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Edited by

J.K. Lowry

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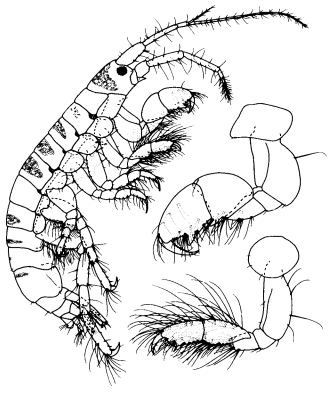

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Natural History of Madang Lagoon with an Appendix of Collecting Localities*

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ABSTRACT. Systematic collections have revealed that the Madang Lagoon is a highly heterogeneous reef system which shows an unprecedented diversity of marine invertebrates (e.g., about 180 species of gammaridean Amphipoda). The characteristics of the Madang Lagoon, including its geological origin, physical geography, and physical and biological oceanography, are described and discussed. Traditional names are used for the reefs and islands of the lagoon. An appendix includes a list of all current collecting localities for the Madang Lagoon amphipod project. Coordinates for these collecting localities have been determined using a global positioning device.

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During parts of February and March from 1989 to 1991 J.L. Barnard, Smithsonian Institution, Washington, DC, USA (since deceased), J.K. Lowry, Australian Museum, Sydney, Australia, A.A. Myers, Cork College, Cork, Ireland and J.D. Thomas, Smithsonian Institution, Washington, DC (then of the Reef Foundation, Big Pine Key, Florida, USA), collected amphipods from the Madang Lagoon and adjacent waters (Fig. 1). The objective of this work was to collect all the gammaridean amphipod species from the lagoon and adjacent areas with the intention of describing the fauna. Because of the unique tectonic and geological history of northern New Guinea in general and the Madang Lagoon in particular, the results of this work should, in addition to documenting the amphipod fauna, provide new insights into the diversity and distribution patterns of Indo-west Pacific amphipods.

Three hundred and six separate samples were made by diving and trapping. Coral rubble was collected in large buckets or bags. Sediments were collected in plastic bags, fine mesh bags by swimming along the bottom like a human dredge or with an airlift. Algae,

* Christensen Research Institute Contribution No. 100.

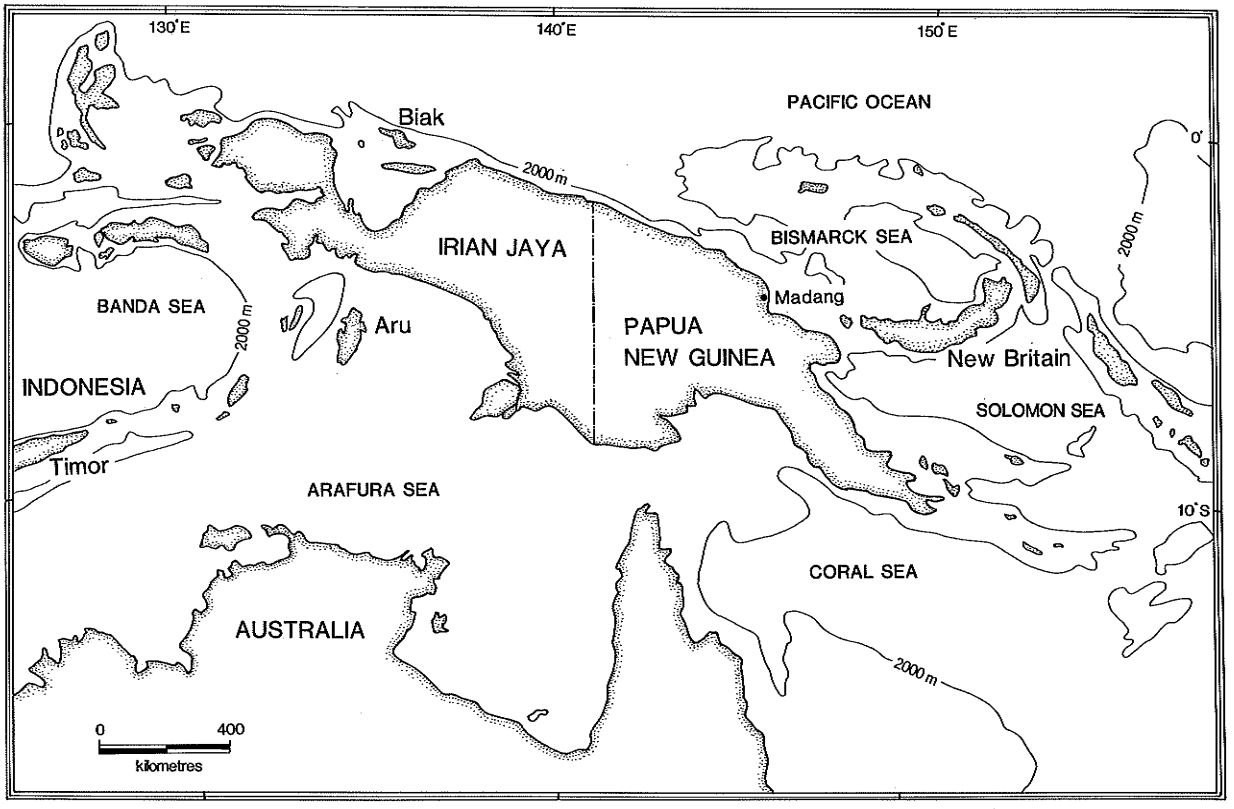

Fig. 1. Papua New Guinea and the Madang area.

seagrasses, sponges and tunicates were collected separately in plastic or fine-mesh bags. Baited traps were set in all of the lagoon habitats, down the face of the outer barrier and onto the sea bottom of Astrolabe Bay to a depth of 500 m. Occasionally we night-lighted from a small boat over reef or soft bottoms or towed a plankton net.

The sorted and identified collections indicate an amphipod fauna in excess of 180 species. These species have been identified and divided between us, mainly at the family level, for study and description in a series of papers.

Publication of Results

It is expected that the majority of taxonomic accounts from the study will be published in the *Records of the Australian Museum*. A series of paratypes, for as many species as possible, will be held in trust by the Australian Museum on behalf of Papua New Guinea, until such time as they are required.

Several papers describing new species from this study have already been published. Lowry & Stoddart (1990) described two new species of wandinid lysianassoids, *Pseudocyphocaris gosema* and *P. lobata*. Thomas & Barnard (1991a) described a new species of corophiid corophioid, *Kamaka taditadi*, and (Thomas & Barnard, 1991b) a new species of iphimediid, *Iphimedia xesta*. Lowry & Stoddart (1992) described a new species of uristid lysianassoid *Ichnopus malpatun* from the face of the outer barrier of Madang Lagoon.

The Physical Environment and its History

Christensen Research Institute (CRI) lies on the inner coastline of a large lagoon about 16 km long and 4 km wide (a total area of 40 km^2) (Fig. 2). This is bordered on its seaward edge by a narrow barrier reef, which is steep-sided on its seaward side, with depths of 400 m found within 1 km of the reef. Inside the lagoon the bottom is even in depth (30–40 m), and there are numerous shallow patch reefs and coral rubble islands that support rich fringing reefs. The inner coastline is much dissected by deep "harbours" which appear to have formed through differential coral growth around river systems. This inner coast has shallow fringing reefs between 10 and 50 m wide. The reef slope of these and the patch reefs fall off steeply at angles of 20° to 30° to the lagoon floor. The lagoon bottom is generally covered by a thick layer of silty clay that supports a

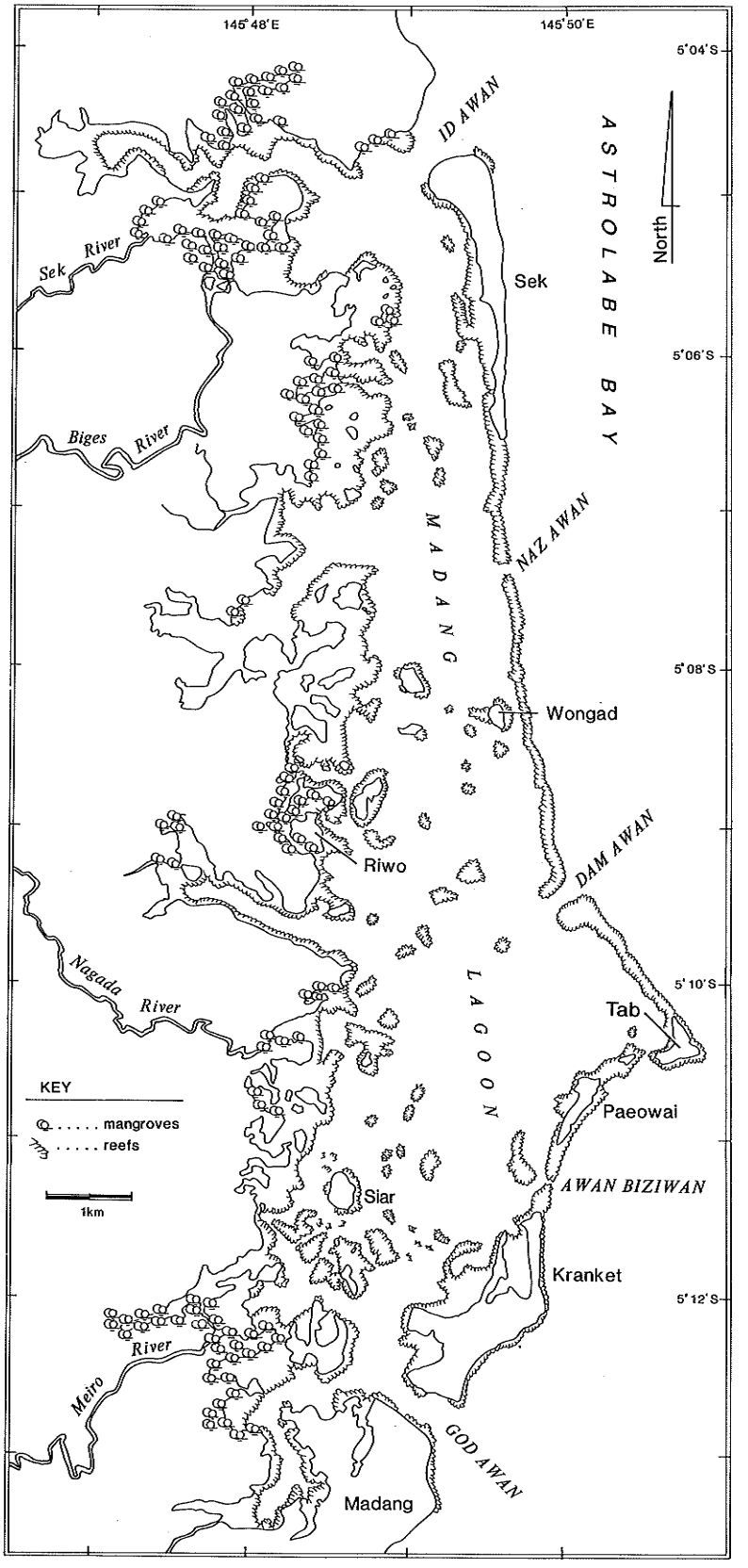

Fig. 2. Madang Lagoon indicating major landmarks.

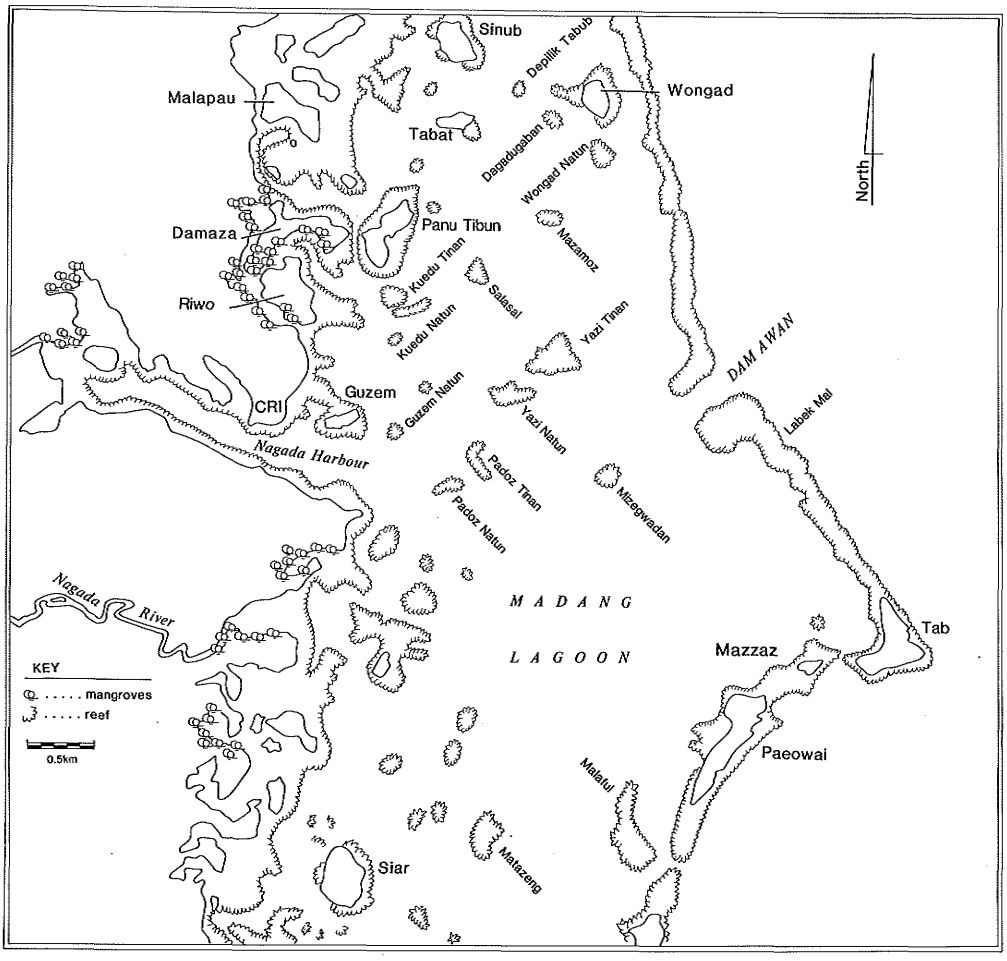

Fig. 3. Madang Lagoon indicating traditional reef and island names.

rich burrowing fauna. Coarse sand and coral rubble dominate near the deep water passages and reefs.

There are two major river inlets within the lagoon, Biges River at the extreme north and Meiro and Wagol Rivers at the extreme south. These rivers carry silty water which traverses the whole lagoon after heavy rains and generally leaves the lagoon rapidly without mixing appreciably. Several other minor inputs also occur, but in relative terms, the catchment behind the lagoon system is small. The watershed lies about 6 km inland, and with the exception of the above river systems, it scarcely exceeds the area of the lagoon.

There are five major passages through the barrier reef; Id Awan, Naz Awan, Dam Awan, Awan Biziwan and God Awan. These passages are as deep or deeper than the floor of the lagoon.

Similar lagoonal systems are found to the north; Sarang, Dilup and Rempi, and east of Madang at Gitua, Sialum, Finsch and Dreger Harbours. The Madang Lagoon however, exceeds all of these in complexity and size.

Two geological events are of equal importance to a discussion of the Madang Lagoon and its biota. Firstly the broad scale tectonic history provides an understanding of the major biogeographical units that have come together to make up the north coast of New Guinea over the past 50 million years. On a local scale the Quaternary (last 2 MA) history of tectonic uplift and accompanying fluctuations in eustatic sea level, especially during the Holocene (last 10 KA), have brought about the present coral reef structure we see today in the Madang region.

Tectonic History

The island of New Guinea is composed of at least 32 separate terranes (micro-continental plates) located on four lithospheric plates (Indo-Australian, North Bismark Sea, South Bismark Sea and Pacific) (Pigram & Davies, 1987). Pandolfi (1992) has recently summarised the tectonic history of New Guinea and its biogeographic significance.

About 50 MA ago the Indo-Australian plate rifted from the Antarctic plate and began a northward migration

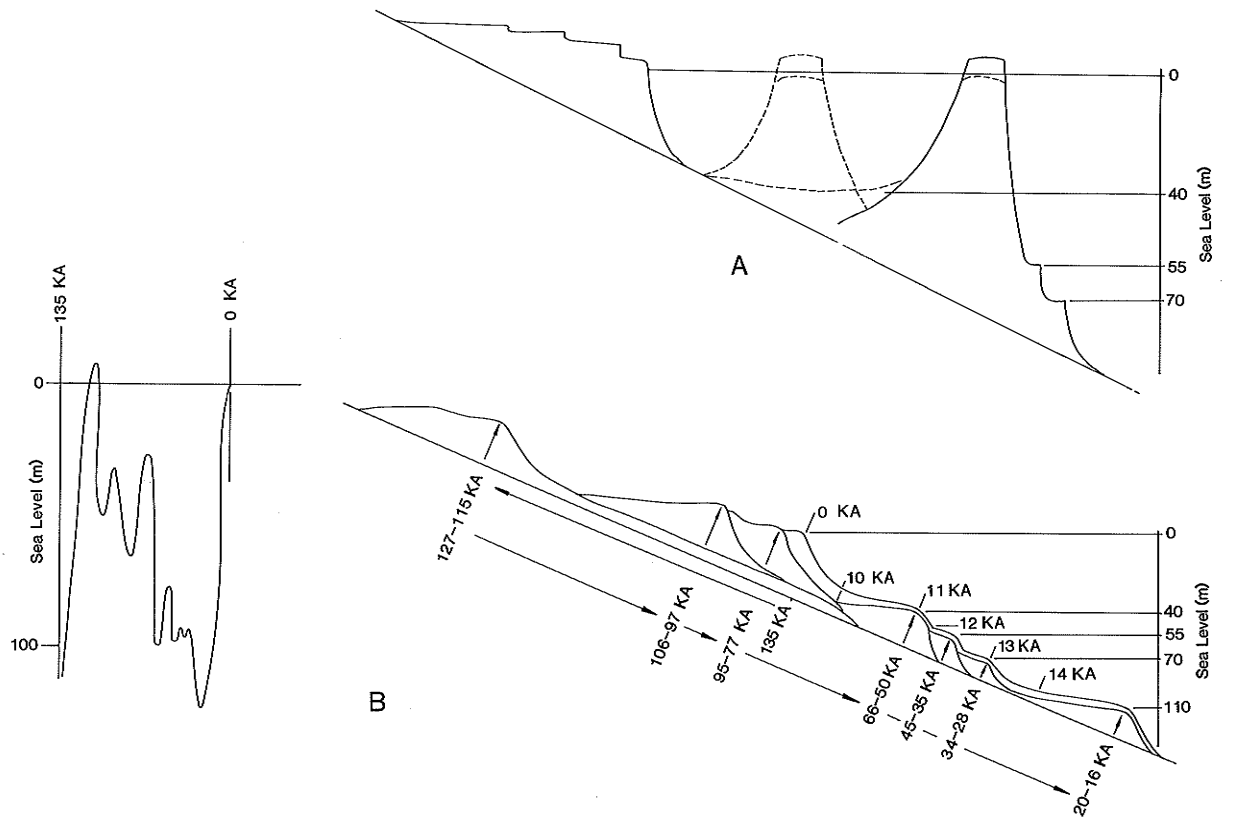

Fig. 4. A, idealised cross section of Madang Lagoon; B, Madang Lagoon formation.

that led to the collision of the Gondwanan and Laurasian fragments to create both the island of New Guinea and the Indonesian Archipelago.

As it drifted northwards, the edge of this plate began a long period of collision with a complex subduction zone, starting about 30 MA (middle Oligocene). During this period terranes began to dock with the northern coastline of New Guinea. Of the 32 techno-stratigraphic terranes identified by Pigram & Davies (1985, 1987) some were displaced portions of the northern edge of the Indo-Australian plate, while others were formerly parts of Gondwana that had been detached since the early Mesozoic (180 MA). Some of these terranes are composed of deep-water carbonates, while others indicate that they were plateaus, seamounts or parts of island arcs. The latest of these dockings probably occurred just 2 MA (early Pleistocene) with the collision between the Finisterre Terrane and the New Guinea Orogen (Composite plate) (Crook, 1989).

Accompanying this northward drift was a counter-clockwise rotation which led to a period of collision from 15 MA (Mid-Miocene) to 5 MA (Pliocene) between the Indo-Australian plate and the Asian component of Laurasia, creating much of the eastern Indonesian archipelago (Audley-Charles, 1981). This created a massive barrier across what was formerly a major connection between the Pacific and Indian Oceans.

These docking events brought together vast areas of reef systems, along with their associated faunas, formerly separated over many hundreds or thousands of kilometers of ocean. Formerly dispersed biogeographic elements have thus been brought together continuously over the past 30 MA. The biogeographic consequences of such a composite unit has led to the loss of any discernible pattern of distribution, as well as unexpectedly high diversities.

Sea Level Changes—Formation of the Lagoon

During the Pleistocene (2 MA to present) there have been regular cycles of Ice ages, leading to the lowering of sea levels throughout the world (eustatic).

The ongoing tectonic uplift of some parts of the north coast of New Guinea led to the development of massive raised carbonate terraces during periods of sea level rise (Chappell, 1974). During the last 120,000 years, eustatic sea levels have mostly been lower than today, with the last major inundation occurring from about 18,000 years ago, when sea level stood some 130 m below modern

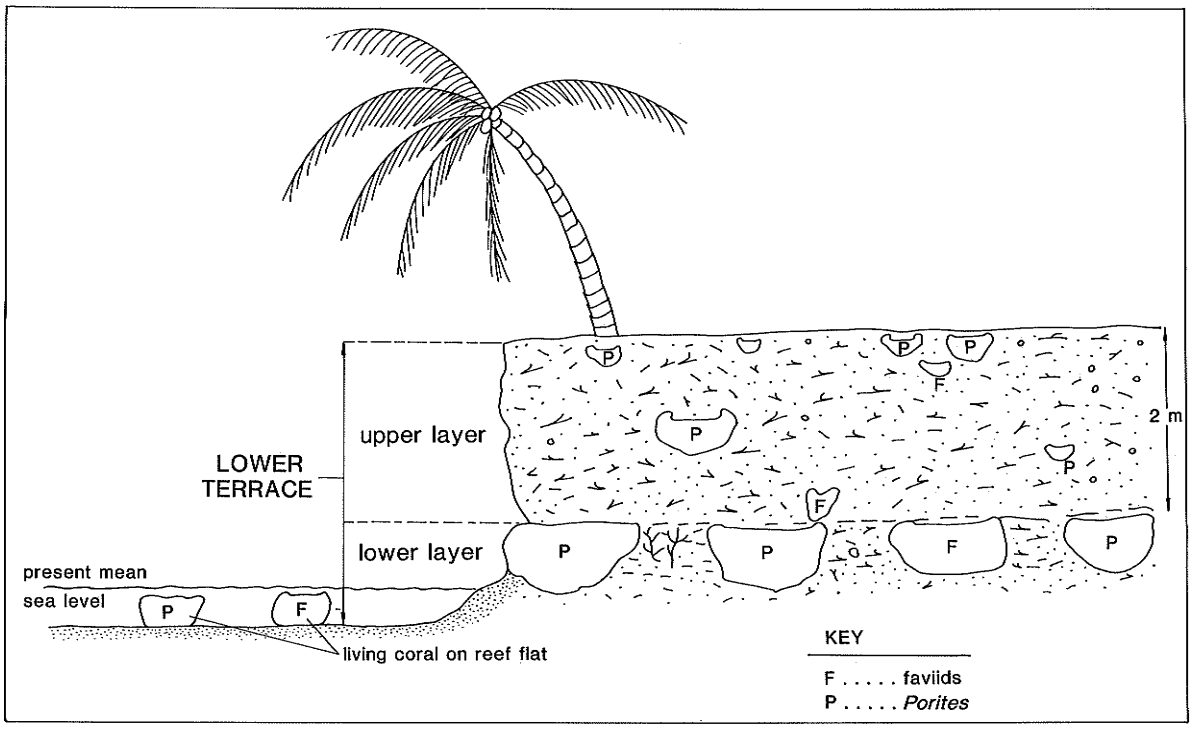

Fig. 5. Cartoon of the raised reef terraces at Jais Aben Resort illustrating the nature of, and relationships between, the Upper Layer and the Lower Layer (from Tudhope, 1992).

levels, to 8,000 years ago, when it was within 20 m of modern levels (Chappell & Polach, 1976).

