

**MIROPANDALUS HARDINGI, NEW GENUS, NEW SPECIES,
A BIZARRE COMMENSAL PANDALID SHRIMP
FROM THE MARSHALL ISLANDS**

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A B S T R A C T

A bizarre commensal pandalid shrimp, known from a single specimen found in association with an antipatharian host at Enewetak, Marshall Islands, is assigned to a new species and genus, *Miropandalus hardingi*.

Amongst shrimps collected recently from Enewetak Atoll, Marshall Islands, is a single example of a small commensal pandalid shrimp that requires the designation of a new taxon. Commensalism is most unusual in the family Pandalidae and the present case, only the second recorded, represents a marked departure of body form from the typical pandalid type of slenderly built shrimps with long legs and rostra, usually found in deep cool waters on soft substrates. The modifications present in this new shrimp correspond closely to the morphological features found in other shrimps that have adopted a commensal way of life.

The new species is dedicated to Dr. J. P. Harding, formerly Keeper of Zoology at the British Museum (Natural History).

***Miropandalus*, new genus**

Definition.—Small-sized pandalid shrimps associated with antipatharian hosts. Body smooth, slightly compressed, integument rather thin, poorly calcified. Rostrum absent. Carapace with large triangular anterior and posterior median dorsal processes; supraorbital, antennal, and pterygostomial spines absent; inferior orbital angle obsolete. Abdomen smooth, slender, with triangular median dorsal process on posterior of third segment; all pleura rounded. Telson with 3 pairs of small distolateral spines, posterior border rounded with (?) 5 pairs of small spines. Eyes well developed, cornea hemispherical, without ocellus. Antennule with biramous reduced flagella; stylocerite short, distally truncate; statocyst absent. Antenna with short flagellum; scaphocerite normal with distolateral tooth exceeded by lamella. Maxillula with setiferous bilobed palp; upper lacinia moderately broad. Maxilla with setiferous palp, basal endite bilobed, coxal endite simple; scaphognathite well developed, broad. First maxilliped with setiferous palp; basal endite normal; coxal endite reduced; caridean lobe well developed, flagellum of exopod absent; epipod feebly bilobed. Second maxilliped without exopod; epipod large and simple without podobranch. Third maxilliped slender, ischio-merus and basis distinct, with small epipod, exopod absent. Pleurobranchs present on all pereopods. First pereopod moderately robust, nonchelate. Second pereopod slender, with small chela, carpus triarticulate. Ambulatory pereopods moderately robust; dactyl feebly biunguiculate; propod feebly spinulate, merus without spines. Endopod of male first pleopod with large appendix interna. Endopod of male second pleopod with well-developed appendix interna and appendix masculina. Uropods normal.

Type-species.—*Miropandalus hardingi*, new species.

Systematic Position.—This new genus is most closely related to the genus *Anachlorocurtis* Hayashi, 1975, another aberrant commensal pandalid genus also

