indo-Pacific are present, but none of these (*Acropora* with 3 species, *Porites* with 6 species, *Favia* with 4 species, and *Tubastrea* with 1 species; Smith, 1971) have xarifiid copepods. One may speculate that in the time when the straits between the Caribbean and the Eastern Pacific were still open (in pre-Pliocene time) xarifiid copepods had not yet evolved and spread eastward from a possible origin in the coral-rich Indo-Malayan region. Perhaps an increasingly continental coastal environment in the Tertiary and the disappearance from the Panamanian region by the end of the Oligocene of many coral genera such as *Goniopora, Hydnophora, Montipora, Stylophora,* and *Platygyra* (Vermeij, 1978) may have interfered with eastward migration of xarifiids. The greatest number of living genera of Scleractinia (more than 50) is found in the vast area of Indonesia, Palau Islands, New Guinea, Great Barrier Reef, and Marshall Islands (Wells, 1954). Many of these genera range westward to tropical coastal Africa and the Red Sea. The extension of fewer genera eastward toward Central and South America is perhaps an effect of the East Pacific barrier. With the closing of the Isthmus of Panama in the Pliocene (Ekman, 1953), Caribbean corals remained unparasitized by xarifiids, but another family of highly transformed parasitic copepods, the Corallovexiidae, evolved in various coral genera living today (*Diploria, Manicina, Meandrina, Acropora, Montastraea, Dichocoenia, Eusmilia, Dendrogyra,* and *Colpophyllia*; Stock, 1975).

The lack of information from the fossil record for the small and delicate members of the family Xarifiidae renders interpretations of their evolutionary history in conjunction with the coral hosts speculative.

In order to obtain additional information that might show relationships in the genus *Xarifia* a cluster analysis was carried out using 26 character states (Table 11). These characters were organized for all 75 species, resulting in the data matrix shown in Table 12. By means of the linkage method with nearest neighbor grouping, data were obtained that permitted the construction of the dendrogram shown in Figure 64.

The dendrogram shows five groups of various sizes: (1) [*mediolobata–torigera*], (2) [*breviramea–varilabrata*], (3) [*tenta–exuta*], (4) [*acicularis–rasilis*], and (5) [*extensa–anopla*]. The genus has such a large mosaic of characters that it has not been possible to assign characters held in common at each branching. The significance of the five groups is at present not clear. However, the pairs and triplets described above on an intuitive, empirical basis are in general corroborated in the dendrogram. The close relationships of *guttulifera–exuta, diminuta–lamellispinosa, longipes–exigua, jugalis–fissilis–decorata, tenuis–infrequens, lissa–serrata, obesa–varilabrata,* and *extensa–temnura* show clearly by the method of cluster analysis.

Evolution in the genus *Xarifia* has resulted in a large number of species, but the interpretation of their relationships is difficult. We have at the moment only scattered instances of what appear to be close relationships. Perhaps when these copepods are more fully known, with the discovery of other species of *Xarifia* in corals as yet unexamined, the relationships of the various species will become clearer.

Concluding Comments

Many unanswered questions concerning the Xarifiidae remain. Do these copepods occur in ahermatypic corals? Are they present in bathyal corals? Since such corals have not been examined for parasitic copepods, we have no information. What developmental stages occur in the life histories of xarifiids? No rearing studies have been published. What are the intimate relationships, spatial and physiological, between the copepods and the coral polyps? Precise observations of living xarifiids in relation to the polyps have yet to be made. How are these copepods spread from one polyp to another, and from one coral colony to another? We can only surmise that transfer occurs by larval stages. Why should the Acroporidae be such attractive hosts for xarifiids and yet an almost equally large family, the Poritidae, have so few xarifiids? Answers to these questions, among others, would add greatly to understanding these parasites of Indo-Pacific corals.

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Addendum

After this review had been completed, the publication of Nair (1983) came to my attention. In this work five new species of *Xarifia* from *Acropora* in the Arabian Sea off southwestern India are described.

Xarifia indica Nair, 1983

Host.—*Acropora hebes* (Dana).

Locality.—Kadamath Island, Lakshadweep, Arabian Sea.

Features for Recognition.—Length of female 1.46 mm. Ratio of length to width of female 6.6:1. Female with 3 long nearly equal processes above fifth legs. Caudal ramus very small, 12 × 8 µm. Second antenna 4-segmented, last 2 segments partially fused. Legs 1–4 with exopods having armature I,I,I and 2-segmented endopods with terminal armature 3, 3, 2, 2. Leg 5 in female elongate. Male unknown.