Using a computerised model developed by Chappell (pers. comm.) it is possible to examine reef formation with variable tectonic uplift and coral growth rates coupled with known sea level changes. The northern coastline of New Guinea drops off steeply, and there is no continental shelf. Both modern and historic reefs would have been confined to the near or very near-shore environment.

Figure 4A shows the major physical features pertaining to an idealised cross section of the lagoon. The lagoon floor lies at a maximum of 40 m, while outside on the outer barrier wall there are two narrow terraces, one at about 55 m and another at about 70 m. Islands on the barrier, within the lagoon, and along the inner coastline have terraces at about 3 m and 5 m above sea level. Further inland reef terraces lie at 10 to 12 m above current sea level.

Varying the parameters above, it is possible to show that with an assumed constant uplift rate of 0.5 m/KA and reef growth rates between 3 to 4 m/KA (Chappell, [1974] estimated a mean growth of 4.7 m/KA for a 10 KA reef at Sialum), that the major structural features can be accounted for in the following scenario. Rising sea levels (Fig. 4B) accompanied by tectonic uplift lead to the development of reef terraces. In the Madang region seven major reef terraces would have formed over a period of the last 135,000 years. There is no direct evidence or dated material for this supposition however.

Following formation of the last formed terrace (20–16 KA) sea level rise far oustripped the rate of tectonic uplift as the sea level rose some 30–40 m in the space of 10,000 years. This would have led to the sudden inundation of the terrace formed between 66 and 50 KA. It is possible that during this period the outer barrier and mid-lagoon patch reefs of the Madang Lagoon were formed. Darwin (1854) postulated that the forereef of lagoonal systems outstrips lagoon floor growth since the body of water which accumulates behind such a developing reef becomes depleted in nutrients and is enriched with waste products.

More recent data suggest that fore reefs may grow vertically by between 4 and 12 m/KA, while lagoonal systems would only increase by 1.5 m/KA. Chappell & Polach (1976) have shown that Holocene reef terraces at Sialum accrued at a mean rate of 4.7 m/KA, while the maximum rate was about 8 m/KA. Mid-lagoon patch reefs and islands may have developed in a similar manner during this period.

Chappell (1974) noted that in the western parts of the Huon reef terraces, where uplift rates are of the order of 0.5 m/KA, barrier and lagoonal associations predominate, while in the east, where uplift rates range

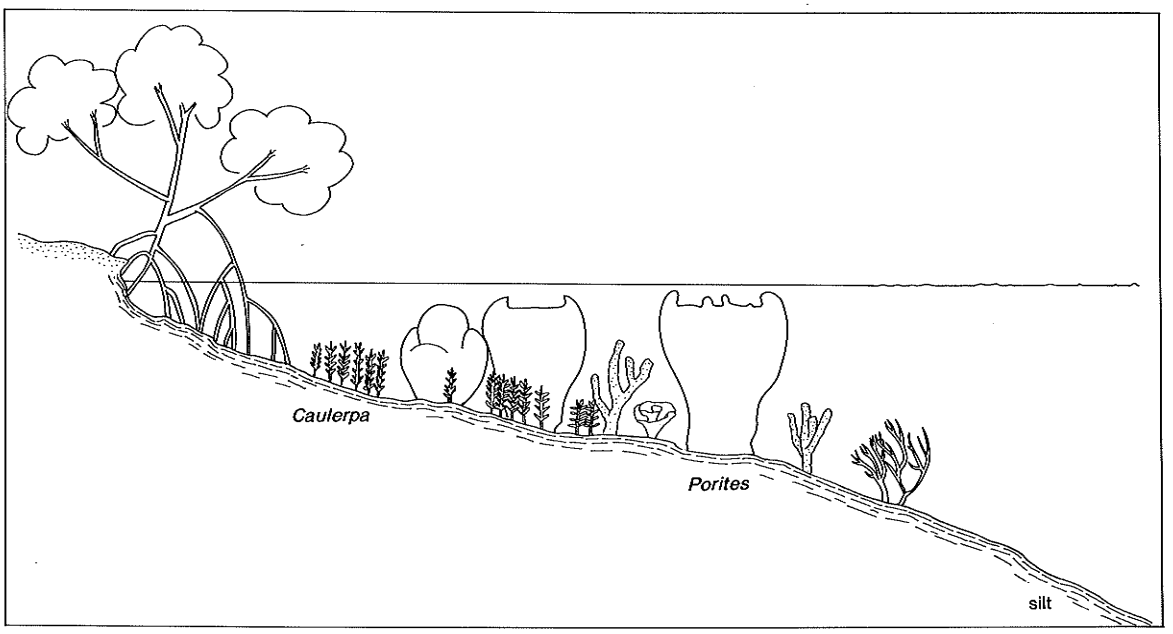

Fig. 6a. Schematic of the reef and island features of Madang Lagoon: back of Nagada Harbour and other similar inlets.

up to 2–3 m/KA, fringing reefs and gravel-built terraces predominate. In the Madang region an uplift rate of around 0.5 m/KA would tend to duplicate conditions in the western Huon terraces.

During maximal periods of rise, sea level would have risen between 8 to 17 m per thousand years (Chappell & Polach, 1976). Thus, if the barrier was formed during this period it would have been a truly remarkable rate of growth (Chappell, 1989). There is a possibility that the barrier may possess a Pleistocene core, but evidence for this is lacking.

Stratigraphic examination of the modern 3 m terrace around CRI by A. Tudhope (pers. comm., 1992) reveals a complex Holocene history. Two distinct layers are present in the terrace (Fig. 5). The boundary between these layers is characterised by a large number of massive micro-atolled corals. These suggest a period of relative stable sea level. In the upper layer there are numerous micro-atolls at differing levels, suggesting a pulsed rise in sea level over several centuries. Since eustatic sea levels have not be known to vary in this way (Chappell, 1974), the structure of these reefs can only be accounted for by localised tectonic subsidence or gravitational slumping in the Madang region (Tudhope, 1992).

This complex Holocene history may well account for the variation seen today in the combination of barrier reef and islands, as well as mid-lagoon islands and both deep (3–4 m) and shallow (<1 m) patch reefs. Differential silting adjacent to the Meiro, Nagada and Biges rivers have probably also been long term influences on reef growth.

Volcanoes

A string of volcanoes (e.g., Bam, Manam, Karkar, Bagabag, Crown Island and Long Island) lies along the tectonic boundary between the North Bismark Sea and the South Bismark Sea. These comprise the Bismark Volcanic Arc. The oldest of these volcanoes is about 5 million years old, and some remain active today. Many have a history of pyroclastic eruptions. Long Island contains a water-filled caldera about 8 km across which last erupted between *1800* and *1840* (Blong, 1982), depositing over 10 cm of ash on some parts of the Madang coastline (Blong, 1982). Dating of fossil, *in situ* *Porites* coral heads on Depilik Tabub suggests a date of c.200 years before present whilst living heads rarely exceed 150 years (A. Tudhope, pers. comm.). The relative abundance of these fossil heads, and their contemporary ages is highly suggestive that the Long Island eruption was the causative agent.

The eruption of Ritter in *1888* produced tsunamis that struck New Britain and the New Guinea mainland (Dow, 1977). Earthquakes can also have important impacts on the quantity of sedimentation and reef growth (Stoddart, 1972). An earthquake of force 8.2 on the Richter Scale, in the Madang area in 1972, led to landslides in which some catchments lost up to 60% of their vegetation (Johns, 1986). Other important climatic effects such as droughts and forest fires are also documented by Johns (1986). Cyclonic winds are virtually unknown on the Madang coastline (Johns, 1986).

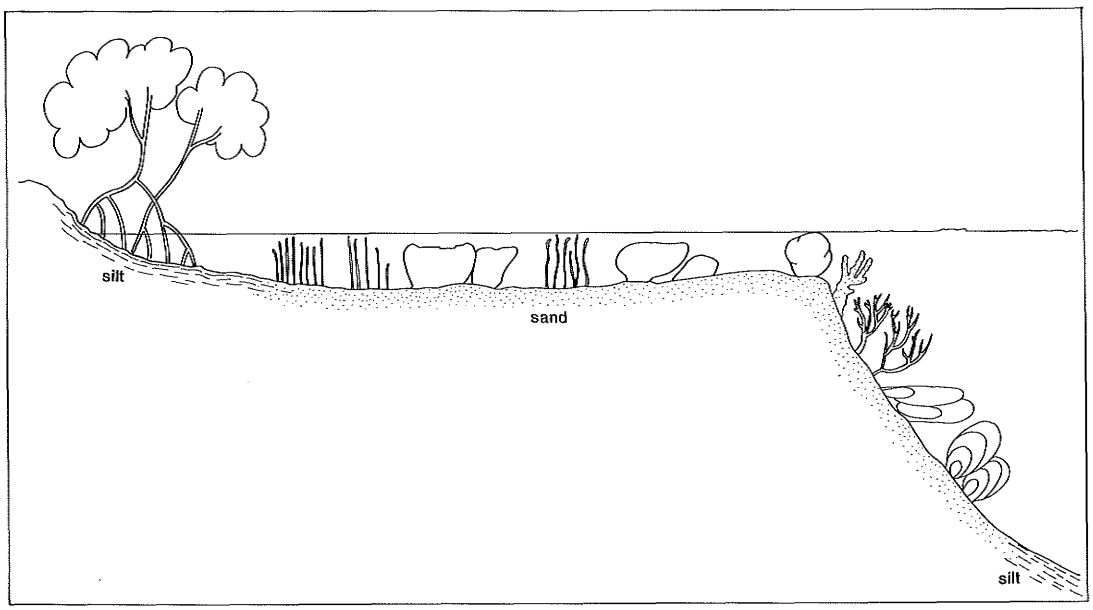

Fig. 6b. Schematic of the reef and island features of Madang Lagoon: fringing reefs at CRI.

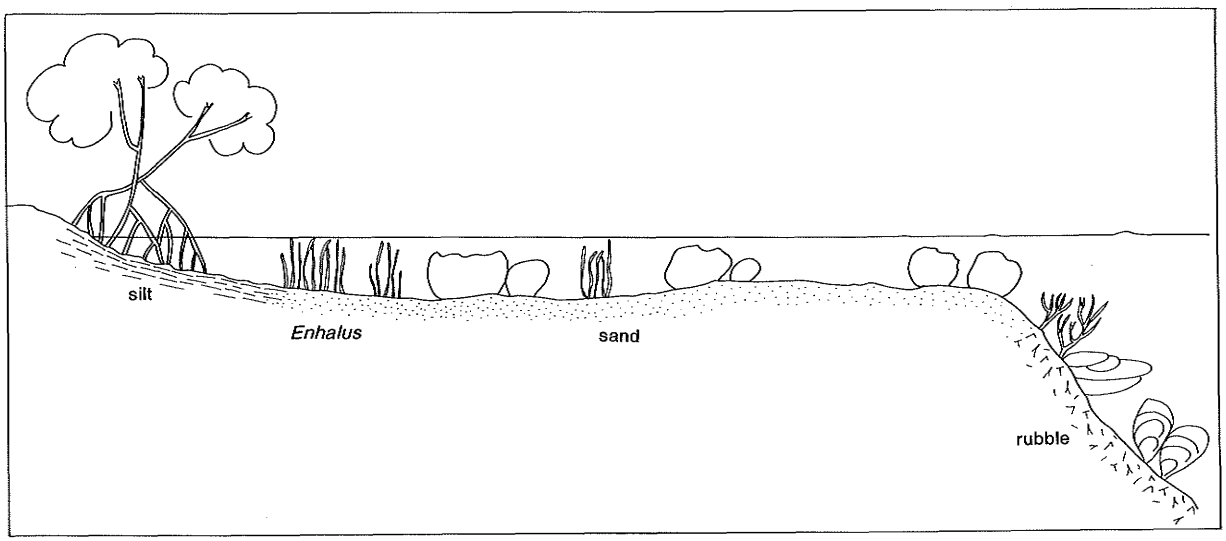

Fig. 6c. Schematic of the reef and island features of Madang Lagoon: sea grass beds.

Oceanography

The surface sea temperatures around the north coast of New Guinea are some of the highest known. These often reach 28°C, while temperatures in the lagoon in excess of 30°C in the top 2 to 4 m are commonplace. The thermocline may descend as far as 30 m on the outer barrier reef. Temperatures of the water on the inner edge of the lagoon, at a depth of 4 m, vary from 27 to 29.5°C through the year, with a mean of about 28.3°C. Temperatures on the outer edge of the lagoon are about 0.5°C lower than on the inner margin (Tudhope, pers. comm. and 1992). Salinities are in the region of 33–35 ppt. Surface salinities drop after heavy rain, and may rise during warm still conditions.

Tides

Madang experiences a mixed semidiurnal tide. Tidal range varies between 0.2 and 1.1 m during an annual cycle. The mixed tide is dominated by a single high and low, with a variable mixed element, that tends to lie close to the high. Prolonged low tide levels can sometimes coincide with the middle of the day. Such a situation may explain the absence of tidal flats. Corals only appear above water level on 1 or 2 days of the year. Other structural features apparently missing from the Madang Lagoon in addition to tide flats are spur and groove formations on the outer barrier reef and algal ridges. A combination of changes in relative sea level and the particular tidal regime may account for this.

The Madang region is strongly influenced by the El Niño Southern Oscillation (ENSO) event. Rainfall varies greatly between adjacent years, from 2500 mm in dry years (1987, 1992) to 4500 mm in wet years (1990).

General Description of the Biological Habitats (Partly based on Oliver, 1988)

Mangrove Associations

Mangrove development is slight in the Madang region, as it is along the entire north coast of New Guinea. This is a consequence of the recent rapid changes in sea level and the lack of large estuarine deposits or deltaic build-ups. Two major mangrove areas occur behind Riwo and around the mouth of the Meiro River (see Fig. 2). Eighteen species of mangrove have been recorded (Rau, 1988).

Back of Nagada Harbour and other Similar Inlets

(Fig. 6a)

Coral cover ranges from 0–50%. The bottom consists of fine silt and clay grading to sand. In muddy areas *Caulerpa* and *Halimeda* dominate, with scattered coral heads of massive *Porites* and massive faviids. In clearer waters branching *Porites, Goniopora, Echinophyllia, Seriatopora* and *Fungia* also occur. Fish are chiefly pomacentrids. Towards the seaward end of the harbour the coral community increases in diversity dramatically.

Fringing reefs at CRI

(Fig. 6b)

At the mouth of Nagada Harbour, and along the sea front at Jais Aben Resort the reef flats are dominated by many faviids, branching *Montipora* and small massive and branching *Porites*. At increasing depths branching *Acropora* and more numerous *Porites* coral heads are interspersed with some large, monospecific stands of *Montipora, Acropora, Echinopora, Leptoseris, Millepora, Pectinia, Seriatopora* and *Turbinaria*. Large gorgonians and sponges are also common. Over 300 common species of reef fish have been recorded here (Allen, 1987).

Sea Grass Beds

(Fig. 6c)

Just to the north of CRI lie large areas of shallow (1–2 m), well protected reef/rubble flats with scattered sea grass beds of *Enhalus acoroides*, interspersed with *Porites* coral heads. Other sea grasses recorded in the area include *Cymodocea serrulata, Halodule uninervis, Halophila ovalis* and *Thalassia hemprichii*. These beds support a diverse holothurian fauna (18 species) (Pearse, 1988). A network of mangrove-fringed islands and micro atolls make this an interesting mosaic of habitats.

Shallow patch reefs (Padoz and Mizegwadan Reefs)

(Fig. 6d)

These reefs are shallow (1 to 2 m), with dense coral cover (30–100%) of high diversity. Many species of massive faviids and large stands of *Acropora palifera* dominate the reef top. With increasing depths compact acroporas, plate-forming *Acropora, Pectinia,* and the soft coral *Sarcophytum* predominate. In addition *Fungia, Seriatopora* and soft corals become more numerous. The rear (lee) reef slope has a rubble crest, and a more gentle sand slope with occasional *Acropora* thickets. The other slopes consist of rubble merging into sand and then silt at depths of 20 m. Large gorgonians are commonly found at this depth around all lagoonal patch reefs.

Deep patch reefs (Mazamoz and Yazi Reefs)

(Fig. 6e)

These reefs, although in a corresponding position to the former two and within 2–3 km, are remarkably different. Their tops are much deeper, and have a sparser hard-coral cover (0–20%). The reef top is dominated by extensive soft coral communities of *Sarcophytum, Sinularia* and *Lobophytum*, as well as numerous gorgonians. Healthy hard coral growth is limited to a narrow depth range around the edges of the reefs, which consists of arborescent and tabulate species of *Acropora* and plate-like species of *Montipora*.

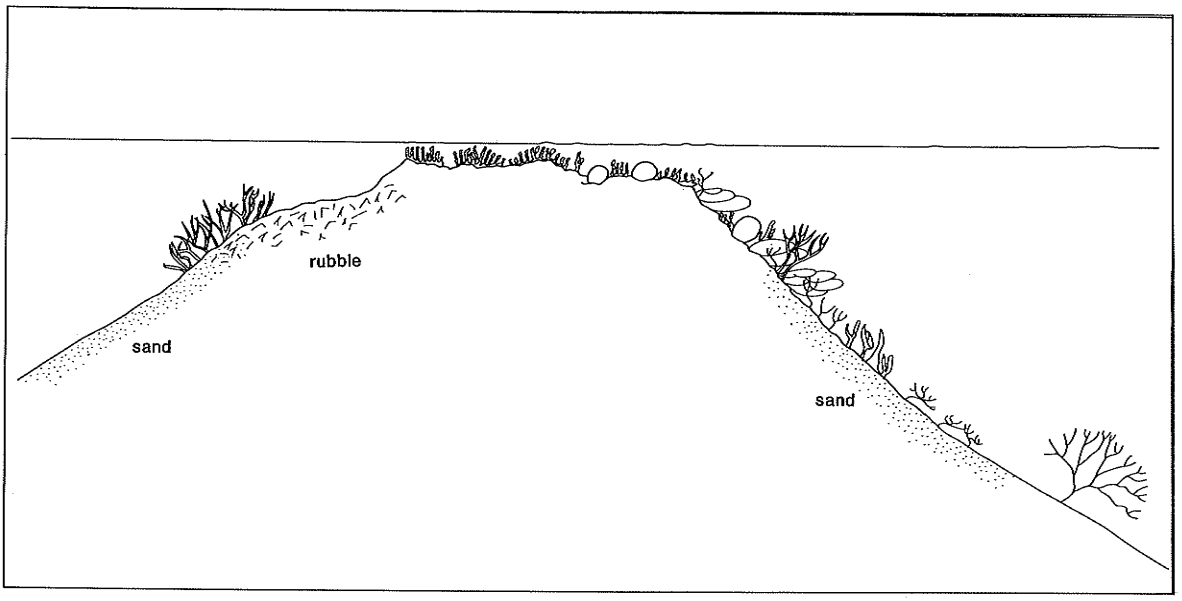

Fig. 6d. Schematic of the reef and island features of Madang Lagoon: patch reefs; view looking North, with seward edge to right (Padoz and Mizegwadan Reefs).

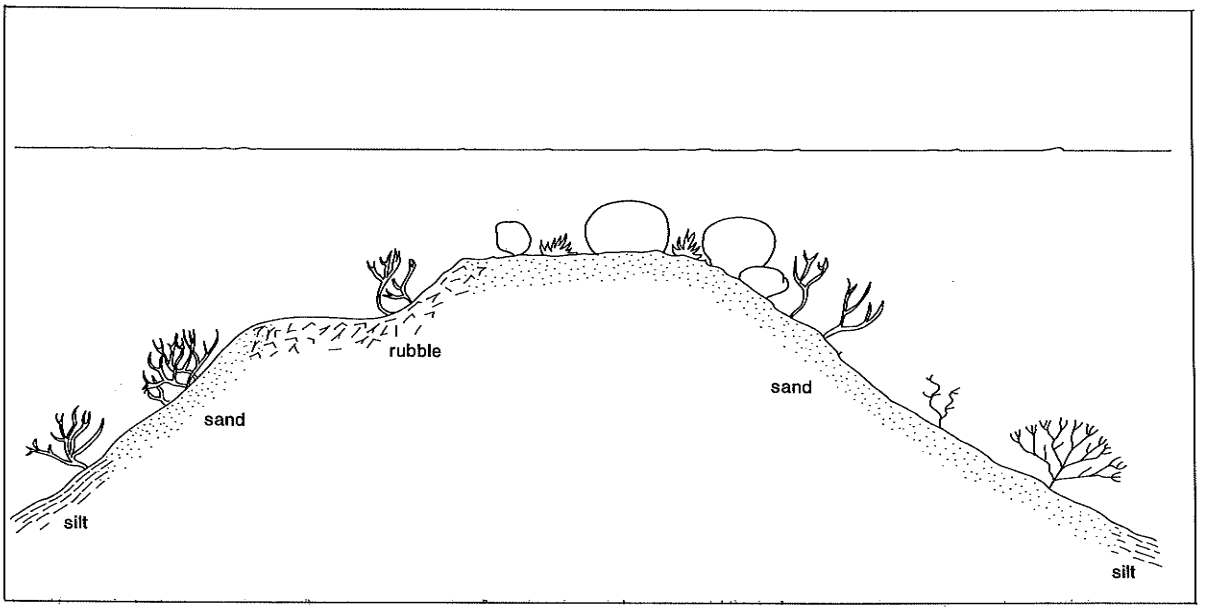

Fig. 6e. Schematic of the reef and island features of Madang Lagoon: patch reefs; view looking North, with seward edge to right (Mazamoz and Yazi Reefs).

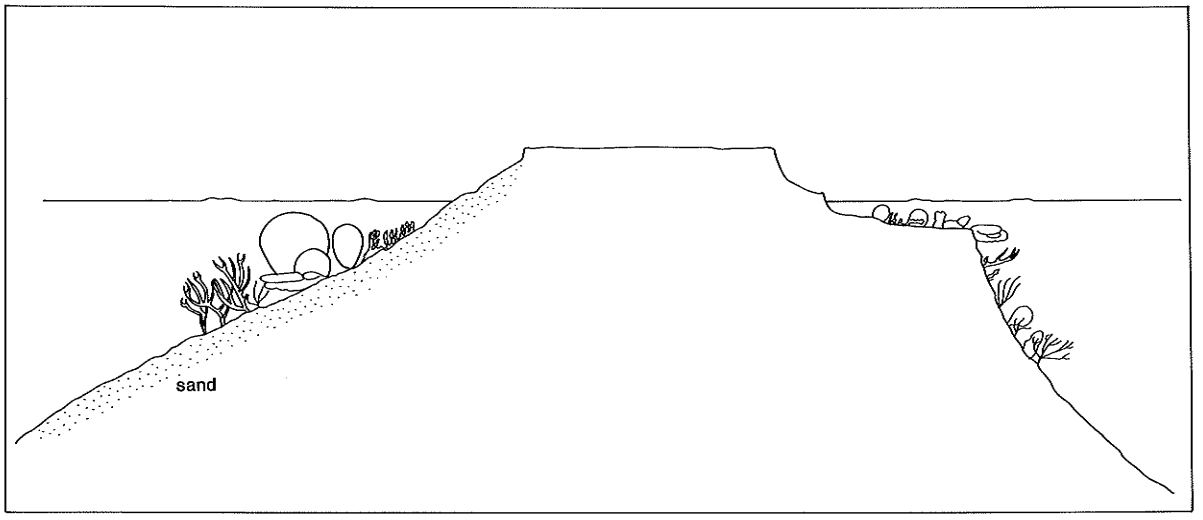

Fig. 6f. Schematic of the reef and island features of Madang Lagoon: Wongad, Tab, Mazzaz, Paeowai and Kranket islands. View looking North, with seaward edge to right.