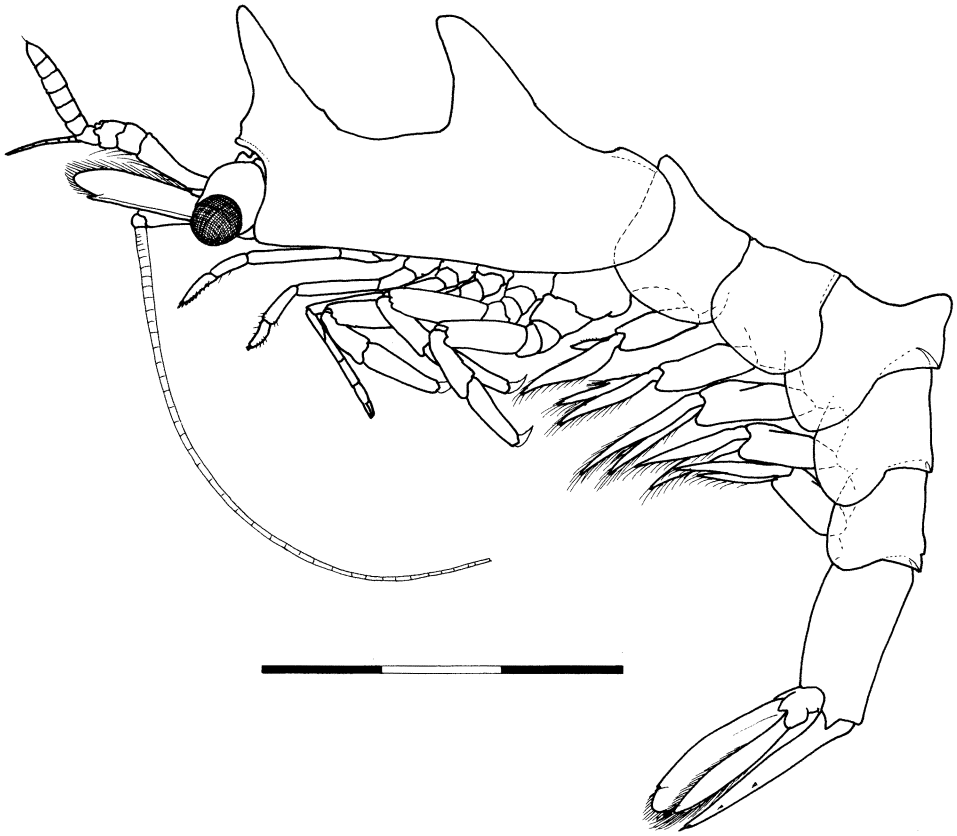


Fig. 1. *Miropandalus hardingi*, new genus, new species, holotype male. Scale in mm.

associated with antipatharian hosts. These two genera appear only distantly related to all other pandalid genera. Major features shared by these two genera are the presence of three segments on the carpus of the second pereiopod and a strongly reduced branchial formula, lacking arthrobranchs and epipods on the pereiopods and the lack of flagella on exopods on the three maxillipeds.

Miropandalus is readily separated from *Anachlorocurtis* by the complete absence of a rostrum, the greatly enlarged median dorsal processes on the carapace and on the third abdominal tergite, the absence of an antennal spine; the presence of a hemispherical cornea, and the ambulatory pereiopods with unarmed merus and biunguiculate dactyls.

Etymology.—*Mirus* (Latin), strange, in combination with the generic name *Pandalus*. Gender: masculine.

***Miropandalus hardingi*, new species**

Figs. 1, 2A–H, 3A–E, 4A–H, 5A–C

Material Examined.—1 ♂, Enewetak Island, Marshall Islands, 23 m, coll. S. Johnson, 5 June 1982, BPBM 1982.320.

Description.—Small-sized, slender shrimp of generally compressed body form. Rostrum completely absent, with frontal margin merely feebly angulated. Cara-