Xarifia laccadivensis Nair, 1983

Host.—*Acropora hebes* (Dana).

Locality.—Kadamath Island, Lakshadweep, Arabian Sea.

Features for Recognition.—Length of female 1.28 mm and male 1.6 mm. Ratio of length to width of female 7.5:1. Female with 3 long subequal processes above fifth legs, median process slightly shorter. Caudal ramus small, 15 × 7 μm, not separated from anal segment. Second antenna 4-segmented, last 2 segments nearly completely fused. Legs 1–4 with exopods having armature I,I,I and 2-segmented endopods with terminal armature 3, 3, 3, 2. Leg 5 in female shorter than lateral processes.

Xarifia linearis Nair, 1983

Host.—*Acropora "corymbosa"* (Lamarck).

Locality.—Kadamath Island, Lakshadweep, Arabian Sea.

Features for Recognition.—Length of female 1.35 mm and male 1.2 mm. Ratio of length to width of female 11.3:1. Female with 3 slender processes above fifth legs, median process twice as long as lateral processes. Caudal ramus moderately long. Second antenna 4-segmented, last 2 segments partially fused. Legs 1–3 with exopods having armature I,I,I, leg 4 with I,0,I, and 2-segmented endopods with terminal armature 2, 3, 3, 5. Female with leg 5 elongate, shorter than lateral processes.

Xarifia longicauda Nair, 1983

Host.—*Acropora humilis* (Dana).

Locality.—Minicoy Island, Laccadives, Arabian Sea.

Features for Recognition.—Length of female 1.24 mm and male 1.38 mm. Ratio of length to width of female 8.86:1. Female with processes above fifth legs long and slender, median process longer than lateral processes and nearly equal in length to caudal rami. Female with caudal rami long and slender, more than 11:1. Second antenna 4-segmented, last 2 segments partially fused. Legs 1–4 with exopods having armature I,I,I; 2-segmented endopods in legs 1 and 2, 1-segmented endopods in legs 3 and 4; terminal armature of endopods 1, 1, 1, 1. Female with leg 5 stout, elongate-conical. Leg 5 in male reduced to setae.

Remarks.—The very long caudal ramus in the female is longer than in any other species of *Xarifia*. Only *X. infrequens*, with the ratio about 9:1, approaches the length of the caudal ramus in this new species.

Xarifia robusta Nair, 1983

Host.—*Acropora hebes* (Dana).

Locality.—Kadamath Island, Lakshadweep, Arabian Sea.

Features for Recognition.—Length of female 1.71 mm. Ratio of length to width 5.7:1. Region dorsal to fifth legs with 3 protuberances, median one larger than lateral ones. Caudal ramus laminar, longer than broad. Second antenna 4-segmented. Legs 1–3 with exopods having armature I,I-1,I, leg 4 with I,I,I. Legs 1–4 with 2-segmented endopods with terminal armature 3, 2, 1, 1. Leg 5 elongate, very slender. Male unknown.

Remarks.—The presence of a seta on the inner side of the second segment of the exopod in legs 1–3 is unique for the genus. Certain species, for example, *X. fissilis,* have hairlike setules at that position but not setae.

Acropora hebes is a new host for *Xarifia,* having three species as parasites, *X. indica, X. laccadivensis,* and *X. robusta.*

Literature Cited

Ekman, S. 1953. Zoogeography of the sea. Sidgwick and Jackson Limited, London. 417 pp.

Endean, R. 1976. Destruction and recovery of coral reef communities. Pages 215–254 *in* O. A. Jones and R. Endean, eds. Biology and geology of coral reefs. Vol. 3, Biol. 2. Academic Press, New York.

Humes, A. G. 1960. New copepods from madreporarian corals. Kieler Meeresforsch. 16: 229–235.

———. 1962. Eight new species of *Xarifia* (Copepoda, Cyclopoida), parasites of corals in Madagascar. Bull. Mus. Comp. Zool. 128: 37–63.

———. 1979. Coral-inhabiting copepods from the Moluccas, with a synopsis of cyclopoids associated with scleractinian corals. Cah. Biol. Mar. 20: 77–107.