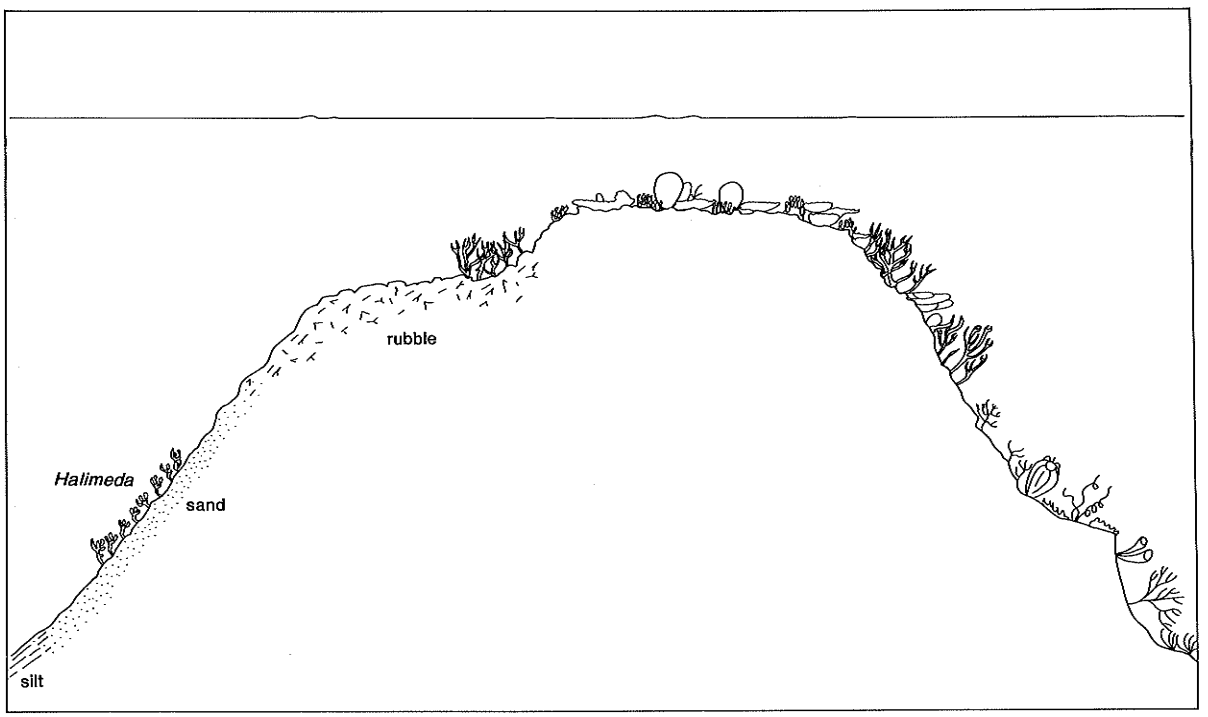

Fig. 6g. Schematic of the reef and island features of Madang Lagoon: the Barrier Reef. View looking North, with seaward edge to right.

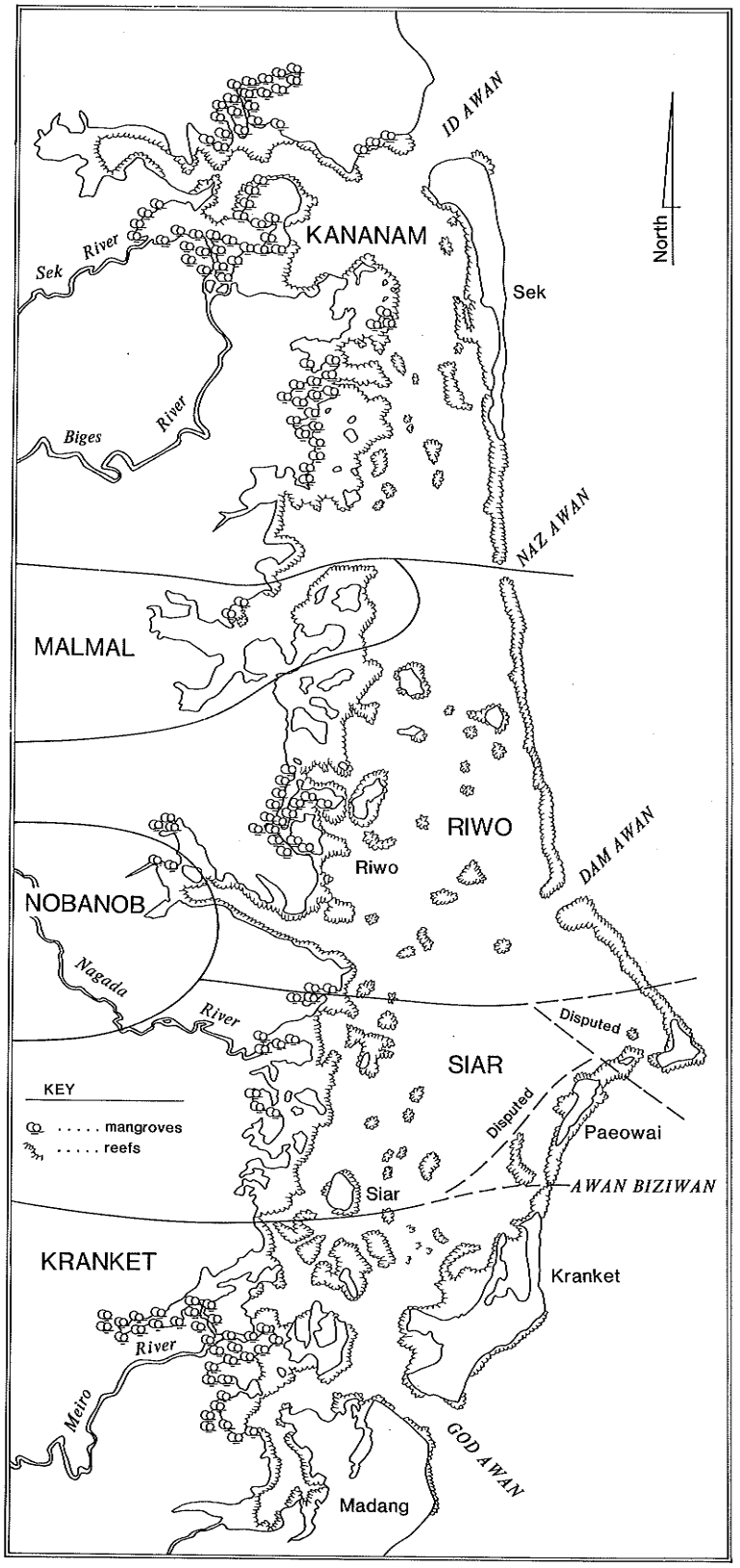

Fig. 7. Village groups (in Roman capitals) indicating current boundaries within the lagoon. (This map is based on conversations with members of Kranket, Siar and Riwo villages, and is in no way authoritative, and must not be used in determining ownership or traditional fishing rights.)

Large heads of *Porites* occur towards the centre of the reefs. The slopes of these reefs consist of rubble. They experience much greater wave action than the former reefs. Some of them have been dynamited for fishing. Explosives are obtained from WWII ammunition dumps around Alexishafen.

Wongad, Tab, Mazzaz, Paeowai and Kranket islands

(Fig. 6f)

The inner side of patch reefs and mid-lagoon islands are broadly speaking, accreting faces, with gentle sand and *Halimeda*-flake slopes developing in the lee of the reef, generally the landward side. This sand slope may develop *Acropora* thickets or large *Porites* coral heads in more stable areas. The seaward side of these islands is characterised by a shallow fringing reef with an abrupt drop off at its extreme edge, similar to the fringing reefs of the mainland.

The Barrier Reef

(Fig. 6g)

The outer slope of the barrier reef varies between 45° and 70° and consists of a steep wall dissected by sand and rubble-filled canyons. Low sea-level terraces are visible at about 55 and 70 m depths, although these vary greatly from place to place. The reef top is narrow (20 to 70 m) and falls less steeply on the leeward side (20 to 45°). Coral cover on the reef top is high at the seaward edge (70 to 100%), declining with depth, and towards the landward margin. The top is dominated by compact branching *Acropora*, such as notably *A. palifera*. The abundance of *Stylophora* and tabulate *Acropora* increases with depth, and *Pachyseris, Montipora* and *Echinophyllia* become dominant below 20 m. Hard coral cover drops off in turn towards the lagoonal edge of the reef, to be replaced by a rubble bottom of 4 to 5 m depth which quickly becomes a steep talus slope with a rich cover of *Halimeda* in places. The slope is chiefly made up from *Halimeda* flakes, with a smaller quantity of coral fragments. This slope meets the lagoon floor at about 20 to 30 m and grades abruptly into the soft silty sediment. The talus slope is very unstable and this suggests a fast accretion rate. In more protected areas, such as behind Wongad and Tab islands, the slope is more stable and supports large populations of the foraminiferans *Alveolinella* and *Marginopera*. Lipps (1987) suggests that these areas are relatively stable (months to years) since foraminiferans cannot tolerate unstable surfaces.

Human Interactions with the Reefs

The Madang Lagoon is divided between five major village groups: Kananam, Malmal, Riwo, Siar and Kranket (Fig. 7). Certain areas are under dispute, and have been for probably hundreds of years (Miklouho-Maclay, 1977). Likewise, land and reef disputes are common among the Riwo clans, as population growth places more pressure upon land use and reef exploitation.

There are nine major clans in the Riwo area. Of these the Tabat and Bazimut clans are reputedly the oldest. They formerly divided the Riwo region between themselves. The arrival of more recent groups through migration and intermarriage have resulted in a denser mosaic of ownership, especially of the agricultural land the reefs adjacent to the mainland. Marriage is one of the major factors in territory disintegration. The reefs immediately adjacent to the major population centres are often disputed.

Modern versus Traditional Names

All reefs have local names. It seems sensible to continue to adopt these terms rather than names such as "Cement Mixer Reef" and "Tripod Reef", terms often unknown to the indigenous population. Two maps (Figs 2,3) are provided for the purpose of identifying the reefs, and to furnish a source map for future workers. *Tinan* means true or original, *Natun* means son of, or child, *Mal* is a reef, *Awan* is a mouth. For some features we have been unable to obtain a consistent name (for instance "Barracuda Point") and these have been retained as bracketed names in the list of stations.

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APPENDIX

Station list, Papua New Guinea

All coordinates not checked using a satellite global positioning system (GPS) are marked with an asterisk. All names are Riwo place names with English names bracketed.

AAM/PNG-1 Kranket, Madang Lagoon, Papua New Guinea (5°11.34'S 145°49.47'E), among *Halophila ovale*, 1 m, A.A. Myers, 21 February 1990.

AAM/PNG-2 just west of bar, Nagada River sandbar, (*5°10.4'S 145°48.40'E); muddy silt, large amount of organic matter, 1.0 m, J.D. Thomas, 26 February 1990.

AAM/PNG-3 south shore of Tab (Pig Island) (5°10.31'S 145°50.32'E), turf of red alga, intertidal, A.A. Myers, 27 February 1990.

AAM/PNG-4 south shore of Tab (Pig Island) (5°10.31'S 145°50.32'E), *Halimeda* and *Acropora* rubble, 1.0 m, A.A. Myers, 27 February 1990.

AAM/PNG-5 in front of Madang Resort Hotel coral rubble and debris, 1 m, A.A. Myers, 28 February 1990.

AAM/PNG-6 Kranket Lagoon (5°11.34'S 145°49.47'E), 1 m A.A. Myers, 28 February 1990.

AAM/PNG-7 Lagoon in front of Christensen Research Institute, red crustose algae, 1 m, A.A. Myers, 29 February 1990.

AAM/PNG-8 Kranket, sheltered bay (5°11.34'S 145°49.47'E), consolidated mud and mangrove litter (fully marine), 1.5 m, A.A. Myers, 27 March 1991.

AAM/PNG-9 Kranket, sheltered bay (5°11.34'S 145°49.47'E), *Padina* sp., 1.5 m, A.A. Myers, 27 March 1991.

AAM/PNG-10 Kranket, sheltered bay (5°11.34'S 145°49.47'E), *Caulerpa racemosa*, 1.5 m, A.A. Myers, 27 March 1991.

AAM/PNG-11 Kranket, sheltered bay (5°11.34'S 145°49.47'E), *Halimeda* sp., 1.5 m, A.A. Myers, 27 March 1991.

AAM/PNG-12 Kranket, sheltered bay (5°11.34'S 145°49.47'E), coral rubble, 1.5 m, A.A. Myers, 27 March 1991.

AAM/PNG-13 channel between Riwo village and Riwo island, among sponges, 1 m, A.A. Myers, 31 March 1991.

AAM/PNG-14 channel at north end of Jais Aben Resort (5°09.06'S 145°48.20'E), *Turbinaria* sp., 1 m, A.A. Myers, 2 April 1991.

AAM/PNG-15 channel at north end of Jais Aben Resort (5°09.06'S 145°48.20'E), *Padina* sp., 1 m, A.A. Myers, 2 April 1991.

AAM/PNG-16 channel at north end of Jais Aben Resort (5°09.06'S 145°48.20'E), coral rubble, A.A. Myers, 2 April 1991.

AAM/PNG-17 channel at north end of Jais Aben Resort (5°09.06'S 145°48.20'E), *Padina* sp., 1 m, A.A. Myers, 3 April 1991.

JDT/PNG-1 Padoz Natun reef (5°09.60'S 145°48.77'E), formalin wash of rubble, 3 m, J.D. Thomas, 7 January 1989.

JDT/PNG-2 Padoz Natun reef (5°09.60'S 145°48.77'E), formalin wash of rubble with sponges and algae, J.D. Thomas, 8 January 1989.

JDT/PNG-3 Padoz Tinan reef (5°09.53'S 145°48.88'E), formalin wash of clean rubble and one piece of circular, flat-topped coral with numerous sponges and ascidians on underside, 2 m, J.D. Thomas, 9 January 1989.

JDT/PNG-4 Guzem (5°09.39'S 145°48.26'E), sand sample just in front of CRI, J.D. Thomas, 9 January 1989.

JDT/PNG-5 Padoz Tinan reef (5°09.53'S 145°48.88'E), formalin wash of rubble sample from slightly deeper water, 3 m, J.D. Thomas, 10 January 1989.

JDT/PNG-6 Wongad, reef in front of island (approximately 5°08.30'S 145°49.80'E), formalin wash of rubble at reef crest, 4 m, J.D. Thomas, 11 January 1989.

JDT/PNG-7 Guzem (5°09.39'S 145°48.26'E), samples from the tops of ripples in about 1 m of water, sand coarse and mixed with coarse rubble, J.D. Thomas, 11 January 1989.

JDT/PNG-8 small patch reef between Guzem and Jais Aben Resort, (5°09.39'S 145°48.26'E); wash of rubble, mainly broken off coral chunks and rubble, 1 m, J.D. Thomas, 13 January 1989.

JDT/PNG-9 near Christensen Research Institute (CRI) pier, (5°09.36'S 145°48.00'E); fine to medium quartz sand, 0.3 m, J.D. Thomas, 14 January 1989.

JDT/PNG-10 Padoz Tinan reef (5°09.53'S 145°48.88'E), near north-west margin of reef, formalin wash of rubble, 3 m, J.D. Thomas, 14 January 1989.

JDT/PNG-11 Yazi Tinan reef (5°09.11'S 145°49.14'E), among breakers, rubble sample, 1 m, high wave energy, J.D. Thomas, 15 January 1989.

JDT/PNG-12 back slope of Yazi Tinan reef (5°09.11'S 145°49.14'E), unconsolidated coral rubble, mainly finer-size fragments overlying a coral/algal sand base, 3 m, J.D. Thomas, 15 January 1989.

JDT/PNG-13 Dagadugaban (B-25 site) (5°08.22'S 145° 49.21'E), sediment sample from coral/algal mud, coarse *Halimeda* flakes with finer overlay of organic mud, 21 m, J.D. Thomas, 17 January 1989.

JDT/PNG-14 Dagadugaban (B-25 site) (5°08.22'S 145° 49.21'E), shallow upper floor layer devoid of specimens, J.D. Thomas, 18 January 1989.

JDT/PNG-20 Guzem Natun reef (5°09.29'S 145°48.37'E), formalin wash of rubble, coral rubble, plates of *Acropora cytherea* upside down and algal-covered, J.D. Thomas, 24 February 1990.

JDT/PNG-21 Padoz Natun reef (5°09.60'S 145°48.77'E), south-east of point in rubble area near margin of reef, sampled *Didemnum molle* and *Aplidium crateferum* (complex encrusting), J.D. Thomas, 25 February 1990.

JDT/PNG-22 Yazi Natun reef (5°09.23'S 145°48.98'E), formalin wash of rubble from hard, elevated substrate, not in connection with bottom sediments, J.D. Thomas, 26 January 1990.

JDT/PNG-23 commensals from sea whip, numerous *Maxillipius*, J.D. Thomas, 26 January 1990.

JDT/PNG-24 Padoz (probably Natun), (5°09.40'S 145°49.4'E), formalin wash of attached rubble, hammered protruding humps and broke up overturned piece of *Acropora*, J.D. Thomas, 27 January 1990.

JDT/PNG-25 Wongad Natun reef (5°08.31'S 145°49.36'E), formalin wash of rubble, 12–15 m, J.D. Thomas, 28 January 1990.

JDT/PNG-26 Guzem Natun reef (5°09.35'S 145°48.43'E), formalin wash of rubble on western portion of reef, little live coral cover, mostly rubble, J.D. Thomas, 29 January 1990.

JDT/PNG-27 deep water sample, 400 m, from Matthew Jebb.

JDT/PNG-28 eastern face of Wongad Natun reef (5°08.31'S 145°49.36'E), sediment sample (24–27 m) and piece of submerged wood (15 m), small sample of wood contained *Tropichelura* and limnoriids, J.D. Thomas, 30 January 1990.

JDT/PNG-29 eastern face of Wongad Natun reef (5°08.31'S 145°49.36'E), sediment sample from large sandy area on reef top, coarse coral/algal round, ripples 6–9 cm high, 5 m, J.D. Thomas, 31 January 1990.

JDT/PNG-30 western most point of eastern arm on Kranket Lagoon, (5°11.34'S 145°49.47'E); sediment sample, fine detrital mud over coarse matrix of *Halimeda* and coral fragments, anoxic layer at 5–6 mm, sloping at approximately 30°, J.D. Thomas, 31 January 1990.

JDT/PNG-31 Padoz Natun reef (5°09.60'S 145°48.77'E), *Maxillipius* off 2 types of gorgonians, about 20–23 m, J.D. Thomas, 1 February 1990.

JDT/PNG-32 Mizegwadan (Tripod) reef (5°09.57'S 145° 49.36'E), formalin wash of rubble from unknown depth, bottom mostly rubble and soft corals, very little live coral cover, 3–4 m, J.D. Thomas, 2 February 1990.

JDT/PNG-33 north-west corner of Tab (Pig Island) (5°09.98'S 145°50.45'E); sediment sample from sand slope, taken in 2 parts, 6 and 21 m, J.D. Thomas, 4 February 1990.

JDT/PNG-34 north-west corner of Tab (Pig Island) (5°09.98'S 145°50.45'E); sediment and algal covered rubble in sand, 45 m, J.D. Thomas, 4 February 1990.

JDT/PNG-35 Malolo Beach, 27 km north of Jais Aben turn-off, (4°58'S 145°47'E); black volcanic sand beaches, sediment sample of fine sand just beyond first sand bar, 2 m, J.D. Thomas, 4 February 1990.

JDT/PNG-36 barrier reef slope in front of Wongad (5°08.30'S 145°49.80'E); sand and rubble sample, sand mixed coarse *Halimeda* from steep slope at 36 m, rubble sample from 30 m, J.D. Thomas, 6 February 1990.

JDT/PNG-37 (Barracuda Point), reef just east of Tab (Pig Island) (5°10.26'S 145°50.61'E), moderate current flow, extensive coral cover in shallower depths, sediment sample 36 m from isolated accumulations of *Halimeda* and mud, rubble sample from underlays and rubble, 27–30 m, J.D. Thomas, 8 February 1990.

JDT/PNG-38 (Banana Rock) (5°10.39'S 145°50.16'E), "penny coral" *Fungia (Cycloseris) sinensis* bed, 27–33 m J.D. Thomas, 8 February 1990.

JDT/PNG-39 Malolo Beach, (4°58'S 145°47'E); beachhoppers, 2 large shell vials, J.D. Thomas, 4 February 1990.

JDT/PNG-40 Guzem reef, in portion of reef closest to Guzem (5°09.35'S 145°48.43'E), formalin wash of rubble, partially cemented rubble, broken pieces of overturned *Acropora* and partially cemented rubble pieces from shallowest section of reef, J.D. Thomas, 10 February 1990.

JDT/PNG-41 Malolo Beach, (4°58'S 145°47'E); sediment sample from near-shore swash zone (just at drop-off) also some samples further out in 2 m of water, fine black silt with abundant organisms, mainly wood fragments, J.D. Thomas, 10 February 1990.

JDT/PNG-42 north side of Awan Biziwan (5°11.05'S 145°49.70'E); single amphipod from yellowish-brown gorgonian, 21 m, J.D. Thomas, 11 February 1990.

JDT/PNG-43 north side of Awan Biziwan (5°11.05'S 145°49.70'E); sediment sample, 36 m, J.D. Thomas, 11 February 1990.

JDT/PNG-44 Guzem reef, just west of shallowest portion of reef top, (5°09.35'S 145°48.43'E); formalin wash of overturned rubble in sand and *Acropora* plates, 2.5 m, J.D. Thomas, 12 February 1990.

JDT/PNG-45 Wongad natun reef, formalin wash of rubble, 3 m, J.D. Thomas, 13 February 1990.

JDT/PNG-46 Padoz Tinan reef, rubble sample some from overturned plates of *Acropora*, two buckets of rubble from deep chipping—uncovering underlying areas of rubble with good growths, J.D. Thomas, 15 February 1990.

JDT/PNG-47 (Barracuda Point), Tab (Pig Island) (5°10.26'S 145°50.61'E); sediment sample from isolated pockets of *Halimeda* and mud, 36 m, J.D. Thomas, 16 February 1990.

JDT/PNG-48 Mizegwadan (Tripod) reef (5°09.57'S 145° 49.36'E), formalin wash of rubble, 3–4 m, J.D. Thomas, 16 February 1990.

JDT/PNG-50 Padoz Natun reef, rubble from centre of reef, some deep rubble under algal-covered layer, J.D. Thomas, 18 February 1990.

JDT/PNG-51 near west end of Guzem reef (5°09.35'S 145°48.43'E), formalin wash of rubble, 2–3 m, J.D. Thomas, 19 February 1990.

JDT/PNG-52 Padoz Natun reef (5°09.60'S 145°48.77'E), rubble sample from reef slope, mud and algae covered rubble, 12 m, J.D. Thomas, 20 February 1990.

JDT/PNG-54 night dive (2000 hrs) on the *Coral Queen* (5°09.57'S 145°49.93'E), swarms of *Birubius*, 3–4 m in depth (bottom depth 28 m) J.D. Thomas, 20 February 1990.

JDT/PNG-55 Kranket Lagoon, (5°11.40'S 145°49.48'E); formalin wash of rubble, low energy area, very little substantial rubble—very pliable, 4–5 m, J.D. Thomas, 21 February 1990.

JDT/PNG-56 north-west coast of Tab (Pig Island) (5°09.98'S 145°50.45'E); sample 1 of silt-sized fraction, 6–8 m; sample 2, 21–24 m, with large clay-mud fraction on the surface, J.D. Thomas, 21 February 1990.

JDT/PNG-57 gully in south entrance of Dam Awan (Rasch Passage) (5°09.27'S 145°49.86'E), rubble and sediment, J.D. Thomas, 22 February 1990.

JDT/PNG-58 gully behind south entrance to Dam Awan (Rasch Passage) (5°09.27'S 145°49.86'E), sediment sample, mix of sediments, 12, 15 and 21 m, J.D. Thomas, 22 February 1990.

JDT/PNG-59 barrier reef near Wongad (5°08.11'S 145° 49.53'E), rubble, encrusted dead *Acropora* plates, also some pieces from caves and overhangs, 36 m and 21 m, J.D. Thomas, 22 February 1990.

JDT/PNG-60 barrier reef near Wongad (5°08.11'S 145° 49.53'E), sediment sample from front of reef slope, 42 m, *Halimeda* coral/algal accumulation with fine brownish silt upper layer, J.D. Thomas, 24 February 1990.

JDT/PNG-61 Nagada River sandbar, (*5°10.4'S 145°48.45'E); sediment samples black silt with little organic matter, 0.6 m at high tide (could be exposed at low tide), definite freshwater layer noticeable on surface, J.D. Thomas, 26 February 1990.

JDT/PNG-62 just west of bar, Nagada River sandbar, (*5°10.4'S 145°48.40'E); muddy silt, large amount of organic matter, 1.0 m, J.D. Thomas, 26 February 1990.