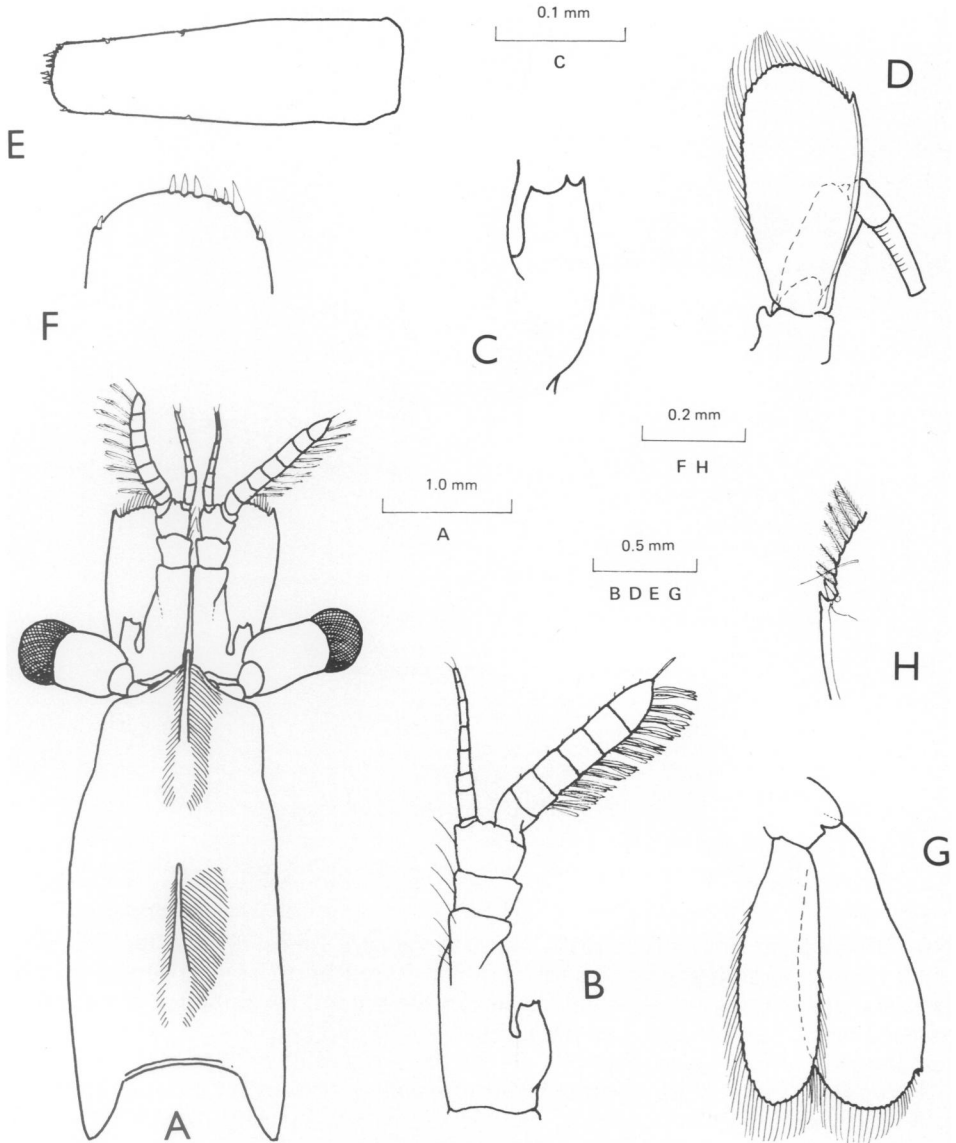


Fig. 2. *Miropandalus hardingi*, new genus, new species, holotype. A, carapace, eyes, and antennae; B, antennule; C, stylocerite; D, antenna; E, telson; F, posterior telson; G, uropod; H, same, exopod, posterolateral spine.

pace smooth, with large triangular anteriorly inclined median dorsal process, strongly compressed and distally rounded, with similar posterior process slightly broader than anterior; orbit and inferior orbital angle obsolete; supraorbital, antennal, and pterygostomial spines absent; anterolateral and posterolateral angles of branchiostegite broadly rounded.

Abdomen smooth and compressed with small rounded pleura on all segments; third segment with blunt triangular posterior median process; sixth segment about