——— and M. Dojiri. 1982. Xarifiidae (Copepoda) parasitic in Indo-Pacific scleractinian corals. Beaufortia 32: 139–228.

——— and ———. 1983. Copepoda (Xarifiidae) parasitic in scleractinian corals from the Indo-Pacific. J. Nat. Hist. 17: 257–307.

——— and B. W. Frost. 1964. New lichomolgid copepods (Cyclopoida) associated with alcyonarians and madreporarians in Madagascar. Cahiers ORSTOM—Oceanographie No. 6—1963 (Série Nosy-Bé II). Pp. 131–212.

——— and R. U. Gooding. 1964. A method for studying the external anatomy of copepods. Crustaceana 6: 238–240.

——— and J.-S. Ho. 1967. New cyclopoid copepods associated with the coral *Psammocora contigua* (Esper) in Madagascar. Proc. U.S. Nat. Mus. 122(3386): 1–32.

——— and ———. 1968. Xarifiid copepods (Cyclopoida) parasitic in corals in Madagascar. Bull. Mus. Comp. Zool. 136: 415–459.

Misaki, H. 1978. Two new species of *Xarifia* (Copepoda, Cyclopoida) parasitic on the coral *Acropora pectinata* at Sabiura. Bull. Mar. Park Res. Sta. 2: 105–114.

Nair, B. U. 1983. On five new species of xarifiid copepods from the Arabian Sea. Selected Papers on Crustacea. Pp. 11–25. Published by Dr. P. Rabindranath on behalf of Prof. N. Krishna Pillai Farewell Committee, The Aquarium, Trivandrum, India.

Patton, W. K. 1976. Animal associates of living reef corals. Pages 1–36 *in* O. A. Jones and R. Endean, eds. Biology and geology of coral reefs. Vol. 3, Biol. 2. Academic Press, New York.

Smith, F. G. W. 1971. Atlantic reef corals. A handbook of the common Atlantic reef and shallow-water corals of Bermuda, the Bahamas, Florida, the West Indies, and Brazil. 2nd ed. University of Miami Press, Coral Gables, Florida. 164 pp.

Stock, J. H. 1975. Corallovexiidae, a new family of transformed copepods endoparasitic in reef corals. Stud. Fauna Curaçao 47: 1–45.

Vaughan, T. W. and J. W. Wells. 1943. Revision of the suborders, families, and genera of the Scleractinia. Geol. Soc. Amer., Spec. Papers, 44: i–xv, 1–363.

Vermeij, G. J. 1978. Biogeography and adaptation. Harvard University Press, Cambridge, Massachusetts. 332 pp.

———. 1983. Intimate associations and coevolution in the sea. Pages 311–327 *in* D. J. Futyuyma and M. Slatkin, eds. Coevolution. Sinauer Associates, Inc., Sunderland, Massachusetts.

Veron, J. E. N. and M. Pichon. 1976. Scleractinia of eastern Australia. Part I. Families Thamnasteriidae, Astrocoeniidae, Pocilloporidae. Austral. Inst. Mar. Sci., Monogr. Ser. 1: 1–86.

——— and ———. 1979. Scleractinia of eastern Australia. Part III. Families Agariciidae, Siderastreidae, Fungiidae, Oculinidae, Merulinidae, Mussidae, Pectiniidae, Caryophylliidae, Dendrophylliidae. Austral. Inst. Mar. Sci., Monogr. Ser. 4: 1–422.

——— and ———. 1982. Scleractinia of eastern Australia. Part IV. Family Poritidae. Austral. Inst. Mar. Sci., Monogr. Ser. 5: 1–159.

———, ——— and M. Wijsman-Best. 1977. Scleractinia of eastern Australia. Part II. Families Faviidae, Trachyphylliidae. Austral. Inst. Mar. Sci., Monogr. Ser. 3: 1–233.

——— and C. Wallace. In Press. Scleractinia of eastern Australia. Part V. Family Acroporidae. Austral. Inst. Mar. Sci.

Wells, J. W. 1954. Recent corals of the Marshall Islands. U.S. Dept. Interior, Geol. Surv. Prof. Paper 260-I, pp. i–iv, 385–486.

———. 1956. Scleractinia. Pages F328–F444 *in* R. C. Moore, ed. Treatise on invertebrate palaeontology, Part F Coelenterata. Geological Society of America, University of Kansas Press, Lawrence Kansas.

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