JDT/PNG-63 Padoz Natun reef (5°09.60'S 145°48.77'E), *Maxillipius* from gorgonians, J.D. Thomas, 25 February 1990.

JDT/PNG-64 south shore of Tab (Pig Island) (5°10.31'S 145°50.32'E), turf of red alga, intertidal, J.D. Thomas, 27 February 1990.

JDT/PNG-65 south shore of Tab (Pig Island) (5°10.31'S 145°50.32'E), *Halimeda* and *Acropora* rubble, 1.0 m, J.D. Thomas, 27 February 1990.

JDT/PNG-66 (Barracuda Point), Tab (Pig Island) (5°10.26'S 145°50.61'E), rubble sample from reef slope, dead plates of overturned *Acropora*, 13 m, J.D. Thomas, 28 February 1990.

JDT/PNG-67 Padoz Natun reef (5°09.60'S 145°48.77'E), formalin wash of cemented rubble in shallow part of reef near centre and northern edge, J.D. Thomas, 28 February 1990.

JDT/PNG-68 in front of Madang Resort Hotel coral rubble and debris, 1 m, J.D. Thomas, 28 February 1990.

JDT/PNG-70 Dagadugaban (B-25 site) (5°08.22'S 145° 49.21'E), *Maxillipius* from gorgonians, 23 m, J.D. Thomas, 1 March 1990.

JDT/PNG-71 western margin of Guzem reef, (5°09.35'S 145°48.43'E); formalin wash of rubble, mainly encrusted *Acropora* rubble, 2 m, J.D. Thomas, 16 April 1991.

JDT/PNG-72 Dam Awan (Rasch Passage) (5°09.27'S 145°49.86'E), coral rubble, previously dead encrusted *Acropora*, 30 m and 15 m, J.D. Thomas, 17 April 1991.

JDT/PNG-73 Dam Awan (south Rasch Passage) (5°09.27'S 145°49.86'E), in line on reef front with Mizegwadan (Tripod) reef marker, fore reef slope, 2 pieces of *Acropora* rubble—overhanging, 2 separate pieces, 12–18 m, J.D. Thomas, 20 April 1991.

JDT/PNG-74 north of Awan Biziwan (5°11.06'S 145°49.70'E); outer reef slope, coral rubble, 12–15 m, J.D. Thomas, 21 April 1991.

JDT/PNG-75 Awan Biziwan, reef just out from south end of Paeowai (5°10.89'S 145°49.72'E); sand sample, 3 m, J.D. Thomas, 23 April 1991.

JDT/PNG-76 south-east shore of Tab (Pig Island) (5°10.30'S 145°50.44'E); rubble, fairly high energy, wave-washed area, 3–4 m, J.D. Thomas, 23 April 1991.

JDT/PNG-77 east side of Tab (Pig Island) (5°10.30'S 145°50.44'E), wave-washed coral pools, sample 1, formalin soak of *Amphiroa* clumps in standing pools; sample 2, rubble sample, 0–1 m, on wave-washed cliff face, J.D. Thomas, 27 April 1991.

JDT/PNG-78 seaward side of Tab (Pig Island) (5°10.30'S 145°50.44'E), *Sargassum* in wave-swept pools, J.D. Thomas, 28 April 1991.

JDT/PNG-79 south-east side of Wongad (5°08.16'S 145° 49.36'E), soft bottom sediment sample on slope, coral/algal mud, 6 m, D. Coulombe, 30 April 1991.

JDT/PNG-80 reef flat on south-east point of Wongad (5°08.16'S 145°49.36'E), formalin wash of coral knobs, some deep rubble dislodged by hammering, 1 m (low tide), J.D. Thomas, 30 April 1991.

JDT/PNG-81 south-east point of Wongad (5°08.16'S 145°49.36'E), rubble from wave-washed area, 1 m, J.D. Thomas, D. Coulombe & S. Thomas, 1 May 1991.

JDT/PNG-82 east side of Tab (Pig Island) (5°10.30'S 145°50.44'E), *Amphiroa* and other seaweeds in subtidal pools, J.D. Thomas, 1 May 1991.

JDT/PNG-83 patch reefs at southern end of Wongad (5°08.19'S 145°49.35'E), 4–6 m, J.D. Thomas, 3 May 1991.

JDT/PNG-84 New Year Bay, Bagabag, (lat. long. not recorded) on large bommie reef *Leucothoe commensalis* from the tunicate *Rhopalaea crassa* several large specimens and numerous smaller ones, 20 m, J.D. Thomas, 3 April 1991.

JDT/PNG-85 southern end of Wongad (5°08.19'S 145° 49.35'E), reef flat rubble, 1.2 m, J.D. Thomas, 2 May 1991.

JDT/PNG-86 Mazamoz reef (5°08.56'S 145°49.09'E), east and north ends of Riwo (island), deep rubble sample from underlying flat *Acropora* pavement over the rubble underneath, 3 m, J.D. Thomas, 7 May 1991.

JDT/PNG-87 north-east corner of Dam Awan (Rasch Passage) (5°09.27'S 145°49.86'E), encrusted *Acropora* plates on reef flat, 3 m, J.D. Thomas, 9 May 1991.

JDT/PNG-88 south of Dam Awan (Rasch Passage) (5°09.53'S 145°50.12'E), Mizegwadan (Tripod) reef in line with CRI, *Acropora* rubble overhangs, 12–15 m, J.D. Thomas, 11 May 1991.

JDT/PNG-89 Nagada River sandbar, (*5°10.30'S 145°48.45'E), sediment just in front of bar at very low tide, 0.3 m, J.D. Thomas, 14 May 1991.

JDT/PNG-90 north of Dam Awan (Rasch Passage) (5°08.59'S 145°49.65'E) half way between Wongad and passage opening, rubble, mainly algal covered, 27–30 m, J.D. Thomas, 16 May 1991.

JDT/PNG-91 Nagada River sandbar (*5°10.30'S 145°48.45'S); approximately 20 m west of shallow point of bar, sediment sample, from ripple areas with lots of organic matter, 1 m, J.D. Thomas, 21 May 1991.

JKL/PNG-64 north side of Awan Biziwan, between Paeowai and Kranket (5°11.06'S 145° 49.70'E); tufted red alga (like a pot scrubber) on outer reef face, 10 m; J.K. Lowry, 20 January, 1990.

JKL/PNG-65 north side of Awan Biziwan, between Paeowai and Kranket (5°11.06'S 145° 49.70'E); small hermit crab outer reef face, 10 m; J.K. Lowry, 20 January, 1990.

JKL/PNG-66 The Quarry, near the village of Bunu 2 (*4°46.50'S 145°48'E), steep coral slope straight off the beach with large unstable rubble and sand, pieces of wood, 40 m, J.K. Lowry, 21 January, 1990.

JKL/PNG-67 The Quarry, near the village of Bunu 2 (*4°46.50'S 145°48'E), steep coral slope straight off the beach with large unstable rubble and sand, pieces of old wood bored by molluscs, 12 m, J.K. Lowry, 21 January, 1990.

JKL/PNG-68 The Quarry, near the village of Bunu 2 (*4°46.50'S 145°48'E), steep coral slope straight off the beach with large unstable rubble and sand, black sponge, 12 m, J.K. Lowry, 21 January, 1990.

JKL/PNG-69 The Quarry, near the village of Bunu 2 (*4°46.50'S 145°48'E), steep coral slope straight off the beach with large unstable rubble and sand, many *Didemnum molle* with encrusting sponges on dead *Acropora* branch, 10 m, J.K. Lowry, 21 January, 1990.

JKL/PNG-70 The Quarry, near the village of Bunu 2 (*4°46.50'S 145°48'E), steep coral slope straight off the beach with large unstable rubble and sand, 40 m, J.K. Lowry, 21 January, 1990.

JKL/PNG-71 The Quarry, near the village of Bunu 2 (*4°46.50'S 145°48'E), steep coral slope straight off the beach with large unstable rubble and sand, 40 m, J.K. Lowry, 21 January, 1990.

JKL/PNG-72 The Quarry, near the village of Bunu 2 (*4°46.50'S 145°48'E), steep coral slope straight off the beach with large unstable rubble and sand, 40 m, J.K. Lowry, 21 January, 1990.

JKL/PNG-73 back slope of Outer Barrier north of Dam Awan (Rasch Pass) (5°08.59'S 145°49.65'E), baited trap 1, small blocks of rubble (about 75% cover) over coarse sand with 2 kinds of *Halimeda*, a dictyotalean a *Caulerpa* and a large black holothurian, 15 m, J.K. Lowry, 22–23 January, 1990.

JKL/PNG-74 back slope of Outer Barrier north of Dam Awan (Rasch Pass) (5°08.59'S 145°49.65'E), baited trap 2, small blocks of rubble (about 40% cover) over coarse sand with 1 kind of *Halimeda*, a dictyotalean and a sand anemone, 20 m, J.K. Lowry, 22–23 January, 1990.

JKL/PNG-75 back slope of Outer Barrier north of Dam Awan (Rasch Pass) (5°08.59'S 145°49.65'E), baited trap 3, sparse coral rubble on a sand bottom, sparse *Halimeda* with a few crinoids and a tunicate similar to *Polycarpa*, a sand anemone, 25 m, J.K. Lowry, 22–23 January, 1990.

JKL/PNG-76 back slope of Outer Barrier north of Dam Awan (Rasch Pass) (5°08.59'S 145°49.65'E), baited trap 4, sparse coral rubble on a sand bottom, sparse *Halimeda*, and a colony of *Goniopora*, 30 m, J.K. Lowry, 22–23 January, 1990.

JKL/PNG-77 front of Guzem Natun reef (5°09.35'S 145°48.43'E), baited trap 2, sandy gully (rubble on sand) between dead *Acropora* and soft corals, 6 m, J.K. Lowry, 24–25 January 1990.

JKL/PNG-78 front of Guzem Natun reef (5°09.35'S 145°48.43'E), baited trap 4, coarse sand bottom near dead between dead *Acropora*, living faviids and gorgonians, 13 m, J.K. Lowry, 24–25 January 1990.

JKL/PNG-79 face of outer barrier between Dam Awan (Rasch Pass) and Wongad (5°08.59'S 145° 49.65'E), baited trap 1, 90 m, J.K. Lowry, J. Mizeu and J.D. Thomas, 26–27 January, 1990.

JKL/PNG-80 face of outer barrier between Dam Awan (Rasch Pass) and Wongad (5°08.59'S 145° 49.65'E), baited trap 2, 140 m, J.K. Lowry, J. Mizeu and J.D. Thomas, 26–27 January, 1990. no specimens.

JKL/PNG-81 face of outer barrier between Dam Awan (Rasch Pass) and Wongad (5°08.59'S 145° 49.65'E), baited trap 4, 240 m, J.K. Lowry, J. Mizeu and J.D. Thomas, 26–27 January, 1990.

JKL/PNG-82 face of outer barrier between Dam Awan (Rasch Pass) and Wongad (5°08.59'S 145° 49.65'E), baited trap 5, 290 m, J.K. Lowry, J. Mizeu and J.D. Thomas, 26–27 January, 1990.

JKL/PNG-83 face of outer barrier between Dam Awan (Rasch Pass) and Wongad (5°08.59'S 145° 49.65'E), baited trap 6, 340 m, J.K. Lowry, J. Mizeu and J.D. Thomas, 26–27 January, 1990.

JKL/PNG-84 face of outer barrier between Dam Awan (Rasch Pass) and Wongad (5°08.59'S 145° 49.65'E), baited trap 7, 390 m, J.K. Lowry, J. Mizeu and J.D. Thomas, 26–27 January, 1990.

JKL/PNG-85 face of outer barrier between Dam Awan (Rasch Pass) and Wongad (5°08.59'S 145° 49.65'E), baited trap 8, 440 m, J.K. Lowry, J. Mizeu and J.D. Thomas, 26–27 January, 1990.

JKL/PNG-86 off beach, south-west side of Wongad (5°08.13'S 145°49.27'E), baited trap 1, a lot of rubble, sponges and soft corals on a sandy bottom, 3 m, J.K. Lowry & J.K. Elliott, 27–28 January 1990.

JKL/PNG-87 off beach, south-west side of Wongad (5°08.13'S 145°49.27'E), baited trap 2, sandy bottom with coral rubble and a lot of sunken wood, 6 m, J.K. Lowry & J.K. Elliott, 27–28 January 1990.

JKL/PNG-88 off beach, south-west side of Wongad (5°08.13'S 145°49.27'E), baited trap 3, sandy bottom with large piece of wood and coconuts, 10 m, J.K. Lowry & J.K. Elliott, 27–28 January 1990.

JKL/PNG-89 off beach, south-west side of Wongad (5°08.13'S 145°49.27'E), baited trap 4, sandy bottom with some blue-green algal cover, sea pens, sunken wood, leaves and coconuts, 14 m, J.K. Lowry & J.K. Elliott, 27–28 January 1990.

JKL/PNG-90 off beach, south-west side of Wongad (5°08.13'S 145°49.27'E), baited trap 5, sandy bottom with some blue-green algal cover, sea pens, large synaptid, leaves and coconuts, 17 m, J.K. Lowry & J.K. Elliott, 27–28 January 1990.

JKL/PNG-91 off beach, south-west side of Wongad (5°08.13'S 145°49.27'E), baited trap 6, sandy bottom with some blue-green algal cover, leaves, 20 m, J.K. Lowry & J.K. Elliott, 27–28 January 1990.

JKL/PNG-92 off beach, south-west side of Wongad (5°08.13'S 145°49.27'E), baited trap 7, sandy bottom with some blue-green algal cover, sea anemone *Macrodactyla doreensis* Quoy & Gaimard, 24 m, J.K. Lowry & J.K. Elliott, 27–28 January 1990.

JKL/PNG-93 off beach, south-west side of Wongad (5°08.13'S 145°49.27'E), baited trap 8, muddy sand bottom with some blue-green algal cover, coconut husks and worm tubes, 27 m, J.K. Lowry & J.K. Elliott, 27–28 January 1990.

JKL/PNG-94 off beach, south-west side of Wongad (5°08.13'S 145°49.27'E), baited trap 9, muddy sand bottom with some blue-green algal cover and worm tubes, 30 m, J.K. Lowry & J.K. Elliott, 27–28 January 1990.

JKL/PNG-95 western side of Riwo channel (5°08.70'S 145°48.38'E), baited trap 1, sitting on a large *Porites lobata* and sandy patch in *Enhalus* bed, 1 m, J.K. Lowry & J.K. Elliott, 29–30 January 1990.

JKL/PNG-96 western side of Riwo channel (5°08.70'S 145°48.38'E), baited trap 2, sitting near a small clump of *Stylophora* in a pure *Enhalus* bed on sandy bottom, 1 m, J.K. Lowry & J.K. Elliott, 29–30 January 1990.

JKL/PNG-97 western side of Riwo channel (5°08.70'S 145°48.38'E), baited trap 3, sitting near coral rubble and small *Porites* and branching corals in a pure *Enhalus* bed on sandy bottom, 1 m, J.K. Lowry & J.K. Elliott, 29–30 January 1990.

JKL/PNG-98 western side of Riwo channel (5°08.70'S 145°48.38'E), baited trap 4, in a pure *Enhalus* bed on sandy bottom, 1 m, J.K. Lowry & J.K. Elliott, 29–30 January 1990.

JKL/PNG-99 western side of Riwo channel (5°08.70'S 145°48.38'E), baited trap 5, in an *Enhalus* bed near coral rubble, *Fungia, Stylophora* and branching soft corals, 1 m, J.K. Lowry & J.K. Elliott, 29–30 January 1990.

JKL/PNG-100 western side of Riwo channel (5°08.70'S 145°48.38'E), baited trap 6, on *Porites* at edge of sandy patch *Enhalus* bed near coral rubble, a lot of soft corals, *Fungia* and *Diadema*, 1 m, J.K. Lowry & J.K. Elliott, 29–30 January 1990.

JKL/PNG-101 western side of Riwo channel (5°08.70'S 145°48.38'E), baited trap 7, sitting near sandy patch and branching soft corals, 1 m, J.K. Lowry & J.K. Elliott, 29–30 January 1990.

JKL/PNG-102 western side of Riwo channel (5°08.70'S 145°48.38'E), baited trap 8, sitting on sandy patch surrounded by *Porites* and branching soft corals, 2.5 m, J.K. Lowry & J.K. Elliott, 29–30 January 1990.

JKL/PNG-103 western side of Riwo channel (5°08.70'S 145°48.38'E), baited trap 9, sitting on a branching *Acropora* near *Porites lobata* 3 m, J.K. Lowry & J.K. Elliott, 29–30 January 1990.

JKL/PNG-104 Wongad Natun reef (5°08.31'S 145°49.36'E), transect laid down front face of reef, dense coral cover to 17 m, baited trap 1, just off edge of sandy patch on top of reef, hard and soft coral cover, 3 m, J.K. Lowry & J.K. Elliott, 30–31 January, 1990.

JKL/PNG-105 Wongad Natun reef (5°08.31'S 145°49.36'E), transect laid down front face of reef, dense coral cover to 17 m, baited trap 2, *Acropora*, branching soft corals and *Porites* 4 m, J.K. Lowry & J.K. Elliott, 30–31 January, 1990.

JKL/PNG-106 Wongad Natun reef (5°08.31'S 145°49.36'E), transect laid down front face of reef, dense coral cover to 17 m, baited trap 3, dense cover of hard coral, *Porites* and *Stylophora*, 5 m, J.K. Lowry & J.K. Elliott, 30–31 January, 1990.

JKL/PNG-107 Wongad Natun reef (5°08.31'S 145°49.36'E), transect laid down front face of reef, dense coral cover to 17 m, baited trap 4, sitting on branching *Acropora* cytherea, also branching soft corals and some *Halimeda*, 9 m, J.K. Lowry & J.K. Elliott, 30–31 January 1990.

JKL/PNG-108 Wongad Natun reef (5°08.31'S 145°49.36'E), transect laid down front face of reef, dense coral cover to 17 m, baited trap 5, base of the reef, a lot of soft corals and *Turbinaria*, 17 m, J.K. Lowry & J.K. Elliott, 30–31 January 1990.

JKL/PNG-109 Wongad Natun reef (5°08.31'S 145°49.36'E), transect laid down front face of reef, dense coral cover to 17 m, baited trap 6, small bommies of *Stylophora* and soft corals on a coarse sand bottom, 21 m, J.K. Lowry & J.K. Elliott, 30–31 January 1990.

JKL/PNG-110 Wongad Natun reef (5°08.31'S 145°49.36'E), transect laid down front face of reef, dense coral cover to 17 m, baited trap 7, sandy mud bottom, some *Halimeda* and some soft corals, 24 m, J.K. Lowry & J.K. Elliott, 30–31 January 1990.

JKL/PNG-111 Wongad Natun reef (5°08.31'S 145°49.36'E), transect laid down front face of reef, dense coral cover to 17 m, baited trap 8, sandy mud bottom, some *Halimeda* and some blue-green algal cover, 27 m, J.K. Lowry & J.K. Elliott, 30–31 January 1990.

JKL/PNG-112 Wongad Natun reef (5°08.31'S 145°49.36'E), transect laid down front face of reef, dense coral cover to 17 m, baited trap 9, sandy mud bottom, and some blue-green algal cover, 29 m, J.K. Lowry & J.K. Elliott, 30–31 January 1990.

JKL/PNG-113 face of outer barrier between Dam Awan (Rasch Pass) and Wongad (5°08.59'S 145° 49.65'E), baited trap 1, 5.5 m, *Acropora* plates, *Porites, Stylophora, Halimeda* and small patches of coarse sand, J.K. Lowry, J. Mizeu, 31 January–1 February, 1990.

JKL/PNG-114 face of outer barrier between Dam Awan (Rasch Pass) and Wongad (5°08.59'S 145° 49.65'E), baited trap 2, 11 m, *Acropora* plates, *Porites, Stylophora, Halimeda* and small patches of coarse sand, J.K. Lowry, J. Mizeu, 31 January–1 February, 1990.

JKL/PNG-115 face of outer barrier between Dam Awan (Rasch Pass) and Wongad (5°08.59'S 145° 49.65'E), baited trap 3, 17 m, *Acropora* plates, *Porites, Stylophora, Halimeda* and small patches of coarse sand, J.K. Lowry, J. Mizeu, 31 January–1 February, 1990.

JKL/PNG-116 face of outer barrier between Dam Awan (Rasch Pass) and Wongad (5°08.59'S 145° 49.65'E), baited trap 4, 24 m, *Acropora, Stylophora, Goniopora*, a finely branched stinging coral and small patches of coarse sand, definite thermocline at the depth, J.K. Lowry, J. Mizeu, 31 January–1 February, 1990.

JKL/PNG-117 face of outer barrier between Dam Awan (Rasch Pass) and Wongad (5°08.59'S 145° 49.65'E), baited trap 5, 31 m, coarse sand bottom near hard bottom of ? *Montipora* sp., J.K. Lowry, J. Mizeu, 31 January–1 February, 1990.

JKL/PNG-118 face of outer barrier between Dam Awan (Rasch Pass) and Wongad (5°08.59'S 145° 49.65'E), baited trap 6, 36 m, coarse sand bottom near hard bottom of ? *Montipora* sp., J.K. Lowry, J. Mizeu, 31 January–1 February, 1990.

JKL/PNG-119 face of outer barrier between Dam Awan (Rasch Pass) and Wongad (5°08.59'S 145° 49.65'E), baited trap 7, 44 m, coarse sand bottom next to rock face with finger sponges and ? *Montipora* sp., J.K. Lowry, J. Mizeu, 31 January–1 February, 1990.

JKL/PNG-120 face of outer barrier between Dam Awan (Rasch Pass) and Wongad (5°08.59'S 145° 49.65'E), baited trap 8, 51 m, coarse sand bottom next to vertical face of ? *Montipora*, and sponges, J.K. Lowry, J. Mizeu, 31 January–1 February, 1990.

JKL/PNG-121 face of outer barrier between Dam Awan (Rasch Pass) and Wongad (5°08.59'S 145° 49.65'E), baited trap 9, 59 m, a gently sloping coarse sand bottom near the vertical drop off, J.K. Lowry, J. Mizeu, 31 January–1 February, 1990.

JKL/PNG-122 just east of the CRI pier, Nagada Harbour (5°09.36'S 145°48.00'E), baited trap 1, sand bottom with sparse *Caulerpa*, 0.5 m, J.K. Lowry & J.K. Elliott, 1–2 February 1990.

JKL/PNG-123 just east of the CRI pier, Nagada Harbour (5°09.36'S 145°48.00'E), baited trap 2, sand bottom with sparse *Caulerpa*, 0.5 m, J.K. Lowry & J.K. Elliott, 1–2 February 1990.

JKL/PNG-124 just east of the CRI pier, Nagada Harbour (5°09.36'S 145°48.00'E), baited trap 3, sand patch near hard coral, 1.5 m, J.K. Lowry & J.K. Elliott, 1–2 February 1990.

JKL/PNG-125 just east of the CRI pier, Nagada Harbour (5°09.36'S 145°48.00'E), baited trap 4, coral rubble with living soft coral and a branching *Montipora*, 3 m, J.K. Lowry & J.K. Elliott, 1–2 February 1990.

JKL/PNG-126 just east of the CRI pier, Nagada Harbour (5°09.36'S 145°48.00'E), baited trap 5, mostly coral rubble near large living *Acropora*, 7 m, J.K. Lowry & J.K. Elliott, 1–2 February 1990.

JKL/PNG-127 just east of the CRI pier, Nagada Harbour (5°09.36'S 145°48.00'E), baited trap 7, soft mud bottom with some coral rubble, 15 m, J.K. Lowry & J.K. Elliott, 1–2 February 1990.

JKL/PNG-128 just east of the CRI pier, Nagada Harbour (5°09.36'S 145°48.00'E), baited trap 8, soft mud bottom, 15 m, J.K. Lowry & J.K. Elliott, 1–2 February 1990.

JKL/PNG-129 just east of the CRI pier, Nagada Harbour (5°09.36'S 145°48.00'E), baited trap 9, soft mud bottom, 16 m, J.K. Lowry & J.K. Elliott, 1–2 February 1990.

JKL/PNG-130 encrusting yellow sponge with red surface on aft railings of the *Coral Queen*, Madang Lagoon, (5°09.57'S 145°49.93'E), 27 m, J.K. Lowry & S.J. Keable, 26 February 1991.