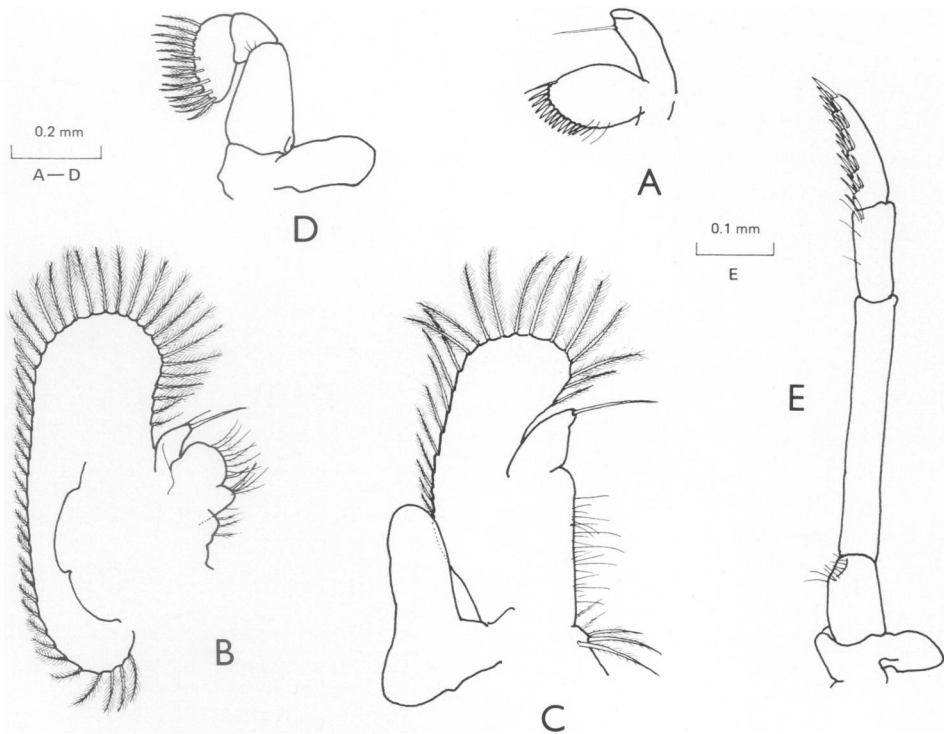


Fig. 3. *Miropandalus hardingi*, new genus, new species, holotype. A, maxillula; B, maxilla; C, first maxilliped; D, second maxilliped; E, third maxilliped.

1.75 times longer than fifth and 2.0 times longer than deep, with posterolateral angle acute. Telson about 1.2 times longer than sixth segment, about 3.3 times longer than wide, sides feebly tapering to broadly rounded posterior margin; three pairs of very small lateral dorsal spines at 0.6, 0.8, and 0.95 of telson length, with (probably) five pairs of small posterior spines (posterior margin of telson damaged).

Eye with stalk subcylindrical, about twice as long as wide; cornea globular, wider than stalk, without distal process or ocellus.

Antennular peduncle equal to 0.45 of carapace length. Proximal segment about 2.2 times longer than width at base; statocyst obsolete; stylocerite reaching to about midpoint of segment, broad, distally truncate with small acute median tooth and two larger lateral teeth; intermediate and distal segments broader than long, together equal to half length of proximal segment; upper flagellum very short, robust, uniramous, with six segments bearing about 12 groups of aesthetascs; lower flagellum very short, slender, six-segmented.

Antenna with basicerite unarmed; carpocerite extending to about middle of lamella of scaphocerite; flagellum short, extending to posterior border of first abdominal segment. Scaphocerite well developed, extending slightly beyond antennular peduncle; lateral margin convex with small acute distal tooth; lamella distally rounded, extending well beyond distolateral tooth, about 2.1 times longer than broad.

Mandible and lower lacinia of maxillula lost in dissection. Maxillula with slen-

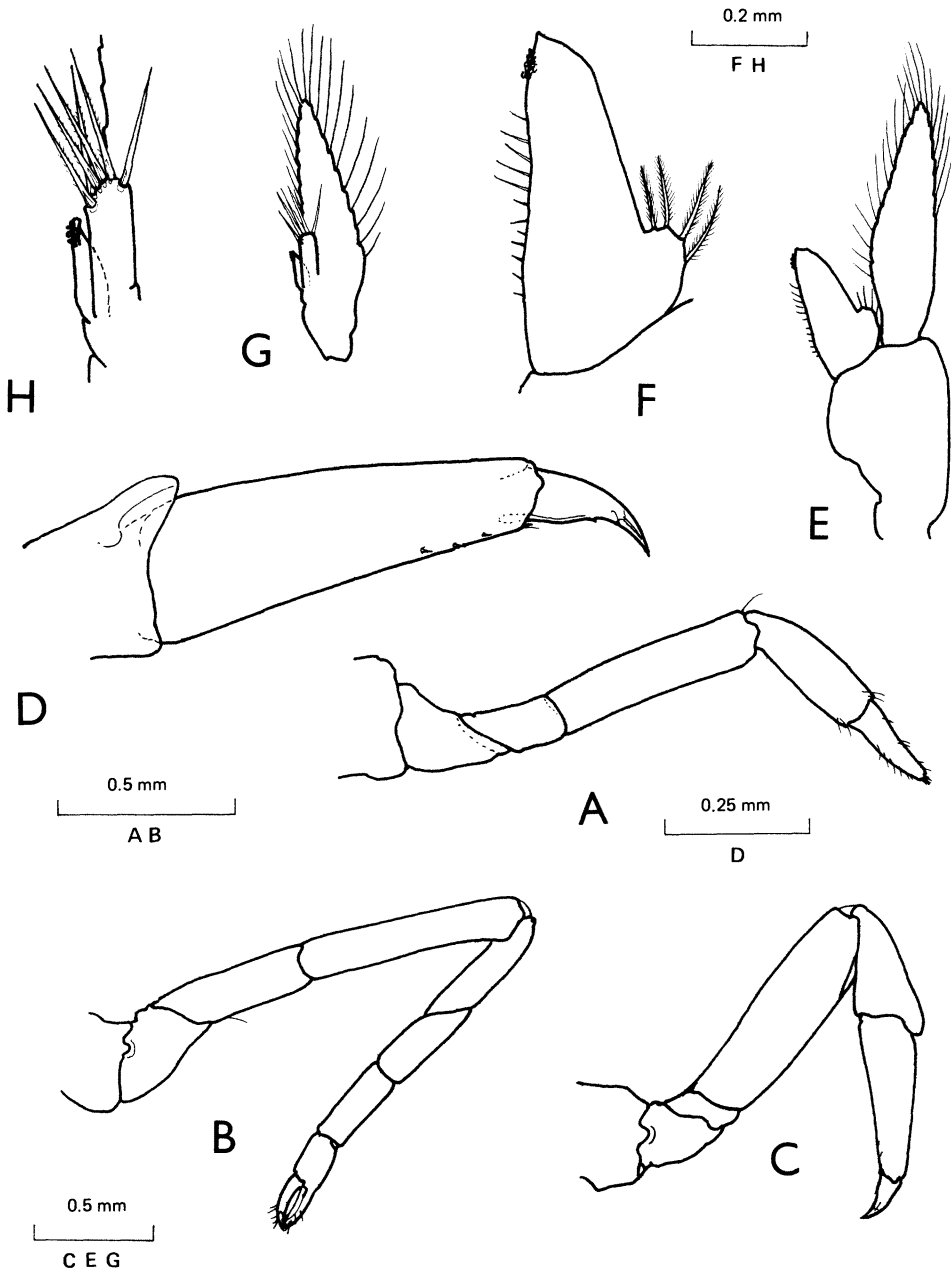


Fig. 4. *Miropandalus hardingi*, new genus, new species, holotype. A, first pereiopod; B, second pereiopod; C, third pereiopod; D, same, dactyl and propod; E, first pleopod; F, same, endopod; G, second pleopod, endopod; H, same, appendix interna and appendix masculina.

der, feebly bilobed palp with simple seta on lower lobe; upper lacinia moderately broad, with single row of about 12 short simple distal spines, with a few longer setae ventrally. Maxilla with small palp bearing both a large and small simple seta distally; basal endite bilobed, short with distal lobe much larger than proximal,