JKL/PNG-131 erect branching grey sponge on aft deck of the *Coral Queen*, Madang Lagoon, (5°09.57'S 145°49.93'E), 27 m, J.K. Lowry & S.J. Keable, 26 February 1991.

JKL/PNG-132 silty clay bottom with about 10% sand near the *Coral Queen*, Madang Lagoon, (5°09.57'S 145°49.93'E), 31 m, J.K. Lowry & S.J. Keable, 26 February 1991.

JKL/PNG-133 next to hull of *Coral Queen*, port side, (5°09.57'S 145°49.93'E), baited trap 1 on muddy sand, 29 m, J.K. Lowry & S.J. Keable, 28–29 February 1991. (sediment sample A).

JKL/PNG-134 10 m from hull of *Coral Queen*, port side, (5°09.57'S 145°49.93'E), baited trap 2 on muddy sand, 29 m, J.K. Lowry & S.J. Keable, 28–29 February 1991. (Sediment sample B).

JKL/PNG-135 patch reef south-west of *Coral Queen*, (5°09.57'S 145°49.93'E), baited trap 3 on muddy patch reef, dominant coral *Montipora aequituberculata*, 29 m, J.K. Lowry & S.J. Keable, 28–29 February 1991.

JKL/PNG-136 aft deck, starboard side of *Coral Queen*, (5°09.57'S 145°49.93'E), baited trap 4 on deck, 26 m, J.K. Lowry & S.J. Keable, 28–29 February 1991.

JKL/PNG-137 fore deck, port side of *Coral Queen*, Madang Lagoon (5°09.57'S 145°49.93'E), baited trap 5 on deck, 26 m, J.K. Lowry & S.J. Keable, 28–29 February 1991.

JKL/PNG-138 CRI Pier, (5°09.36'S 145°48.00'E); baited trap 6 on sandy bottom, 1 m, J.K. Lowry & S.J. Keable, 28–29 February 1991.

JKL/PNG-139 10 m from port side hull of *Coral Queen*, Madang Lagoon, (5°09.57'S 145°49.93'E); dredge sample on muddy sand, 29 m, J.K. Lowry & S.J. Keable, 29 February 1991.

JKL/PNG-141 south-eastern corner of Tab (Pig Island) (5°10.31'S 145°50.32'E), baited trap 1 on sandy bottom immediately adjacent to coral reef, 10 m, J.K. Lowry & S.J. Keable, 27–28 February 1991. (sediment sample 3).

JKL/PNG-142 south-eastern corner of Tab (Pig Island) (5°10.31'S 145°50.32'E), baited trap 2 on sandy bottom 3 m from coral reef, 14 m, J.K. Lowry & S.J. Keable, 27–28 February 1991.

JKL/PNG-143 south-eastern corner of Tab (Pig Island) (5°10.31'S 145°50.32'E), baited trap 3 on sandy bottom not near and from coral reef, 19 m, J.K. Lowry & S.J. Keable, 27–28 February 1991.

JKL/PNG-144 south-eastern corner of Tab (Pig Island) (5°10.31'S 145°50.32'E), baited trap 4 at base of steep slope on coarse sandy bottom 2 m from small patch reefs, 23 m, J.K. Lowry & S.J. Keable, 27–28 February 1991.

JKL/PNG-145 south-eastern corner of Tab (Pig Island) (5°10.31'S 145°50.32'E), baited trap 5 next to small patch reef on coarse sandy bottom, 25 m, J.K. Lowry & S.J. Keable, 27–28 February 1991. (Sediment sample 2)

JKL/PNG-146 south-eastern corner of Tab (Pig Island) (5°10.31'S 145°50.32'E), baited trap 6 next to small patch reef on coarse sandy bottom, 27 m, J.K. Lowry & S.J. Keable, 27–28 February 1991.

JKL/PNG-147 south-eastern corner of Tab (Pig Island) (5°10.31'S 145°50.32'E), baited trap 7 next to small patch reef on coarse sandy bottom, 28 m, J.K. Lowry & S.J. Keable, 27–28 February 1991.

JKL/PNG-148 south-eastern corner of Tab (Pig Island) (5°10.31'S 145°50.32'E), baited trap 8 on coarse sandy bottom next to *Lysiosquilla* burrow and about 3 m from small patch reef, 28 m, J.K. Lowry & S.J. Keable, 27–28 February 1991.

JKL/PNG-149 south-eastern corner of Tab (Pig Island) (5°10.31'S 145°50.32'E), baited trap 9 near edge of small patch reef covered in encrusting *Montipora* 28 m, J.K. Lowry & S.J. Keable, 27–28 February 1991 (Sediment sample 1).

JKL/PNG-150 south-eastern corner of Tab (Pig Island) (5°10.31'S 145°50.32'E), baited trap 10 near edge of large patch reef covered in the agariciid coral *Pavona cactus*, 28 m, J.K. Lowry & S.J. Keable, 27–28 February 1991.

JKL/PNG-151 innermost reach, north-west branch of Nagada Harbour (5°08.90'S 145°47.45'E), airlift sample of *Caulerpa* among corals on a silty bottom, 1.5 m, J.K. Lowry & S.J. Keable, 2 March 1991.

JKL/PNG-152 innermost reach, north-west branch of Nagada Harbour (5°08.90'S 145°47.45'E), airlift sample of *Halimeda* among corals on a silty bottom, 1.5 m, J.K. Lowry & S.J. Keable, 2 March 1991.

JKL/PNG-153 innermost reach, north-west branch of Nagada Harbour (5°08.90'S 145°47.45'E), sample of blue sponge on coral, 1.5 m, J.K. Lowry & S.J. Keable, 2 March 1991.

JKL/PNG-154 innermost reach, north-west branch of Nagada Harbour (5°08.90'S 145°47.45'E), airlift sample of silty bottom, 3 to 6 m, J.K. Lowry & S.J. Keable, 2 March 1991.

JKL/PNG-155 about 2 km off Rasch Pass, (5°09.40'S 145°51.1'E); baited trap, about 500 m, fine silty clay bottom (foraminiferal ooze), J.K. Lowry, S.J. Keable and M. Jebb, 9 March 1991.

JKL/PNG-156 just off the southern tip of Tab (Pig Island) (5°10.31'S 145°50.32'E); (2000–2130), night light sample from the *Frohm*, J.K. Lowry, S.J. Keable and M. Jebb, 10 March 1991.

JKL/PNG-157 just off the southern tip of Tab (Pig Island) (5°10.31'S 145°50.32'E); (2000–2130), night light sample from the *Frohm*, J.K. Lowry, S.J. Keable and M. Jebb, 10 March 1991.

JKL/PNG-158 just off the southern tip of Tab (Pig Island) (5°10.31'S 145°50.32'E); (2000–2130), night light sample over the reef from the *Frohm*, J.K. Lowry, S.J. Keable and M. Jebb, 10 March 1991.

JKL/PNG-159 just off the southern tip of Tab (Pig Island) (5°10.31'S 145°50.32'E); (2000–2130), night light sample from the *Frohm*, J.K. Lowry, S.J. Keable and M. Jebb, 10 March 1991.

JKL/PNG-160 just off the southern tip of Tab (Pig Island) to about 1 km offshore (5°10.31'S 145°50.32'E); (2000–2130), 3 plankton samples, 1/3, 2/3, 3/3, from the *Frohm*, J.K. Lowry, S.J. Keable and M. Jebb, 10 March 1991.

JKL/PNG-161 Mizegwadan (Tripod) reef, (5°09.57'S 145° 49.36'E), coarse sand and loose rubble, baited trap 1, 3 m, J.K. Lowry & S.J. Keable, 2–3 March 1991.

JKL/PNG-162 Mizegwadan (Tripod) reef, (5°09.57'S 145° 49.36'E), thick rubble and *Halimeda*, baited trap 2, 3 m, J.K. Lowry & S.J. Keable, 2–3 March 1991.

JKL/PNG-163 Mizegwadan (Tripod) reef, (5°09.57'S 145° 49.36'E), *Acropora* and loose rubble, baited trap 3, 4 m, J.K. Lowry & S.J. Keable, 2–3 March 1991.

JKL/PNG-164 Mizegwadan (Tripod) reef, (5°09.57'S 145° 49.36'E), coarse sand near *Acropora* and large garden of probably *Montipora aequituberculata*, baited trap 4, 9 m, J.K. Lowry & S.J. Keable, 2–3 March 1991.

JKL/PNG-165 Mizegwadan (Tripod) reef, (5°09.57'S 145° 49.36'E), soft corals and encrusting *Montipora*, baited trap 5, 14 m, J.K. Lowry & S.J. Keable, 2–3 March 1991.

JKL/PNG-166 Mizegwadan (Tripod) reef, (5°09.57'S 145° 49.36'E), soft corals and encrusting *Montipora*, baited trap 6, 18 m, J.K. Lowry & S.J. Keable, 2–3 March 1991.

JKL/PNG-167 Mizegwadan (Tripod) reef, (5°09.57'S 145° 49.36'E), sandy bottom near many small coral outcrops of encrusting *Montipora* and some large sponges, baited trap 7, 23 m, J.K. Lowry & S.J. Keable, 2–3 March 1991.

JKL/PNG-168 Mizegwadan (Tripod) reef, (5°09.57'S 145° 49.36'E), sandy bottom near many small coral outcrops of encrusting *Montipora* and *Seriatopora hystrix*, baited trap 8, 26 m, J.K. Lowry & S.J. Keable, 2–3 March 1991.

JKL/PNG-169 Mizegwadan (Tripod) reef, (5°09.57'S 145° 49.36'E), sandy bottom near many small coral outcrops of encrusting *Montipora*, baited trap 9, 28 m, J.K. Lowry & S.J. Keable, 2–3 March 1991. Trap damaged.

JKL/PNG-170 Mizegwadan (Tripod) reef, (5°09.57'S 145° 49.36'E), thin muddy bottom near many small coral outcrops of encrusting *Montipora*, baited trap 10, 29 m, J.K. Lowry & S.J. Keable, 2–3 March 1991.

JKL/PNG-171 Mizegwadan (Tripod) reef towards northern tip of Paeowai (5°09.57'S 145°49.36'E), sandy mud bottom at foot of reef, baited trap 1, 30 m, J.K. Lowry & S.J. Keable, 5–6 March 1991. (Sediment sample).

JKL/PNG-172 Mizegwadan (Tripod) reef towards northern tip of Paeowai (5°09.57'S 145°49.36'E), sandy mud bottom right at edge of reef, muddy coral outcrops, baited trap 2, 31 m, J.K. Lowry & S.J. Keable, 5–6 March 1991.

JKL/PNG-173 Mizegwadan (Tripod) reef towards northern tip of Paeowai (5°09.57'S 145°49.36'E), muddy bottom, many burrows, a burrowing holothurian, baited trap 3, 34 m, J.K. Lowry & S.J. Keable, 5–6 March 1991.

JKL/PNG-174 Mizegwadan (Tripod) reef towards northern tip of Paeowai (5°09.57'S 145°49.36'E), muddy bottom, many burrows, baited trap 4, 34 m, J.K. Lowry & S.J. Keable, 5–6 March 1991.

JKL/PNG-175 Mizegwadan (Tripod) reef towards northern tip of Paeowai (5°09.57'S 145°49.36'E), muddy bottom, many burrows, baited trap 5, 34 m, J.K. Lowry & S.J. Keable, 5–6 March 1991.

JKL/PNG-176 Mizegwadan (Tripod) reef towards northern tip of Paeowai (5°09.57'S 145°49.36'E), muddy bottom, many burrows, baited trap 6, 34 m, J.K. Lowry & S.J. Keable, 5–6 March 1991.

JKL/PNG-177 Mizegwadan (Tripod) reef towards northern tip of Paeowai (5°09.57'S 145°49.36'E), muddy bottom, many burrows, baited trap 7, 34 m, J.K. Lowry & S.J. Keable, 5–6 March 1991.

JKL/PNG-178 Mizegwadan (Tripod) reef towards northern tip of Paeowai (5°09.57'S 145°49.36'E), muddy bottom, many burrows, baited trap 8, 34 m, J.K. Lowry & S.J. Keable, 5–6 March 1991.

JKL/PNG-179 Mizegwadan (Tripod) reef towards northern tip of Paeowai (5°09.57'S 145°49.36'E), muddy bottom, many burrows, baited trap 9, 34 m, J.K. Lowry & S.J. Keable, 5–6 March 1991.

JKL/PNG-180 Mizegwadan (Tripod) reef towards northern tip of Paeowai (5°09.57'S 145°49.36'E), muddy bottom, many burrows, baited trap 10, 34 m, J.K. Lowry & S.J. Keable, 5–6 March 1991. (sediment sample).

JKL/PNG-181 just off the southern tip of Tab (Pig Island) (5°10.31'S 145°50.32'E); (2000–2130), night light sample from the *Frohm*, J.K. Lowry, S.J. Keable and M. Jebb, 10 March 1991.

JKL/PNG-182 channel between the outer barrier and Wongad (5°08.10'S 145°49.40'E), human dredge, sandy mud, 30 m, J.K. Lowry, and S.J. Keable, 13 March 1991.

JKL/PNG-183 slope off back of outer barrier directly east of Wongad (5°07.98'S 145°49.51'E), loose rubble with *Padina* and a fine bushy red, 20 m, J.K. Lowry, and S.J. Keable, 13 March 1991.

JKL/PNG-184 slope off back of outer barrier directly east of Wongad (5°07.98'S 145°49.51'E), loose rubble with *Padina* and a fine bushy red, 9 m, J.K. Lowry, and S.J. Keable, 13 March 1991.

JKL/PNG-185 top of outer barrier directly east of Wongad (5°07.98'S 145°49.51'E), *Halimeda*, 6 m, J.K. Lowry, and S.J. Keable, 13 March 1991.

JKL/PNG-186 top of outer barrier directly east of Wongad (5°07.98'S 145°49.51'E), compound ascidian *Lysielinum patella*, 6 m, J.K. Lowry, and S.J. Keable, 13 March 1991.

JKL/PNG-187 beach at Wongad (5°08.13'S 145°49.27'E); intertidal sand and rock, baited trap sample, S.J. Keable, 13–14 March 1991.

JKL/PNG-188 beach at Tabat (5°08.24'S 145°48.71'E); intertidal sand and rock, baited trap sample, S.J. Keable, 13–14 March 1991.

JKL/PNG-189 small beach opposite Jais Aben Resort, (5°09.70'S 145°48.20'E); *Enhalus* beds and small patch reef, baited trap sample, S.J. Keable, 13–14 March 1991.

JKL/PNG-190 small beach opposite Jais Aben Resort, (5°09.70'S 145°48.20'E); *Enhalus* beds and small patch reef, baited trap sample, S.J. Keable, 13–14 March 1991.

JKL/PNG-191 near outer edge of the outer barrier directly east of Wongad (5°07.98'S 145°49.51'E), dense *Acropora* plates, baited trap 1, 4 m, J.K. Lowry & S.J. Keable, 11–12 March 1991.

JKL/PNG-192 top of outer barrier directly east of Wongad (5°07.98'S 145°49.51'E), mostly living hard coral and patches of *Halimeda*, baited trap 2, 4 m, J.K. Lowry & S.J. Keable, 11–12 March 1991.

JKL/PNG-193 top of outer barrier directly east of Wongad (5°07.98'S 145°49.51'E), in a shallow depression of unconsolidated rubble, living coral within 2 m, baited trap 3, 4 m, J.K. Lowry & S.J. Keable, 11–12 March 1991.

JKL/PNG-194 top of outer barrier directly east of Wongad (5°07.98'S 145°49.51'E), baited trap hanging from coral outcrop on edge of shallow gully of rubble (probably a lot of baited trap movement) baited trap 4, 3.5 m, J.K. Lowry & S.J. Keable, 11–12 March 1991.

JKL/PNG-195 top of outer barrier directly east of Wongad (5°07.98'S 145°49.51'E), about half living hard coral and half unconsolidated rubble, baited trap 5, 3 m, J.K. Lowry & S.J. Keable, 11–12 March 1991.

JKL/PNG-196 top of outer barrier directly east of Wongad (5°07.98'S 145°49.51'E), about half living hard coral and half unconsolidated rubble, baited trap 6, 3 m, J.K. Lowry & S.J. Keable, 11–12 March 1991.

JKL/PNG-197 top of outer barrier directly east of Wongad (5°07.98'S 145°49.51'E), more than half living hard coral, mostly *Acropora* plates, small *Porites* (0.5 m diameter), blue *Linckia*, patches of *Halimeda*, a lot of *Didemnum molle*, unconsolidated rubble, baited trap 7, 3.5 m, J.K. Lowry & S.J. Keable, 11–12 March 1991.

JKL/PNG-198 top of outer barrier directly east of Wongad (5°07.98'S 145°49.51'E), more than half living hard coral, mostly *Acropora*, patches of *Halimeda*, a lot of *Didemnum molle*, unconsolidated rubble, baited trap 8, 3.5 m, J.K. Lowry & S.J. Keable, 11–12 March 1991.

JKL/PNG-199 top of outer barrier directly east of Wongad (5°07.98'S 145°49.51'E), large pieces of unconsolidated rubble, small outcrops of living hard coral, mostly plate *Acropora*, some clumps of *Halimeda*, baited trap 9, 3.5 m, J.K. Lowry & S.J. Keable, 11–12 March 1991.

JKL/PNG-200 top of outer barrier directly east of Wongad (5°07.98'S 145°49.51'E), large pieces of unconsolidated rubble, many crinoids, baited trap 10, 3.5 m, J.K. Lowry & S.J. Keable, 11–12 March 1991.

JKL/PNG-201 top of outer barrier near back edge, directly east of Wongad (5°07.98'S 145°49.51'E), patchy hard and soft corals, about 50% cover, large pieces of unconsolidated rubble, *Halimeda* flake sediment, baited trap 1, 6 m, J.K. Lowry & S.J. Keable, 12–13 March 1991.

JKL/PNG-202 top of outer barrier near back edge, directly east of Wongad (5°07.98'S 145°49.51'E), patchy hard and soft corals, about 50% cover, large pieces of unconsolidated rubble, *Halimeda* flake sediment, baited trap 2, 6 m, J.K. Lowry & S.J. Keable, 12–13 March 1991.

JKL/PNG-203 top of outer barrier near edge, directly east of Wongad (5°07.98'S 145°49.51'E), small patches of hard corals, large pieces of unconsolidated rubble, *Halimeda* flake sediment, baited trap 3, 8 m, J.K. Lowry & S.J. Keable, 12–13 March 1991.

JKL/PNG-204 top of outer barrier at top of back slope, directly east of Wongad (5°07.98'S 145°49.51'E), unconsolidated rubble with *Padina* and some living *Halimeda* on *Halimeda* flake sediment, baited trap 4, 11 m, J.K. Lowry & S.J. Keable, 12–13 March 1991.

JKL/PNG-205 back slope of outer barrier, directly east of Wongad (5°07.98'S 145°49.51'E), unconsolidated rubble with *Padina* and some living *Halimeda* on *Halimeda* flake sediment, baited trap 5, 15 m, J.K. Lowry & S.J. Keable, 12–13 March 1991. sediment sample.

JKL/PNG-206 back slope of outer barrier, directly east of Wongad (5°07.98'S 145°49.51'E), some rubble with living *Halimeda* on *Halimeda* flake sediment, baited trap 6, 20 m, J.K. Lowry & S.J. Keable, 12–13 March 1991.

JKL/PNG-207 back slope of outer barrier, directly east of Wongad (5°07.98'S 145°49.51'E), pure thick *Halimeda* flake sediment, baited trap 7, 24 m, J.K. Lowry & S.J. Keable, 12–13 March 1991.

JKL/PNG-208 back slope of outer barrier, directly east of Wongad (5°07.98'S 145°49.51'E), *Halimeda* flake sediment at bottom of slope, very large sponges, baited trap 8, 27 m, J.K. Lowry & S.J. Keable, 12–13 March 1991.

JKL/PNG-209 channel bottom directly between Wongad and the outer barrier towards Bagabag (5°07.98'S 145°49.51'E), some *Halimeda* flakes on sandy mud bottom with detritus layer, baited trap 9, 29 m, J.K. Lowry & S.J. Keable, 12–13 March 1991.

JKL/PNG-210 channel bottom directly between Wongad and the outer barrier towards Bagabag (5°07.98'S 145°49.51'E), some *Halimeda* flakes on sandy mud bottom with detritus layer, baited trap 10, 29 m, J.K. Lowry & S.J. Keable, 12–13 March 1991. Sediment sample.

JKL/PNG-211 among *Halophila ovalis*, 1 m CRI jetty (5°08.90'S 145°47.45'E); 14 March 1991, A. Myers.

JKL/PNG-212 Planet Rock, Astrolabe Bay (5°15.48'S 145°49.14'E); dead *Acropora* plates with epiphytes about 10 m, M. Jebb, 15 March 1991.

JKL/PNG-213 Planet Rock, Astrolabe Bay (5°15.48'S 145°49.14'E), dead *Acropora* plates with epiphytes about 6 m, J.K. Lowry & S.J. Keable, 16 March 1991.

JKL/PNG-221 1 km transect east from Planet Rock, Astrolabe Bay (5°15.48'S 145°49.14'E), baited trap 1 on *Montipora* bottom, 12 m, J.K. Lowry & S.J. Keable, 15–16 March 1991.

JKL/PNG-222 1 km transect east from Planet Rock, Astrolabe Bay (5°15.48'S 145°49.14'E), baited trap 2 on *Montipora* bottom, c. 23 m, J.K. Lowry & S.J. Keable, 15–16 March 1991.

JKL/PNG-223 1 km transect east from Planet Rock, Astrolabe Bay (5°15.48'S 145°49.14'E), baited trap 3 on *Montipora* bottom, c. 34 m, J.K. Lowry & S.J. Keable, 15–16 March 1991.

JKL/PNG-224 1 km transect east from Planet Rock, Astrolabe Bay (5°15.48'S 145°49.14'E), baited trap 5, over the edge, <65 m, J.K. Lowry & S.J. Keable, 15–16 March 1991.

JKL/PNG-225 1 km transect east from Planet Rock, Astrolabe Bay (5°15.48'S 145°49.14'E), baited trap 6 unknown bottom, <85 m, J.K. Lowry & S.J. Keable, 15–16 March 1991.

JKL/PNG-226 1 km transect east from Planet Rock, Astrolabe Bay (5°15.48'S 145°49.14'E), baited trap 8, unknown bottom, <205 m, J.K. Lowry & S.J. Keable, 15–16 March 1991.

JKL/PNG-227 1 km transect east from Planet Rock, Astrolabe Bay (5°15.48'S 145°49.14'E), baited trap 9 unknown bottom, <265 m, J.K. Lowry & S.J. Keable, 15–16 March 1991.

JKL/PNG-228 1 km transect east from Planet Rock, Astrolabe Bay (5°15.48'S 145°49.14'E), baited trap 10 on unknown bottom, <325 m, J.K. Lowry & S.J. Keable, 15–16 March 1991.

JKL/PNG-229 1 km transect east from Planet Rock, Astrolabe Bay (5°15.48'S 145°49.14'E), baited trap 11 on unknown bottom, <385 m, J.K. Lowry & S.J. Keable, 15–16 March 1991.

JKL/PNG-230 1 km transect east from Planet Rock, Astrolabe Bay (5°15.48'S 145°49.14'E), baited trap 12 on silty mud bottom, <445 m, J.K. Lowry & S.J. Keable, 15–16 March 1991.

JKL/PNG-231 1 km transect east from Planet Rock, Astrolabe Bay (5°15.48'S 145°49.14'E), baited trap 13 on silty mud bottom, about 500 m, J.K. Lowry & S.J. Keable, 15–16 March 1991.

JKL/PNG-232 1 km transect east from Planet Rock, Astrolabe Bay (5°15.48'S 145°49.14'E), baited trap 15 on silty mud bottom, about 500 m, J.K. Lowry & S.J. Keable, 15–16 March 1991.

JKL/PNG-233 1 km transect east from Planet Rock, Astrolabe Bay (5°15.48'S 145°49.14'E), baited trap 16 on silty mud bottom, about 500 m, J.K. Lowry & S.J. Keable, 15–16 March 1991.

JKL/PNG-234 1 km transect east from Planet Rock, Astrolabe Bay (5°15.48'S 145°49.14'E), baited trap 17 on silty mud bottom, about 500 m, J.K. Lowry & S.J. Keable, 15–16 March 1991.