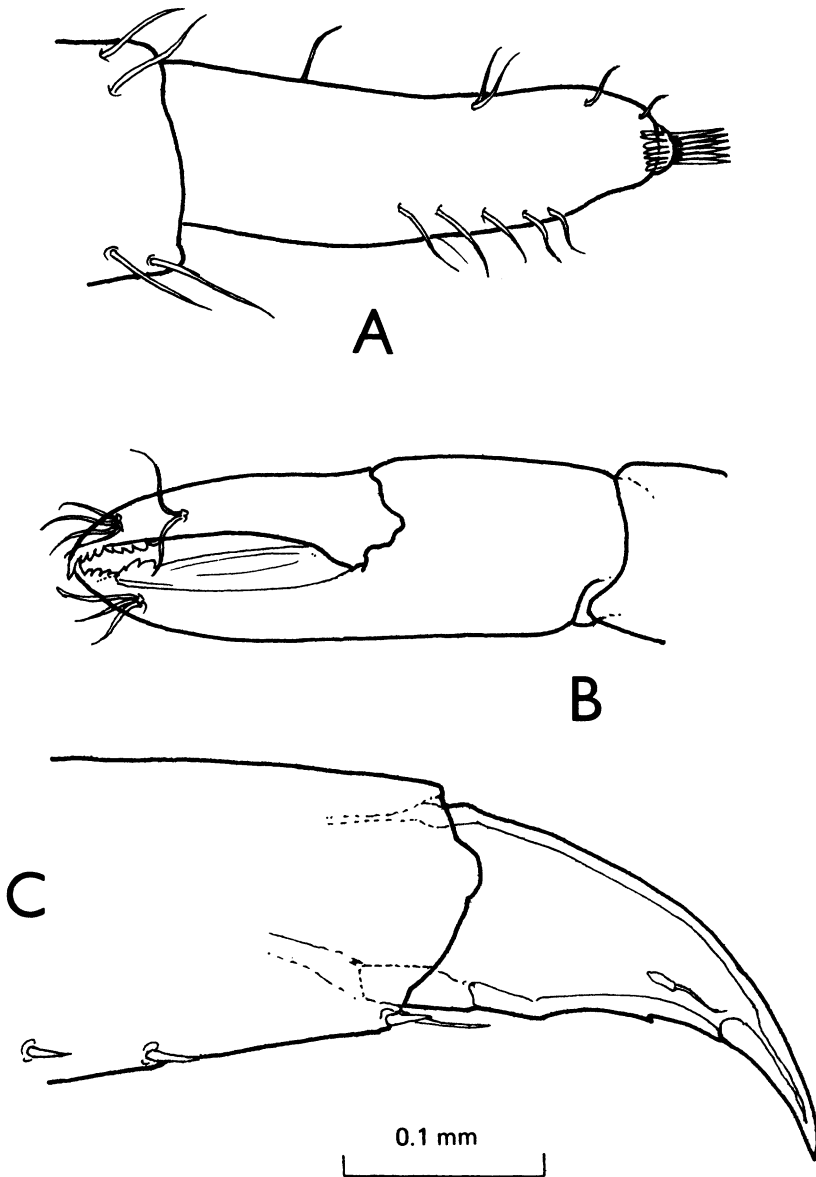


Fig. 5. *Miropandalus hardingi*, new genus, new species, holotype. A, first pereiopod, dactyl, and propod; B, second pereiopod, chela; C, third pereiopod, dactyl, and distal propod.

both with sparse short setulose setae; coxal endite very small, rounded, sparsely setose; scaphognathite well developed, about 3.0 times longer than wide; anterior lobe broad, distally rounded; posterior lobe small. First maxilliped with small palp with single simple terminal seta; basal endite elongated, narrow, sparsely setose; coxal endite greatly reduced with a few robust setae; caridean lobe well developed, broad, with numerous marginal plumose setae but flagellum of exopod completely lacking; irregularly bilobed epipod present. Second maxilliped with

endopod of normal form but dactylar and propodal segments not distinguishable, medial margin with about 12 strong, finely setulose slender spines; exopod absent; epipod large, subrectangular. Third maxilliped slender, reaching middle of carpocerite; ischio-merus about 7.5 times longer than wide, subcylindrical, and straight; penultimate segment 0.4 of length of antipenultimate; terminal segment almost 0.5 of antipenultimate, tapering distally with numerous transverse rows of short spinulate setae ventrally; basis with setose convexity distoventrally; exopod absent; small oval epipod present.

Thoracic sternites narrow and unarmed. Abdominal sternites also unarmed, sixth segment without preanal tubercle.

First pereopod slender, feeble, reaching only to middle of carpocerite, non-chelate; dactylar segment reduced to small rounded process bearing bunch of six short similar setae; propod subcylindrical, tapering slightly distally, about 3.0 times longer than wide, sparsely setose ventrally; carpus about 1.8 times propod length, subcylindrical, slightly swollen centrally, about 3.0 times longer than wide; merus 1.4 times carpus length, 4.4 times longer than wide, uniform, ischium and basis subequal, together equal to 0.8 of merus length; coxa robust. Second pereopod more slender than first, extending to base of carpocerite, chela small, feebly subspatulate with fingers subequal to subcylindrical palm, about 1.3 times longer than deep, with laterally situated entire cutting edges, posteriorly gaping, tips acute with 3 or 4 small acute teeth adjacent on medial edge and larger and more remote on lateral edge; carpus triarticulate, distal segment subequal to chela length, intermediate and proximal segment obliquely articulated, together equal to 2.25 length of distal article, whole segment slender, uniform, about 8.0 times longer than wide; merus slightly longer than proximal two segments of carpus, more robust, about 6.0 times longer than wide, unarmed; ischium 0.6 of merus length, unarmed; basis and coxa normal. Third ambulatory pereopod reaching to middle of carpocerite, dactyl robust, acute, about 2.5 times longer than deep, with feebly demarcated unguis and minute accessory spine at middle of ventral margin; propod robust, 3.0 times length of dactyl and 3.0 times longer than wide proximally, tapering distally with small distoventral spine and seta and three minute ventral spinules; carpus robust, 1.75 times longer than wide, expanded distally; merus about 1.4 times propod length, 3.5 times longer than wide, uniform, unarmed; ischium short and stout; basis and coxa normal. Fourth and fifth pereopods similar to third.