JKL/PNG-235 1 km transect east from Planet Rock, Astrolabe Bay (5°15.48'S 145°49.14'E), baited trap 18 on silty mud bottom, about 500 m, J.K. Lowry & S.J. Keable, 15–16 March 1991.

JKL/PNG-236 1 km transect east from Planet Rock, Astrolabe Bay (5°15.48'S 145°49.14'E), baited trap 19 on silty mud bottom, about 500 m, J.K. Lowry & S.J. Keable, 15–16 March 1991.

JKL/PNG-237 1 km transect east from Planet Rock, Astrolabe Bay (5°15.48'S 145°49.14'E), baited trap 20 on silty mud bottom, about 500 m, J.K. Lowry & S.J. Keable, 15–16 March 1991.

JKL/PNG-238 Padoz Natun reef (5°09.60'S 145°48.77'E), clumps of *Halimeda* attached to rubble held together by sponges, 2 m, J.K. Lowry & S.J. Keable, 17–18 March 1991.

JKL/PNG-239 Padoz Natun reef (5°09.60'S 145°48.77'E), anastomosing red alga forming mats on bottom, 2 m, J.K. Lowry & S.J. Keable, 17–18 March 1991.

JKL/PNG-240 Padoz Natun reef (5°09.60'S 145°48.77'E), coral rubble from top of reef, 1.5 to 2 m, J.K. Lowry & S.J. Keable, 17–18 March 1991.

JKL/PNG-241 transect between Padoz Natun reef toward the north end of Paeowai (5°09.60'S 145°48.77'E), baited trap 1 on hard rubble with *Porites* and *Acropora* plates near small sand patch (3 m diameter), 1.5 m, J.K. Lowry & S.J. Keable, 17–18 March 1991.

JKL/PNG-242 transect between Padoz Natun reef and the north end of Paeowai (5°09.60'S 145°48.77'E), baited trap 2 on hard rubble near *Acropora* plates, 1.5 m, J.K. Lowry & S.J. Keable, 17–18 March 1991.

JKL/PNG-243 transect between Padoz Natun reef and the north end of Paeowai (5°09.60'S 145°48.77'E), baited trap 3 sitting on large soft coral plate near *Porites* and *Acropora* plates, 1.5 m, J.K. Lowry & S.J. Keable, 17–18 March 1991.

JKL/PNG-244 transect between Padoz Natun reef and the north end of Paeowai (5°09.60'S 145°48.77'E), baited trap 4 sitting in a rubble depression near large soft coral plates and *Acropora* plates, 2 m, J.K. Lowry & S.J. Keable, 17–18 March 1991.

JKL/PNG-245 transect between Padoz Natun reef and the north end of Paeowai (5°09.60'S 145°48.77'E), baited trap 5 sitting among *Porites* and *Acropora* plates, 2 m, J.K. Lowry & S.J. Keable, 17–18 March 1991.

JKL/PNG-246 transect between Padoz Natun reef and the north end of Paeowai (5°09.60'S 145°48.77'E), baited trap 6 sitting among *Acropora* plates, some soft corals, 3 m, J.K. Lowry & S.J. Keable, 17–18 March 1991.

JKL/PNG-247 transect between Padoz Natun reef and the north end of Paeowai (5°09.60'S 145°48.77'E), baited trap 7 sitting among *Acropora* plates, *Stylophora, Turbinaria* an agariciid, probably *Pavona minuta* and some soft corals, 10 m, J.K. Lowry & S.J. Keable, 17–18 March 1991.

JKL/PNG-248 transect between Padoz Natun reef and the north end of Paeowai (5°09.60'S 145°48.77'E), baited trap 8 sitting among solid soft coral cover, over thin sediment and *Millepora* crust, 12 m, J.K. Lowry & S.J. Keable, 17–18 March 1991.

JKL/PNG-249 transect between Padoz Natun reef and the north end of Paeowai (5°09.60'S 145°48.77'E), baited trap 9 sitting on edge of coral outcrop among sea fans, soft corals and a rubble bottom, 16 m, J.K. Lowry & S.J. Keable, 17–18 March 1991.

JKL/PNG-250 transect between Padoz Natun reef and the north end of Paeowai (5°09.60'S 145°48.77'E), baited trap 10, a lot of sea fans, soft corals and a sand/ rubble bottom, 20 m, J.K. Lowry & S.J. Keable, 17–18 March 1991.

JKL/PNG-251 transect between Padoz Natun reef and the north end of Paeowai (5°09.60'S 145°49.77'E), baited trap 11, sitting on large coral outcrop between two large sea fans (one at least 2 m across), about 26 m, J.K. Lowry & S.J. Keable, 17–18 March 1991.

JKL/PNG-252 transect between Padoz Natun reef and the north end of Paeowai (5°09.60'S 145°49.77'E), baited trap 12, sitting on sandy mud sloping bottom near edge of reef, 32 m, J.K. Lowry & S.J. Keable, 17–18 March 1991. Sediment sample.

JKL/PNG-253 transect between Padoz Natun reef and the north end of Paeowai (5°09.60'S 145°49.77'E), baited trap 13, sitting soft mud with small cones, many burrows and what looks like *Ampelisca* tubes on the surface, 35 m, J.K. Lowry & S.J. Keable, 17–18 March 1991.

JKL/PNG-254 transect between Padoz Natun reef and the north end of Paeowai (5°09.60'S 145°49.77'E), baited trap 14, sitting on soft mud with small cones, many burrows and what looks like *Ampelisca* tubes on the surface, 35 m, J.K. Lowry & S.J. Keable, 17–18 March 1991.

JKL/PNG-255 transect between Padoz Natun reef and the north end of Paeowai (5°09.60'S 145°49.77'E), baited trap 15, sitting soft mud with small cones, many burrows and what looks like *Ampelisca* tubes on the surface, 35 m, J.K. Lowry & S.J. Keable, 17–18 March 1991.

JKL/PNG-256 transect between Padoz Natun reef and the north end of Paeowai (5°09.60'S 145°49.77'E), baited trap 16, sitting soft mud with small cones, many burrows and what looks like *Ampelisca* tubes on the surface, 35 m, J.K. Lowry & S.J. Keable, 17–18 March 1991. Sediment sample.

JKL/PNG-257 off the front face of Padoz Natun reef towards Paeowai (5°09.60'S 145°49.77'E), diver dredge at 40 m on soft mud bottom with small cones, many burrows and *Ampelisca* tubes on the surface, 35 m, J.K. Lowry & S.J. Keable, 17–18 March 1991.

JKL/PNG-258 Awan Biziwan, (5°11.06'S 145°49.70'E), channel at bottom of reef face, rubble, 27 m, J.K. Lowry & S.J. Keable, 19 March 1991.

JKL/PNG-259 Awan Biziwan, (5°11.06'S 145°49.70'E), rubble at top of reef, 3–10 m, M. Jebb, 19 March 1991.

JKL/PNG-260 Awan Biziwan, (5°11.06'S 145°49.70'E), mat of sand tubes at base of reef, 27 m, J.K. Lowry & S.J. Keable, 19 March 1991.

JKL/PNG-261 small rubble beach just across from CRI, (5°09.53'S 145°48.00'E), *Halophila ovalis* beds on sandy bottom in less than 1 m, J.K. Lowry & S.J. Keable, 20 March 1991.

JKL/PNG-262 upper reaches of Nagada Harbour, Madang Lagoon, (5°09.53'S 145°48.00'E), sphaeromatid isopods burrowing tips of the aerial roots of the mangrove tree *Rhizophora stylophora*, M. Jebb, J.K. Lowry & S.J. Keable, 23 March 1991.

JKL/PNG-263 reef top near Dam Awan (Rasch Pass) (5°09.27'S 145°49.86'E), overturned *Acropora* plates, small white vase sponges contained 3 species of leucothoid amphipod, 3 m, M. Jebb & J.K. Lowry, 16 January 1993.

JKL/PNG-264 outside the reef near Dam Awan (Rasch Pass) (about 5°09.27'S 145°49.86'E), crabs from floating mats of seaweed, flotsam (coconuts, wood, etc.) and a one-celled green alga, G. Allen, G. Lowry & J.K. Lowry, 17 January 1993.

JKL/PNG-265 outer reef face near Dam Awan (Rasch Pass) (about 5°09.27'S 145°49.86'E), shrimps and lobsters from rotenone station on mainly coral plate covered bottom, 10 to 20 m, G. Allen & J.K. Lowry, 17 January 1993.

JKL/PNG-266 Planet Rock, Astrolabe Bay (5°15.48'S 145°49.14'E), large pieces of coral rubble, 20 to 25 m, M. Jebb, 18 January 1993.

JKL/PNG-267 Planet Rock, Astrolabe Bay (5°15.48'S 145°49.14'E), crab from a giant neon pink anemone, 20 m, J.K. Lowry, 18 January 1993.

JKL/PNG-268 dredge sample (pipe dredge) just south of Padoz Natun reef (about 5°09.60'S 145°48.77'E), 30 m, M. Jebb, J. Mizeu and J.K. Lowry.

JKL/PNG-269 sand sample at The Quarry (*4°46.50'S 145°48'E), M. Jebb, 27 January 1993.

JKL/PNG-270 rubble sample at The Quarry (*4°46.50'S 145°48'E), M. Jebb, 27 January 1993.

JKL/PNG-271 face of outer barrier between Tab and Dam Awan (Rasch Pass), Rotenone station, 9–12 m, G. Allen & R. Steene, 28 Jan 1993.

JKL/PNG-272 Padoz Natun reef (5°09.60'S 145°48.77'E), clumps of *Halimeda* and epiphytic algae attached to rubble held together by sponges, 8 m, D. Gochfeld, 15 December 1993.

JKL/PNG-273 Padoz Natun reef (5°09.60'S 145°48.77'E), clumps of *Halimeda* and epiphytic algae attached to rubble held together by sponges, 8 m, D. Gochfeld, 2 January 1994.

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The Amphipoda (Crustacea) of Madang Lagoon: Aoridae, Isaeidae, Ischyroceridae and Neomegamphopidae *

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ABSTRACT. In this first comprehensive study of corophioid amphipods from the north coast of Papua New Guinea 38 species in 20 genera and four families are reported. In the Aoridae ten species in four genera are recorded, of which three, *Aoroides vitiosus* n.sp., *Bemlos pugiosus* n.sp. and *Grandidierella nagadae* n.sp. are new to science. In the Isaeidae 20 species in nine genera are recorded. Four genera, *Falcigammaropsis* n.gen., *Gammaropsella* n.gen., *Papuaphotis* n.gen. and *Paraloiloi* n.gen. and thirteen species, *Cheiriphotis pediformis* n.sp., *Chevalia pacifica* n.sp., *Falcigammaropsis excavata* n.sp., *Gammaropsella simplex* n.sp., *G. pilosa* n.sp., *Gammaropsis christenseni* n.sp., *G. gemina* n.sp., *G. lacinia* n.sp., *G. planodentata* n.sp., *G. siara* n.sp., *Papuaphotis regis* n.sp., *Paraloiloi vaga* n.sp. and *Photis paeowai* n.sp. are new to science. Six genera and seven species of Ischyroceridae are recorded. Of which, one genus, *Scutischyrocerus* n.gen. and three species, *Ischyrocerus parma* n.sp., *I. mediodens* n.sp. and *Scutischyrocerus scutatus* n.sp., are new to science. One species, *Parajassa spinipalma* Ledoyer, 1979b, is recorded for the first time from the western Pacific. A new genus and species of the family Neomegamphopidae, *Riwomegamphopus bamus* n.gen. and n.sp., is described.

MYERS, A.A., 1995. The Amphipoda (Crustacea) of Madang Lagoon: Aoridae, Isaeidae, Ischyroceridae and Neomegamphopidae. **In** J.K. Lowry (ed.). The Amphipoda (Crustacea) of Madang Lagoon, Papua New Guinea, Part 1. Records of the Australian Museum, Supplement 22: 25–95.

Contents

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Introduction

Collections of marine amphipods were made by the writer, J.D. Thomas, J.K. Lowry and M. Jebb, on the north coast of Papua New Guinea, Madang Province during January and February 1990 and in March and April 1991. The present paper reports on 38 species in four families of corophioid amphipods from these collections.

Ten species of Aoridae are reported, three of which are new to science. The three new species, *Aoroides vitiosus* n.sp., *Bemlos pugiosus* n.sp. and *Grandidierella nagadae* n.sp., are fully described and figured. Figures are also provided of three little known species, *Bemlos tui* (Myers, 1985c), previously known only from Western Samoa, *Bemlos bidens* Myers, 1988b, previously known only from Queensland, Australia and *Globosolembos ruffoi* (Myers, 1975), previously reported from East Africa and Queensland.

Twenty species of Isaeidae are reported from the collections, thirteen of which are new to science. The thirteen new species are fully described and figured. Figures are also provided of three established species, for comparison with new species. *Gammaropsis setifera* (Schellenberg, 1938), previously known only from Kiribati and Fiji and *Photis pirloti* Myers, 1985b previously known only from Fiji, are recorded from Papua New Guinea.

Six genera of Ischyroceridae (*Borneoecetes* Barnard & Thomas, *Ericthonius* Milne Edwards, *Ischyrocerus* Krøyer, *Parajassa* Stebbing, *Scutischyrocerus* n.gen. and *Ventojassa* Barnard) are reported. Descriptions and figures are given of three new species, *Ischyrocerus parma* n.sp., *Ischyrocerus mediodens* n.sp. and *Scutischyrocerus scutatus* n.sp., as well as figures of *Parajassa spinipalma* Ledoyer, 1979b and *Ericthonius pugnax* Dana, 1852.

The family Neomegamphopidae is represented in these samples by a single species, new to science, which is placed in a new genus, *Riwomegamphopus* n.gen. The species is described and figured herein. This is the first record of the family from the western Pacific.

Holotypes, paratypes and the majority of the collection are deposited in the collections of the Australian Museum, Sydney. All other material is in the collections of the writer, but will be donated to the Australian Museum on completion of the work in the region, by the writer.

Complete station data is published in Jebb & Lowry (1995, this volume pp. 14–24).

The following abbreviations are used in figures: **Hd**, head; **A**, antenna; **L**, labium; **Lb**, labrum; **Md**, mandible; **Mx**, maxilla; **Mxp**, maxilliped; **C**, coxa; **G**, gnathopod; **P**, pereopod; **Us**, urosome; **U**, uropod; **T**, telson.

Systematics

Corophioidea

Aoridae

Aoroides Walker

Aoroides vitiosus n.sp.

Figs 1, 2

? *Aoroides nahili* Barnard, 1970.–Ledoyer, 1979a: 149, fig. 6(II).

Type material examined. HOLOTYPE male, 2.3 mm, AM P42294; PARATYPE male, AM P42295; Kranket, Madang Lagoon, Papua New Guinea (5°11.34'S 145°49.47'E), among *Halophila ovale*, 1 m, A.A. Myers, 21 February 1990, stn AAM/PNG-1.

Additional material examined. AM P42296 to P42298 from stations: AAM/PNG-13 (2 males), AAM/PNG-15 (1 male), JKL/PNG-261 (16 males, 14 females).

Diagnosis. Body and coxae 1–5 with irregular brown markings. Male pereon segments without sternal processes. Labium outer plate distal margin with three spines. Mandible palp absent. Maxilla palp article 2 with 7 spines. Maxilliped palp articles stout. Antenna 1 over three quarters body length, peduncular articles in the ratios 4:5:3, flagellum over one and a half times length of peduncle, accessory flagellum absent. Antenna 2 a little over half length of antenna 1, peduncular articles

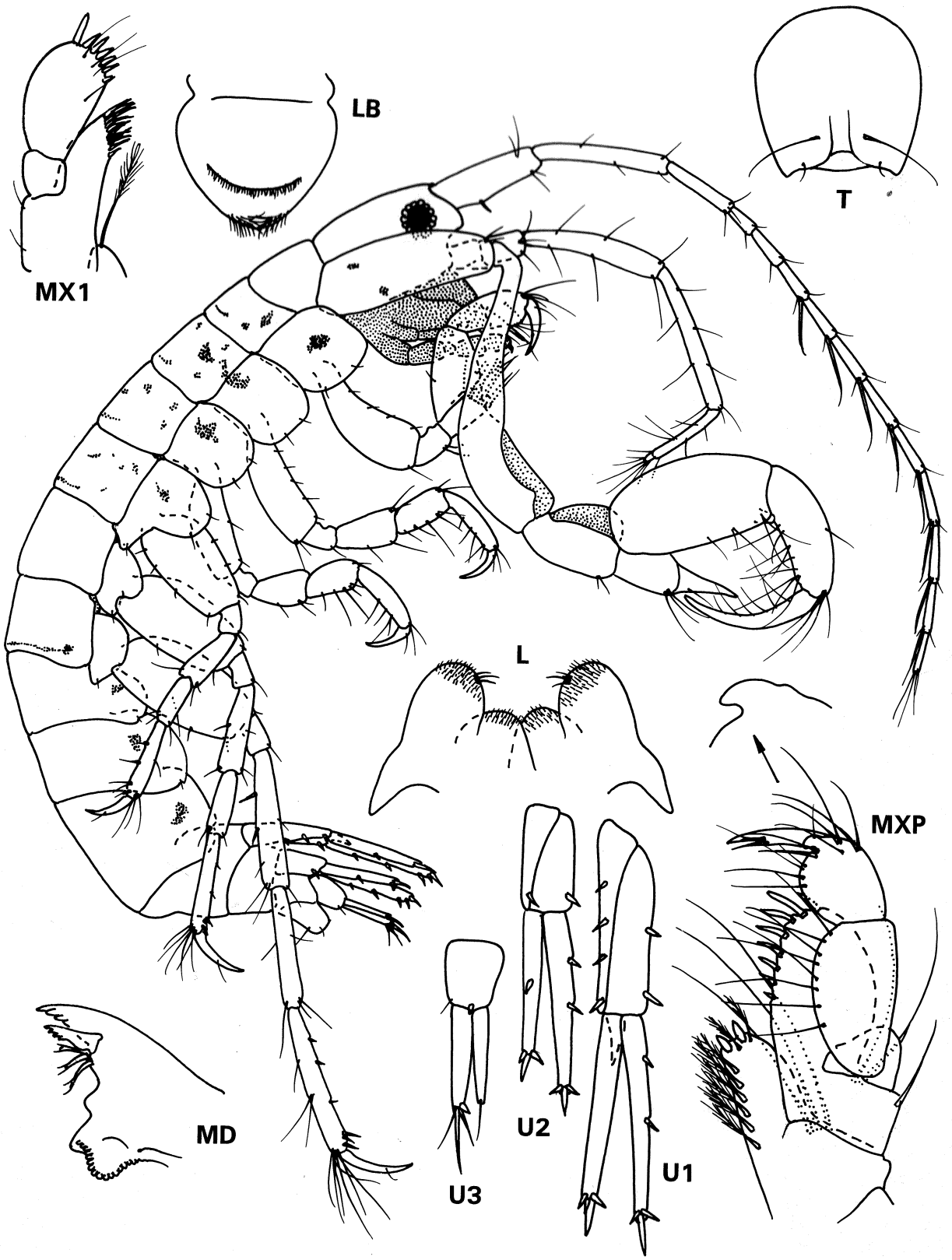

Fig. 1. *Aoroides vitiosus* n.sp., Kranket, Madang Lagoon, Papua New Guinea, AAM/PNG-1.

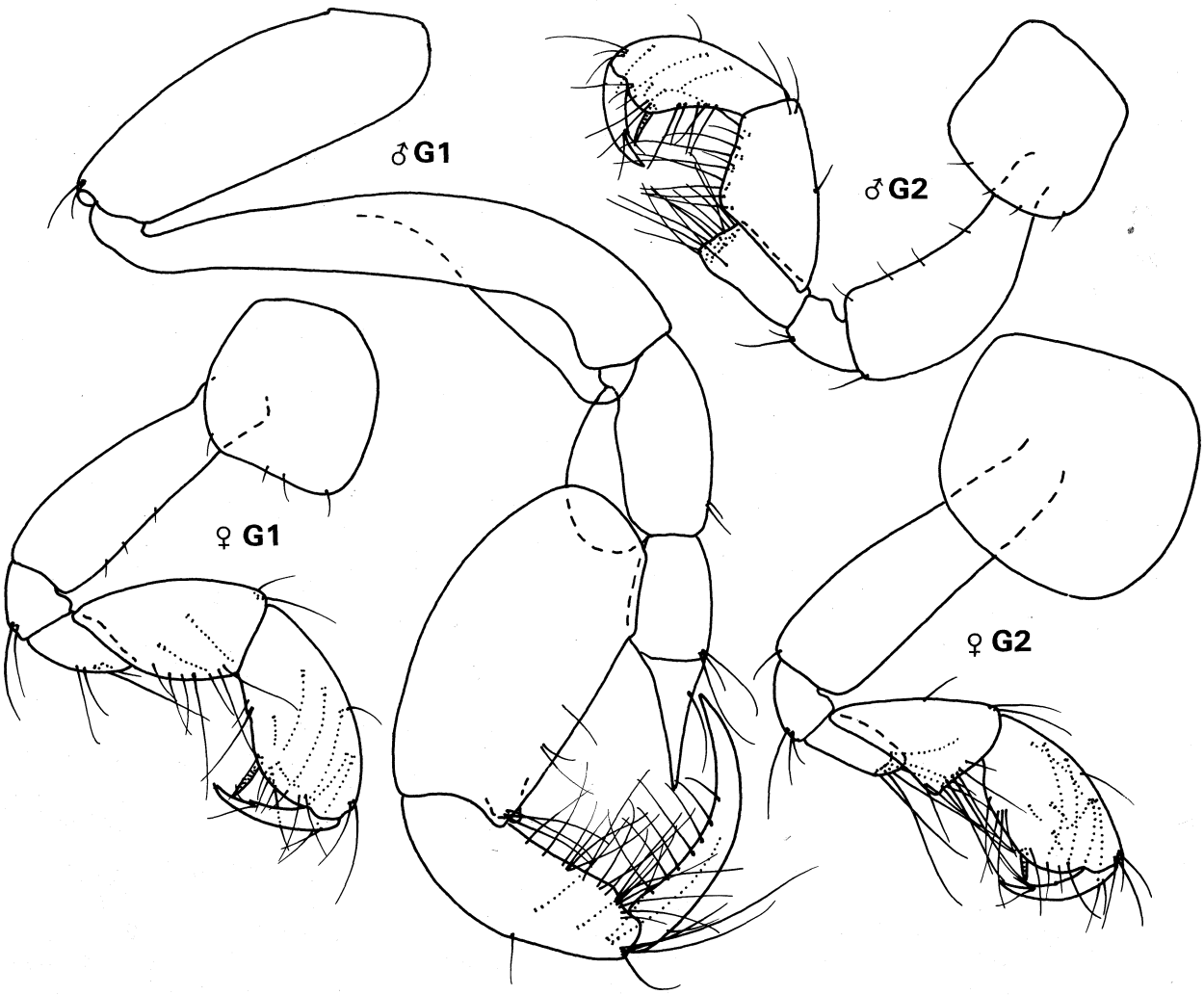

Fig. 2. *Aoroides vitiosus* n.sp., Kranket, Madang Lagoon, Papua New Guinea, AAM/PNG-1.

4 and 5 subequal, flagellum with two articles, article 1 over half length of peduncular article 5. Male gnathopod 1 greatly enlarged, coxa strongly elongated, almost three times as long as broad, basis very elongate, slender proximally, expanded distally and excavate anterodistally, ischium large with rounded anterior flange on inner face, merus with strong, acute, distal tooth, not reaching distal end of carpus, carpus subovoid, propodus over twice as long as broad but shorter than carpus, dactylus elongate, longer than propodus. Female gnathopod 1 not greatly enlarged, propodus very slightly longer than carpus, dactylus overlapping palm. Male gnathopod 2 basis anterior margin concave, posterior margin convex, merus subrectangular, anterior margin transverse, carpus subtriangular, propodus slender proximally, expanded distally, posterior margin concave, dactylus strongly overlapping palm. Female gnathopod 2 basis anterior margin substraight, posterior margin weakly convex, merus anterior margin oblique, carpus shorter than that of male, propodus subovoid, posterior margin convex, dactylus slightly overlapping palm. Pereopods 3–4 slender, dactylus a little over half length of propodus. Pereopods 5–7 slender in the length ratios 7:8:12. Epimera 1–3 each with small posterodistal tooth with a small seta inserted above it. Uropod 1 peduncle with interramal tooth about one quarter length of peduncle, inner ramus slightly longer than outer ramus, outer ramus subequal in length with peduncle. Uropod 2 peduncle lacking an interramal tooth, inner ramus distinctly longer than outer ramus and almost twice length of peduncle. Uropod 3 outer ramus the longer, more than one and a half times length of peduncle, both rami lacking marginal spines or setae. Telson with each lateral crest bearing a single long seta.