Pleopods with broad peduncles. Endopod of first pleopod with ramus greatly reduced to small lobe with four short plumose setae laterally but very large appendix interna medially, extending far beyond ramus proper, tapering, distally pointed, about 2.8 times longer than wide, with group of preterminal concinni medially and 12 short spines and setae along medial margin. Second pleopod with endopod with normal appendix masculina and appendix interna; corpus of appendix masculina reaching to middle of ramus of endopod, about 3.0 times longer than wide with five spines distally, subequal to corpus length and finely denticulate; appendix interna small, tapering, not exceeding appendix masculina.

Uropods normal; protopodite unarmed; exopod about 2.4 times longer than wide, lateral border sinuous, convex, with small acute tooth distally with larger mobile spinule adjacent; endopod slightly shorter, 3.3 times longer than wide.

Type Material.—The single male example, dissected, is designated as the holotype and deposited in the collection of the B.P. Bishop Museum, Honolulu, accession number 1982.320.

Measurements.—Postorbital carapace length 3.3 mm; total body length 10.5 mm (approximately).

Colouration.—No data.

Host.—*Cirripathes* sp. (Antipatharia), from a small cave at 23 m depth.

Remarks.—*Miropandalus hardingi* is not likely to be confused with any other pandalid shrimp known. It is at once recognizable by its characteristic dorsal processes and the complete absence of a rostral process. It shows many resemblances to *Anachlorocurtis commensalis* Hayashi, generally in a more extreme form. For example, *A. commensalis* shows well-developed anterior and posterior dorsal teeth on the carapace and the mouthparts are generally similar, particularly in the loss of exopods from the maxillipeds.

Other points in which *M. hardingi* differs from *A. commensalis* are the absence of the antennal spine, distolateral spines on the meri of the ambulatory pereopods, and the reduced size of the dorsal and posterior telson spines. These are all signs of increasing adaptation to a commensal life style when found in other carideans, such as the Pontoniinae.

DISCUSSION

The discovery of *Miropandalus hardingi* in association with *Cirripathes* and its evident adaptation to that host, raises to two the number of commensal genera of the family Pandalidae, with at present 19 described genera, 10.5% of all pandalid genera. It may be noted that, in the Caridea, commensalism is most strongly developed in shallow-water tropical areas, particularly coral reefs. In these habitats, pandalid shrimps are very poorly represented, being more conspicuous in colder and deeper waters.

Although coelenterates as a whole provide hosts for a wide variety of commensal caridean shrimps, few have been recorded from the order Antipatharia. Carideans have been reported from *Antipathes grandis* by Grigg (1963) but these were not identified. Otherwise only species of the pontoniine genera *Dasycaris* Bruce and *Pontonides* Calman have been recorded in association with *Cirripathes anguina* Dana (Bruce, 1973; De Ridder and Holthuis, 1979). Davis and Cohen (1969) and Monod (1979) have also recorded species of the genus *Pontonides* in association with antipatharian hosts. The association of both the commensal pandalid genera *Anachlorocurtis* and *Miropandalus* with Antipatharia may suggest that they have occupied a niche for some reason not fully adopted by shrimps of the subfamily Pontoniinae.

The association of *Miropandalus hardingi* and *Dasycaris zanzibarica* with the antipatharians *Cirripathes* spp. provides an interesting example of convergent evolution between distantly related species. The males of *D. zanzibarica* also have conspicuously developed anterior and posterior dorsal processes on the carapace, basically similar to those found on the male of *Miropandalus hardingi* (Bruce, 1973).

ACKNOWLEDGEMENT

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