Ovigerous female with 5 eggs.

Etymology. From the Latin *vitiosus* = faulty, referring to the missing mandible palp.

Remarks. This species is similar to *Aoroides nahili* from Hawaii, but differs in a number of ways, not least the complete absence of a mandibular palp. Other differences are the greatly elongated male coxa 1 and basis, the short meral tooth of the male gnathopod 1, and the very different form of the male gnathopod 2. *Aoroides vitiosus* may be synonymous with the species described by Ledoyer (1979a) from Banda, Indonesia, under the name *A. nahili.*

The absence of a mandibular palp is unique in the genus and it might be considered sufficient for the erection of a new genus. However, the similarity of the species to *A. nahili* which has a typical *Aoroides*-form mandibular palp, suggests that the diagnosis of the genus should be modified to include species without a mandibular palp.

Habitat. Among *Halophila ovale* in shallow water.

Distribution. Known only from the type locality, Kranket, north-east of Madang, Papua New Guinea.

Bemlos Shoemaker

Bemlos aequimanus (Schellenberg)

Lembos aequimanus Schellenberg, 1938: 76, fig. 39.–Barnard, 1965: 527, fig. 26.–Barnard, 1970: 72, figs 36a–c.–Ledoyer, 1984: 31, fig. 14.–Myers, 1985c: 385, figs 246–248.
Bemlos aequimanus.–Myers, 1988a: 188.

Material examined. AM P42321 to P42324: AAM/PNG-15 (3 males 4 females), AAM/PNG-16 (2 females), JKL/PNG-238 (1 female), JKL/PNG-240 (3 males, 9 females, 3 juveniles).

Remarks. Present material agrees well with the type description and with other described Pacific material.

Habitat. Among algae and coral rubble. Unlike most *Bemlos* species, it is often found among algae and phanerogammes throughout its range.

Distribution. Hawaii, Marshall Islands, Kiribati, Tonga, Western Samoa, New Caledonia.

Bemlos waipio (Barnard)

Lembos processifer Barnard, 1965: 529, figs 28g–m (not *Bemlos processifer* [Pirlot, 1938]).
Lembos waipio Barnard, 1970: 85, figs 44, 45.–Myers, 1985c: 379, figs 242–245.
? *Lembos waipio*.–Ledoyer, 1984: 37, fig. 17B.
Bemlos waipio.–Myers, 1988a: 189.

Material examined. AM P42325 to P42331: AAM/PNG-8 (2 females), AAM/PNG-11 (11 specimens), AAM/PNG-12 (4 specimens), AAM/PNG-13 (5 males, 7 females), JDT/PNG-60 (8 males, 7 females), JKL/PNG-213 (2 males, 2 females). Author's collection: JDT/PNG-34 (1 male, 1 female).

Remarks. The present material agrees closely with the original description (Hawaii) and with material described from Vanuatu (Myers, 1985c). The material described under the name *L. waipio* by Ledoyer (1984), from New Caledonia may be referable to this species, but is too immature to assign with certainty.

Habitat. All material of this species has been collected from coral rubble, often with epiphytes and from red algae, in 1–52 m depth.

Distribution. Hawaii; Caroline Islands (Barnard, 1970, 1965); ? New Caledonia (Ledoyer, 1984); Vanuatu, (Myers, 1985c); Papua New Guinea.

Bemlos tui (Myers) **n.comb.**

Fig. 3

Lembos tui Myers, 1985c: 398, figs 255–258.

Material examined. AM P42332 to P42333: JDT/PNG-57 (6 males, 10 females), AAM/PNG-5 (7 males, 10 females).

Remarks. This species was previously known only from one male and two female specimens collected on Upolu Island, Western Samoa (Myers, 1985b). Present material is in perfect agreement with the original description, but an entire male is figured here to show the form of the disruptive patterning on the dorsum.

Habitat. *Halimeda*, coral rubble and debris.

Distribution. Western Samoa, Papua New Guinea.

Bemlos bidens Myers

Fig. 4

Bemlos bidens Myers, 1988b: 293, figs 24, 25.

Material examined. AM P42334 to P42341: AAM/PNG-13 (2 males, 3 females), JDT/PNG-24 (1 male), JDT/PNG-32 (1 male), JDT/PNG-50 (1 male), JDT/PNG-67 (12 males, 9 females), JKL/PNG-213 (20 males, 10 females), JKL/PNG-238 (1 male, 1 female, 1 juvenile), JKL/PNG-239 (3 males, 5 females), JKL/PNG-240 (10 males, 13 females).

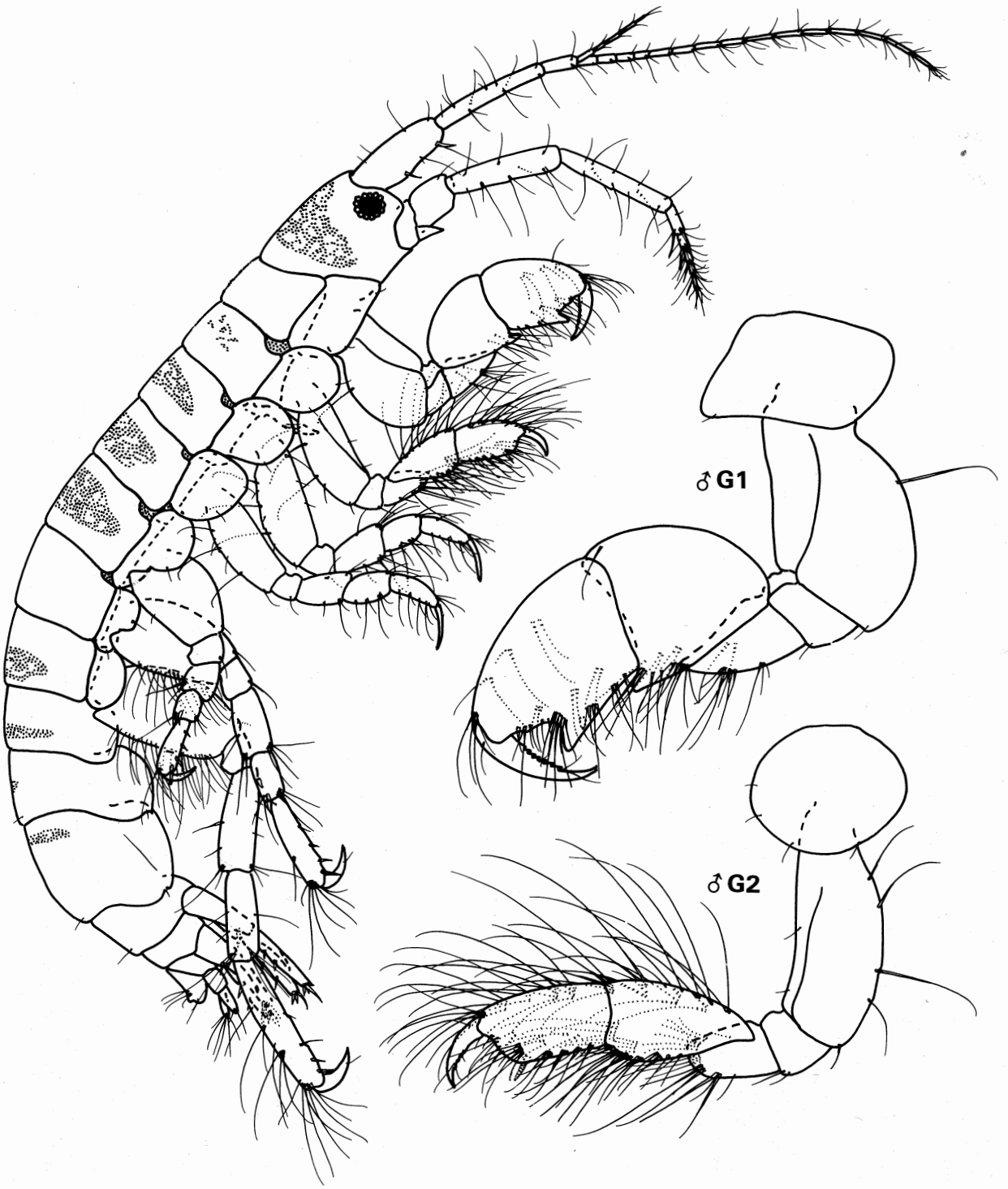

Fig. 3. *Bemlos tui* (Myers), Dam Awan (Rasch Passage), Madang Lagoon, Papua New Guinea, AAM/ PNG-5.

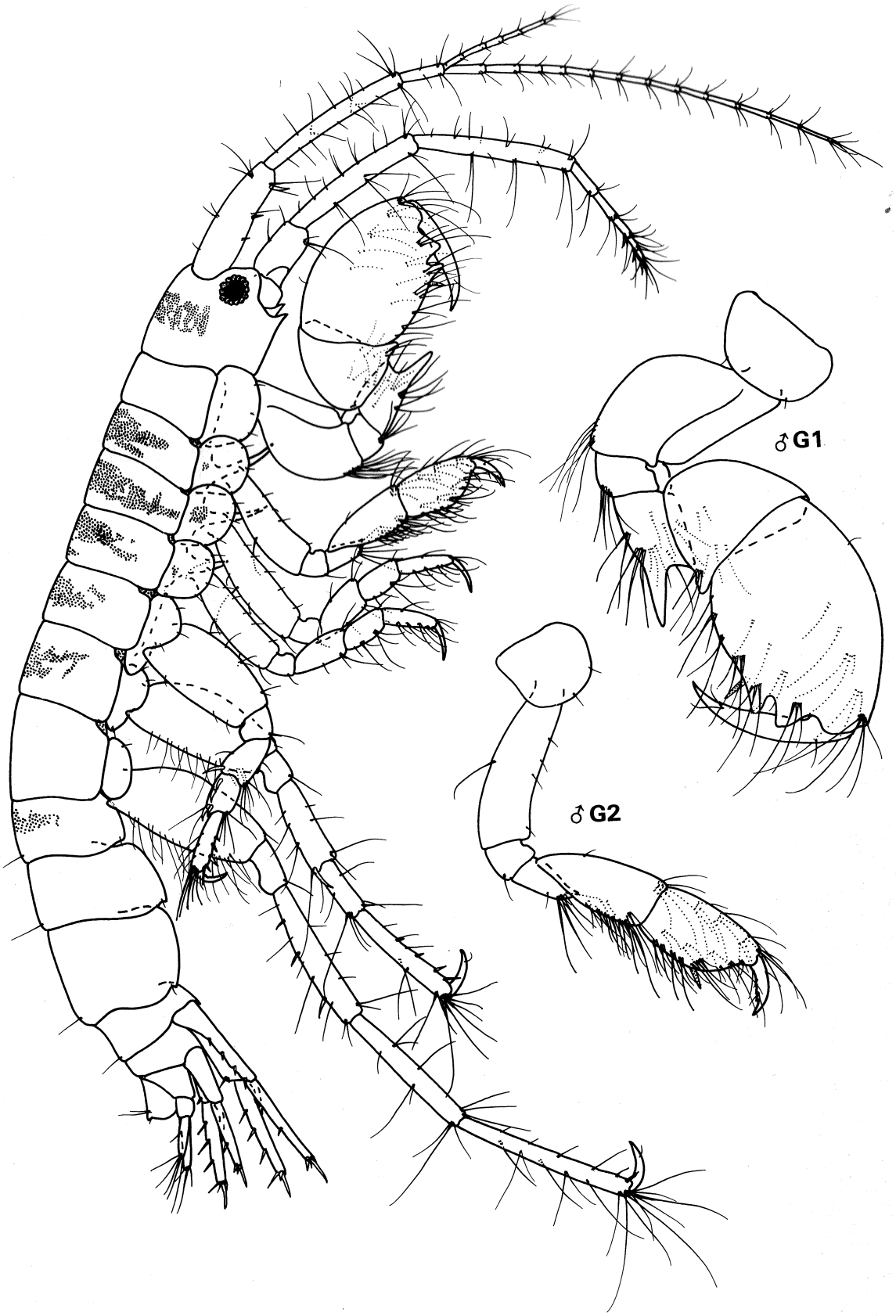

Fig. 4. *Bemlos bidens* Myers, Padoz Natun reef, Madang Lagoon, Papua New Guinea, JDT/PNG-67.

Remarks. *Bemlos bidens* was described from a single male specimen collected in Queensland. Present material differs in the form of the male gnathopod 1, in that the carpal tooth is short and blunt rather than relatively long and acute as in Queensland material and the palm is almost transverse and separated from a posterodistal tooth by a deep excavation, whereas in Queensland material, the palm is oblique and has only a rudimentary excavation. With regard to the propodus, Queensland material appears somewhat immature, however, the carpal and meral teeth are very well developed and the male specimen described was larger (3.9 mm) than Papua New Guinea material (3.8 mm). In other respects there appear to be no significant differences between the two populations and until further material is available from Queensland for comparison it would seem sensible to allocate present material to *B. bidens.*

Habitat: Coral rubble, 1–50 m depth.

Distribution: Queensland, Australia; north coast of Papua New Guinea.

Bemlos pugiosus n.sp.

Figs 5, 6

Type material. HOLOTYPE male, 2.5 mm, AM P42342; PARATYPES, 1 male, 1 female, AM P42343; barrier reef near Wongad (5°08.11'S 145°49.53'E), rubble, encrusted dead *Acropora* plates, also some pieces from caves and overhangs, 36 m and 21 m, J.D. Thomas, 22 February 1990, stn JDT/PNG-59.

Other material examined. AM P42344 to P42347: JDT/PNG-57 (2 males), JKL/PNG-204 (4 specimens), JKL/PNG-259 (13 males, 16 females), JKL/PNG-260 (5 males). Author's collection: JDT/PNG-37 (1 male), JKL/PNG-183 (1 male, 1 female), JKL/PNG-184 (2 males, 3 females, 1 juvenile).

Diagnosis. Eye large. Pereon segments 2–4 and 5 with weak dorsal pigmentation. Male pereon segments lacking sternal processes. Labium outer plate distal margin with 8 spines. Maxilla 1 palp with 7 distal spines. Mandible palp articles in the basi-distal ratios, 3:5:8, article 3 posterior margin straight, with about 7 long setae and a comb row of short setae. Maxilliped palp with dactylus much less than half length of propodus. Antenna 1 three quarters body length, peduncular articles in the basi-distal ratios, 7:11:3, primary flagellum one and a half times length of peduncle with 17–18 articles, accessory flagellum with 5 articles, the terminal article rudimentary. Antenna 2 two thirds length of antenna 1, peduncular articles 4 and 5 subequal, flagellum a little shorter than peduncular article 5, with 7 articles. Male gnathopod 1 coxa subrectangular, anteriorly rounded, basis stout, anterior margin straight, merus strong, carpus cup-shaped less than half length of propodus, posterior distal margin with a cluster of long setae, propodus weakly setiferous, anterior margin strongly convex, palm short, convex, separated from a long, acute posterodistal tooth by a deep triangular excavation, posterior margin almost straight, dactylus stout, not strongly falcate, posterior margin weakly toothed. Female gnathopod 1 slender, propodus longer than carpus, broader distally, palm oblique, evenly convex, dactylus overlapping palm. Male gnathopod 2 basis anterior margin markedly concave, posterior margin convex, carpus and propodus slender, carpus the longer, anterior margins of carpus and propodus weakly setiferous, dactylus fitting oblique palm. Female gnathopod 2 basis anterior margin straight, carpus and propodus subequal. Pereopods 3 and 4 slender, dactylus a little over half length of propodus. Pereopods 5–7 in the length ratios 4:6:9. Epimeron 1 rounded, epimera 2–3 each with small posterodistal tooth above which is inserted a seta. Uropod 1 peduncle with interramal tooth less than half length of peduncle, rami subequal, longer than peduncle. Uropod 2 peduncle with interramal tooth three quarters length of peduncle, inner ramus longer than outer and one and a half times length of peduncle. Uropod 3 inner ramus the longer and twice length of peduncle. Telson with each lateral crest bearing a pair of long setae.

Etymology. From the latin *pugio* = dagger, referring to the dagger-like tooth on the propodus of the male gnathopod 1.

Remarks. In the form of the male gnathopod 1 this species resembles *Bemlos podoceroides* (Walker, 1904) but differs in the rounded coxa 1 and *Bemlos spinicarpus inermis* (Myers, 1979), but that species has a strongly setose male gnathopod 2. The only similar Pacific species is *B. quadrimanus* (Sivaprakasam, 1970), but that species has a male gnathopod 1 with a more rectangular propodus, a shallower palmar excavation, and a markedly deflected posterodistal tooth.

Habitat. Dead coral and rubble.

Distribution. Currently known only from Papua New Guinea.

Globosolembos Myers

Globosolembos ovatus (Myers)

Lembos (Globosolembos) ovatus Myers, 1985a: 354, figs 228–230.
Globosolembos ovatus.–Myers, 1985b: 47, figs 34, 35.–Myers, 1989: 66, table 1.

Material examined. AM P42349 to P42358: AAM/PNG-8 (1 male, 2 females), AAM/PNG-12 (1 male, 2 females), AAM/PNG-13 (3 males, 5 females), JDT/PNG-24 (1 female), JDT/PNG-32 (1 female), JDT/PNG-47 (2 males, 8 females), JDT/

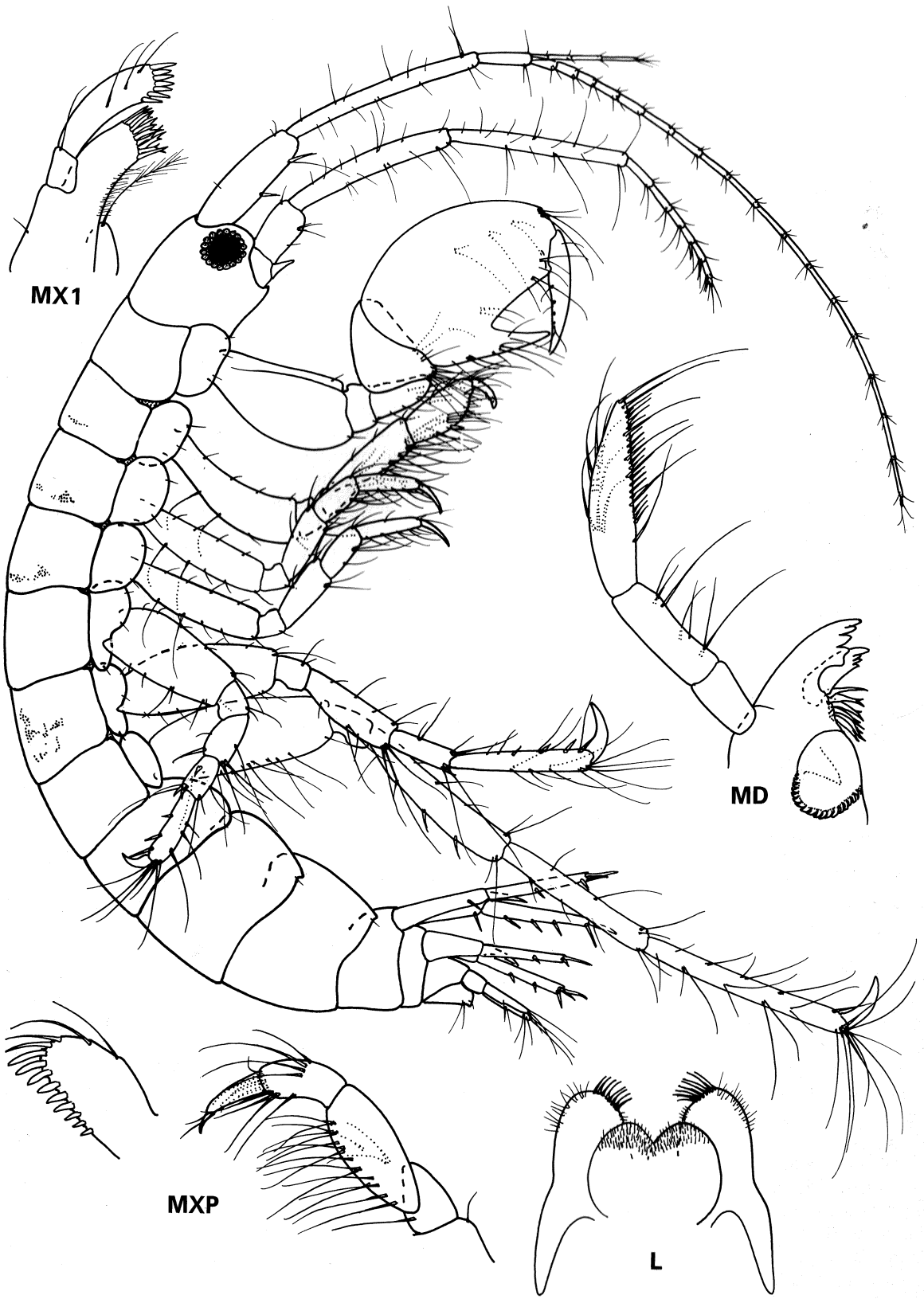

Fig. 5. *Bemlos pugiosus* n.sp., barrier reef near Wongad, Madang Lagoon, Papua New Guinea, JDT/PNG-59.

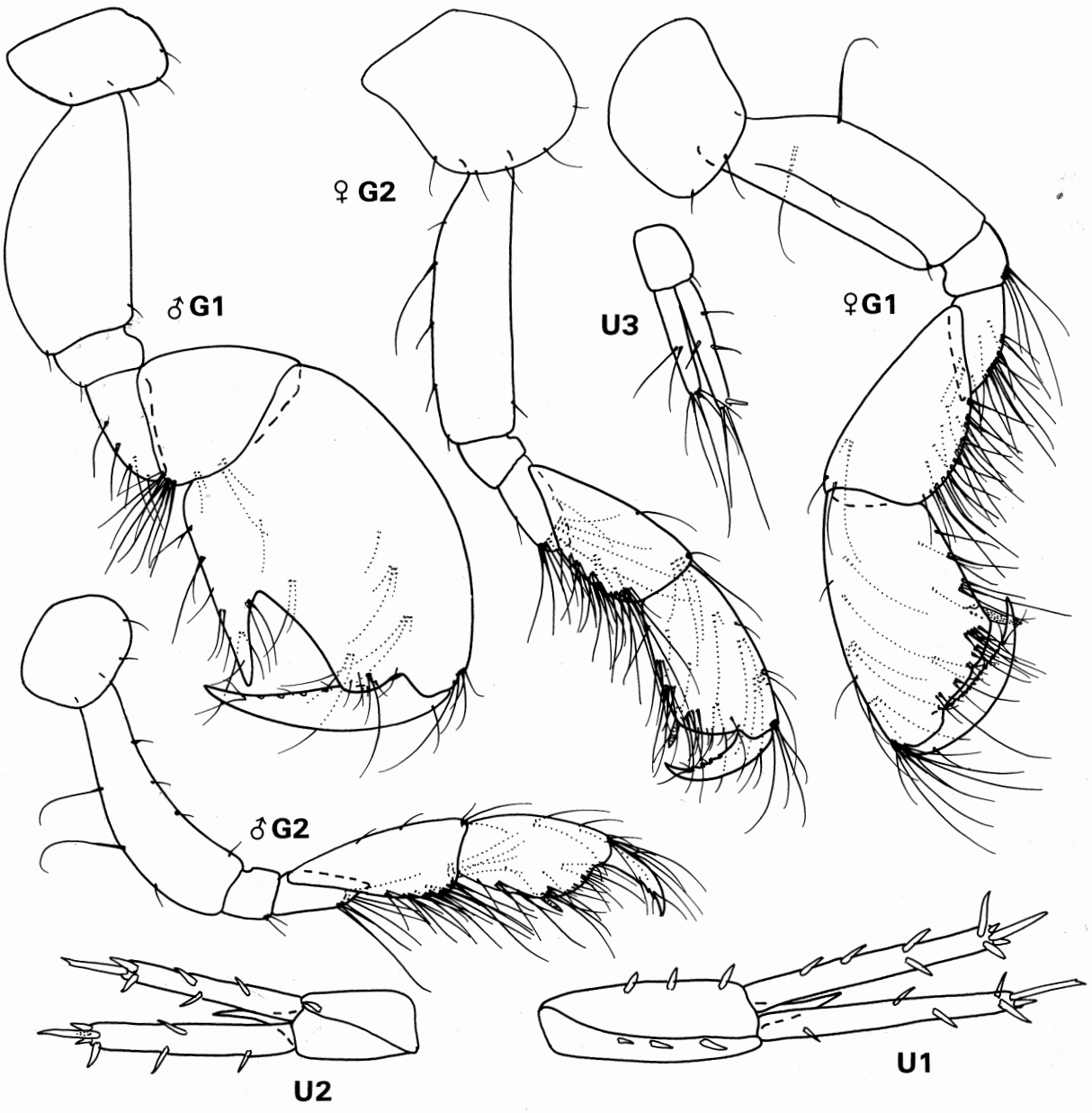

Fig. 6. *Bemlos pugiosus* n.sp., barrier reef near Wongad, Madang Lagoon, Papua New Guinea, JDT/PNG-59.

PNG-57 (7 males, 6 females), JDT/PNG-58 (3 males, 3 females, 7 juveniles), JDT/PNG-60 (8 males, 14 females), JKL/PNG-259 (1 male), AAM/PNG-5 (3 males, 4 females).

Remarks. Present material is in good agreement with material described from Fiji.

Habitat. Coral rubble and *Halimeda.*

Distribution. Western Samoa, Fiji, Vanuatu (Myers, 1985a), Society Islands (Myers, 1989).

Globosolembos ruffoi (Myers)

Fig. 7

? *Lembos* sp. Barnard, 1965: 530, figs 28a–e.
? *Lembos leapakahi*.–Sivaprakasam, 1970: 86, fig. 3. (non *L. leapakahi* Barnard, 1970: 79, figs 39, 40).
Lembos ruffoi Myers, 1975: 22, figs 68–75.
Lembos sp. Myers, 1985a: 365, fig. 235.
Globosolembos ruffoi.–Myers, 1988a: 189.–Myers, 1988b: 327, fig. 54.

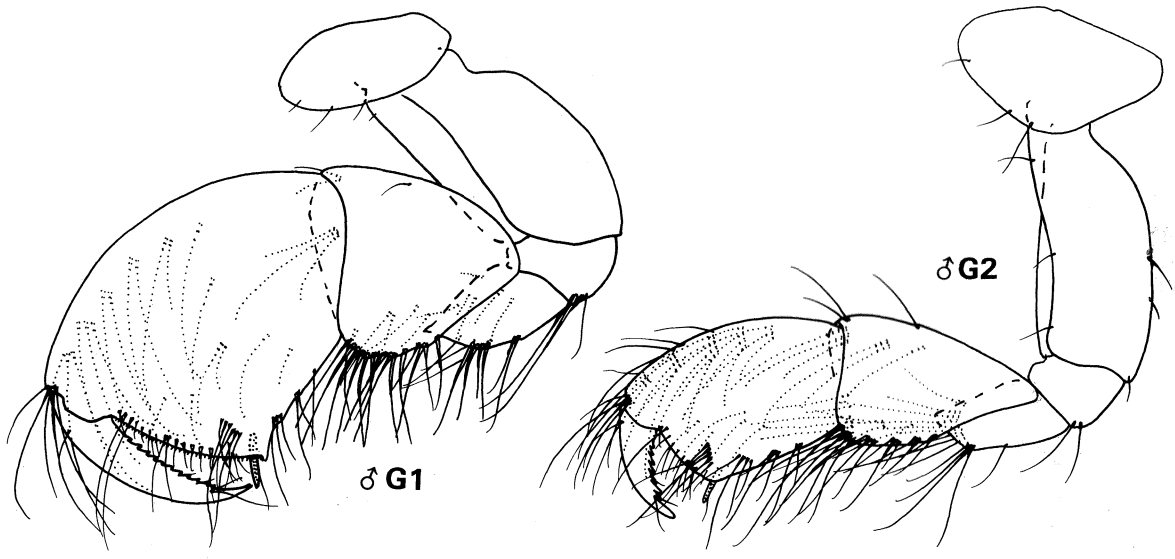

Fig. 7. *Globosolembos ruffoi* (Myers), Barracuda Point, Madang Lagoon, Papua New Guinea, JDT/PNG-57.

Material examined. AM P42359 to P42361: JDT/PNG-47 (1 male, 2 females), JDT/PNG-57 (1 male, 3 females), JKL/PNG-259 (5 males, 6 females). Author's collection: AAM/PNG-5 (1 male), JKL/PNG-212 (3 males, 4 females).

Remarks. Present material is much smaller than East African material (Type locality), 2.5 mm as opposed to 5.0 mm, and is also quite differently pigmented. Present material has posterior margins of head, pereon segments 1–7 and pleon segments 1–2 with narrow red bands, proximal part of antenna 1 peduncular articles red, flagellum red, peduncular articles of antenna 2 spotted with red. East African material: body with weak brown bands on pereon segments 1–5. Notwithstanding these differences, no morphological differences could be found. For the present, therefore, this material is attributed to *G. ruffoi*.

Habitat. Coral rubble and *Halimeda*.

Distribution. East Africa (Myers, 1975), ? India (Sivaprakasam, 1970), Queensland, Australia (Myers, 1988b), ? Caroline Islands (Barnard, 1965), Papua New Guinea.

Grandidierella Coutière

Grandidierella bonnieroides Stephensen

Grandidierella bonnieroides Stephensen, 1948: 12, fig. 3.–Myers, 1970: 141, figs 1, 2.–Myers, 1972: 790.–Myers, 1981: 218.–Asari & Myers, 1982: 252, figs 9, 10.
For detailed synonymy prior to 1948, see Myers (1970)

Material examined. AM P42362 to P42365: AAM/PNG-7 (3 males, 5 females), AAM/PNG-13 (2 males, 1 female), AAM/PNG-17 (1 male), JKL/PNG-261 (10 males, 15 females).

Remarks. Agrees well with the original description.

Habitat. In highly sedimented habitats among algae, mangrove roots etc. in variable salinity.

Distribution. Apparently circumtropical.

Grandidierella nagadae n.sp.

Figs 8, 9

Type Material. HOLOTYPE male, 5.0 mm, AM P42366; PARATYPES, 2 males, 7 females, AM P42367; just west of bar, Nagada River sandbar, (5°10.40'S 145°48.40'E), muddy silt, large amount of organic matter, 1.0 m, J.D. Thomas, 26 February 1990, stn AAM/PNG-2.

Other material examined. JKL/PNG-151 (25 males, 30 females, 82 juveniles, AM P42365). Author's collection: AAM/PNG-9 (1 male).

Diagnosis. Length 5.0 mm. Head with distoventral corner weakly produced, ocular lobes evenly rounded. Mandible palp article ratios (basi-distal) 3:4:4. Antenna 1 a little longer than antenna 2, accessory flagellum composed of one long and one rudimentary article. Male gnathopod 1 carpus broadly ovoid with strong

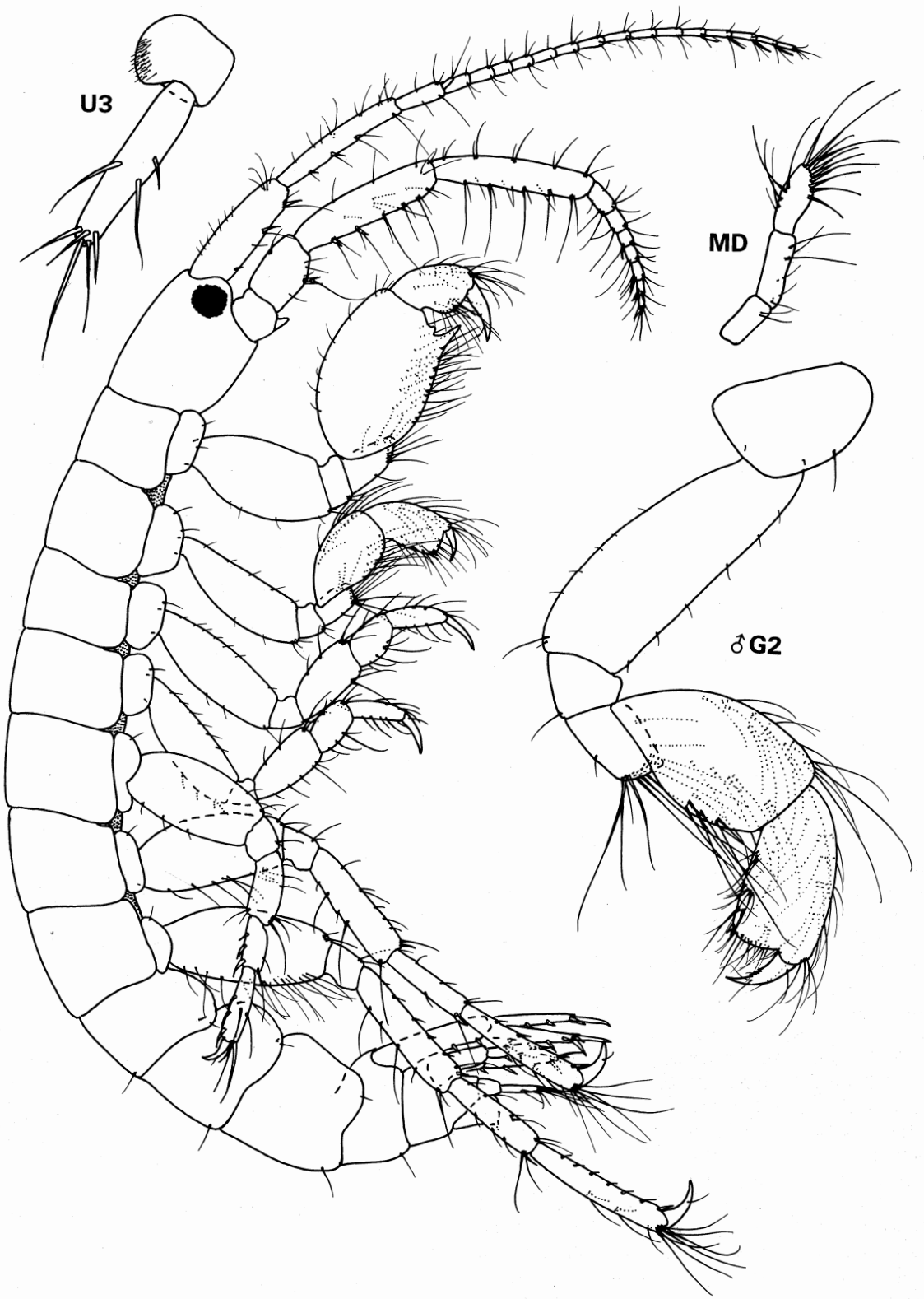

Fig. 8. *Grandidierella nagadae* n.sp., Nagada River estuary, Madang Lagoon, Papua New Guinea, AAM/PNG-2.

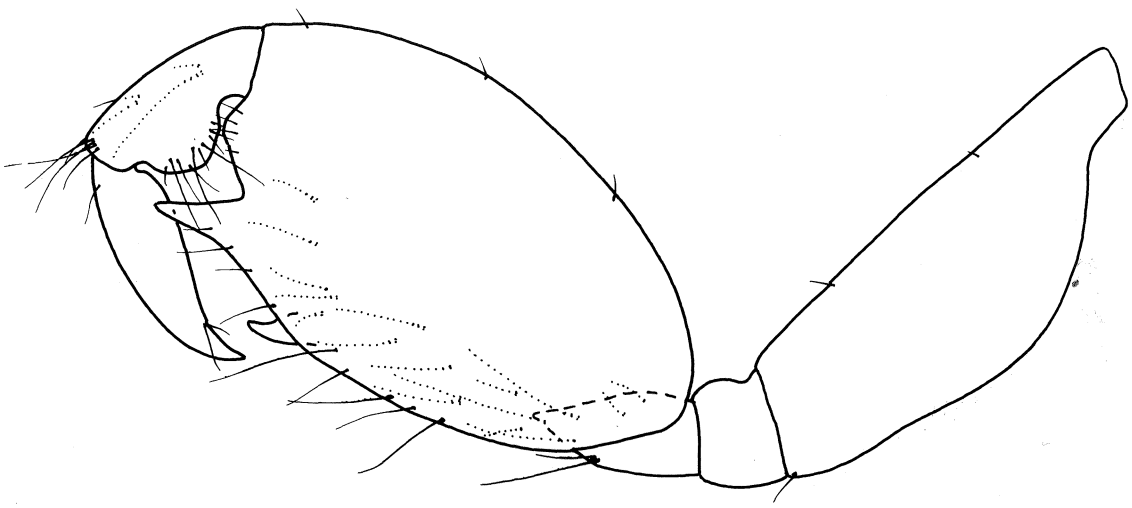

Fig. 9. *Grandidierella nagadae* n.sp., hyperadult male, Kranket, Madang Lagoon, Papua New Guinea, AAM/PNG-9.

posterodistal tooth and smaller rounded distal tooth, posterior margin smooth, propodus posterior margin concave proximally, convex distally, dactylus stout. Male gnathopod 2 basis anterior margin smooth, carpus enlarged, anterior margin with numerous long setae. propodus broader distally, anterior margin convex, posterior margin straight, palm almost transverse, dactylus fitting palm. Pereopods 5–7 stout, in the length ratios 4:6:7, pereopod 7 scarcely over half body length. Uropod 3 peduncle expanded on inner face, finely setose, ramus slender, over three times length of peduncle.

Etymology. Named after the type locality.

Remarks. This species is very close to *G. bispinosa* Schellenberg, 1938 but is more robust with stouter antennae and pereopods, pereopod 7 for example being only about half the body length as compared with two thirds the body length in *G. bispinosa* (as figured by Myers, 1985b). It also differs in the form of the male gnathopod 2. The basis lacks any crenulations, and the propodus is broad distally due to the palm being almost transverse. The specimens described from Amboina by Ledoyer (1979a), under the name *G. bispinosa* also lack crenulations on the basis of the male gnathopod 2 but exhibit the very oblique palm typical of *G. bispinosa*. The limited figures and descriptions provided by Schellenberg (1938) and Ledoyer (1979a) make it difficult to assess those specimens and compare them with those of Myers (1985b) and present material. Schellenberg's specimens were collected in the Bismark Archipelago, a locality geographically close to Madang. However, present material appears to differ sufficiently from Bismark specimens to warrant specific recognition, although a study of collections from a wider range of localities is necessary to clarify the relationships of the several materials.

Habitat. In mangrove litter and other organically enriched habitats and among sea grasses on reef flats.

Distribution. Nagada River Estuary, north-east Papua New Guinea.

Isaeidae

Ampelisciphotis Pirlot

Ampelisciphotis tridens Pirlot

Ampelisciphotis tridens Pirlot, 1938: 341, figs 154–156.– Ledoyer, 1982: 175, fig. 59.

Material examined. AM P42428 to P42432 AAM/PNG-5 (1 male, 9 females), AAM/PNG-11 (2 males), AAM/PNG-13 (1 male), AAM/PNG-15 (4 females), AAM/PNG-16 (1 male, 1 female).

Habitat. In shallow water (0–2 m) on rubble bottoms among dead coral, *Halimeda, Padina* and sponges.

Distribution. Madagascar, Sulawesi, Papua New Guinea.

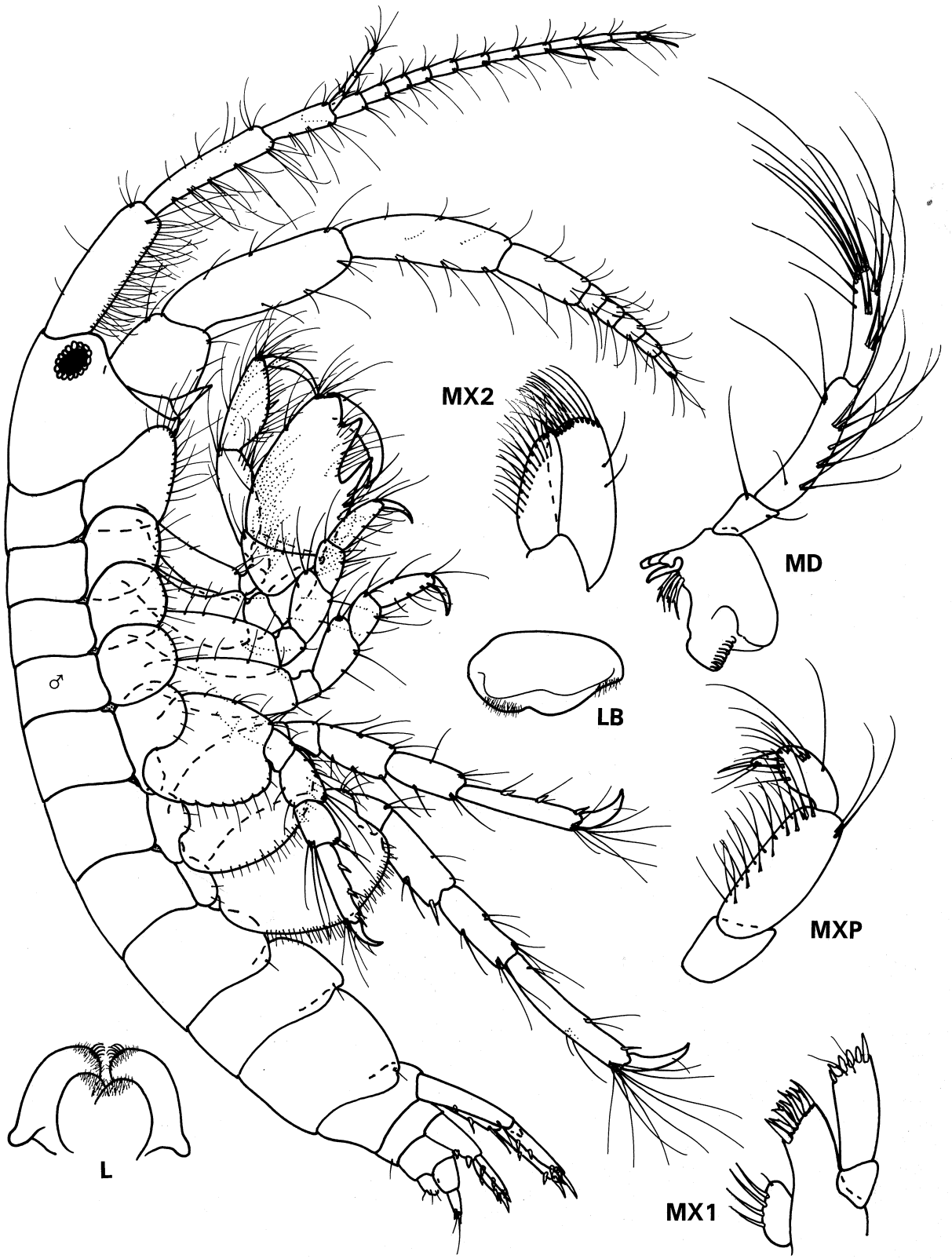

Fig. 10. *Cheiriphotis pediformis* n.sp., Nagada River sand bar, Madang Lagoon, Papua New Guinea, JDT/PNG-61.

Cheiriphotis Walker

Cheiriphotis pediformis n.sp.

Figs 10, 11

Type material. HOLOTYPE male, 2.1 mm, AM P42433; 1 immature PARATYPE, AM P42434; Nagada River sandbar, (5°10.40'S 145°48.45'E); sediment samples black silt with little organic matter, 0.6 m at high tide (could be exposed at low tide), definite freshwater layer noticeable on surface, J.D. Thomas, 26 February 1990, stn JDT/PNG-61.

Diagnosis. Length 2.1 mm. Head eye lobes weakly produced, sub-ocular margin excavate, deep, for reception of enlarged antenna 2 peduncle, eye sub-round; antenna 1 peduncular articles in the basi-distal ratios 6:5:3, article 1 stout, strongly setose on posterior margin, article 2 more slender than 1 with tufts of long setae, flagellum a little shorter than peduncle, with about 12 articles, the terminal articles with aesthetascs; accessory flagellum with 4 articles; antenna 2 subpediform, article 3 massive, articles 4 and 5 greatly enlarged, article 4 the longer, flagellum longer than peduncular article 5, with about 6 articles, the first article half the length of peduncular article 5; Labrum ventral margin sinuous; mandible palp article 2 setiferous on anterior margin, article 3 three-quarters length of article 2, slender, spatulate, distally setose; labium outer plate anterior margin with stout, strongly curved setae, mandibular processes short, rounded; maxilla 1 inner plate with four stout evenly spaced setae; maxilla 2 normal; maxilliped palp article 4 coniform with strong distal spine; gnathopod 1 coxa anterodistal margin produced forward, rounded, basis, carpus and propodus slender, the carpus slightly the longer, propodus palm very oblique, dactylus elongate and slender, over three quarters length of propodus; male gnathopod 2 coxa subquadrangular, basis stout, anterodistal margin produced into a rounded lobe, carpus short, cup-shaped, propodus enlarged, more than three times length of carpus, palm with short, acute proximal tooth, separated from a similar but much larger distal tooth, by a deep triangular excavation, dactylus stout, overlapping palm; female gnathopod 2 unknown; pereopods 3–4 stout, normal, dactylus two-thirds length of propodus, pereopod 5 basis posterior margin produced into a crenulate flange so that the podomere is as broad as long, merus and carpus with a few long plumose setae; pereopods 6–7 basis expanded, posterior margin evenly convex, not or only minutely crenulate; epimeron 1 rounded, epimera 2–3 each with small notch bearing a seta at the posterodistal margin; uropod 1 peduncle longer than rami and with a short inter-ramal tooth less than one fifth length of peduncle, inner ramus a little longer than outer; uropod 2 peduncle subequal in length with inner ramus, lacking an inter-ramal process, inner ramus slightly longer than outer; uropod 3 uniramous, the peduncle and ramus subequal in length, ramus with three strong distal spines and two or three setae; telson with each dorsolateral crest bearing a pair of setae.

Etymology. From the Latin *pes* = foot, and *formis* = in the shape of, referring to the stout antenna 2.

Remarks. This species differs from all other known species of *Cheiriphotis* by its subpediform antenna 2.

Habitat. In black silt in shallow water, perhaps polyhaline.

Chevalia Walker

Chevalia pacifica n.sp.

Fig. 12

Chevalia aviculae.–Myers, 1985b: 76, fig. 59.
Chevalia sp. Barnard & Thomas, 1987b: 534.
not *Chevalia aviculae* Walker, 1904: 288, pl. 7, fig. 50, pl. 8, fig. 50.

Type material. HOLOTYPE male, 3.0 mm, AM P42436; PARATYPE female, AM P42437; barrier reef near Wongad (5°08.11'S 145°49.53'E), rubble, encrusted dead *Acropora* plates, also some pieces from caves and overhangs, 36 m and 21 m, J.D. Thomas, 22 February 1990, stn JDT/PNG-59.

Other material examined. AM P42438 to P42439; JDT/PNG-25 (2 males, 2 females), JDT/PNG-36 (1 male), JDT/PNG-67 (1 male, 1 female).

Diagnosis. Length 3.1 mm. Article 3 of antenna 1 about two thirds length of article 1, accessory flagellum two articulate the second article rudimentary; gnathopod 1 coxa anteroventral corner blunt, gnathopod 2 palm oblique, notch at dactylus hinge moderately deep; basis of pereopods 5–7 expanded, pereopod 7 basis posterodistal margin protuberant, merus slender; uropod 1 inner ramus with fine serrations proximally but lacking marginal setae; uropod 2 outer ramus with 1–2 setae.

Remarks. Barnard & Thomas (1987b) have revised the genus *Chevalia*, which prior to their work was considered monotypic. The above diagnosis is based on their descriptions and key and provides a formal name for the Fijian/Papua New Guinean species originally described by Myers (1985b) under the name *C. aviculae*.

Habitat. On rubble bottoms in 1 m to at least 36 m, among dead coral, sand, or *Halimeda*.

Distribution. Fiji, Papua New Guinea.

Falcigammaropsis n.gen.

Diagnosis. Head lobes produced, rounded; antenna 1 peduncular article 3 shorter than article 1, accessory flagellum present; labrum with well-developed, acute epistome; maxilla 1 inner plate asetiferous; maxilla 2

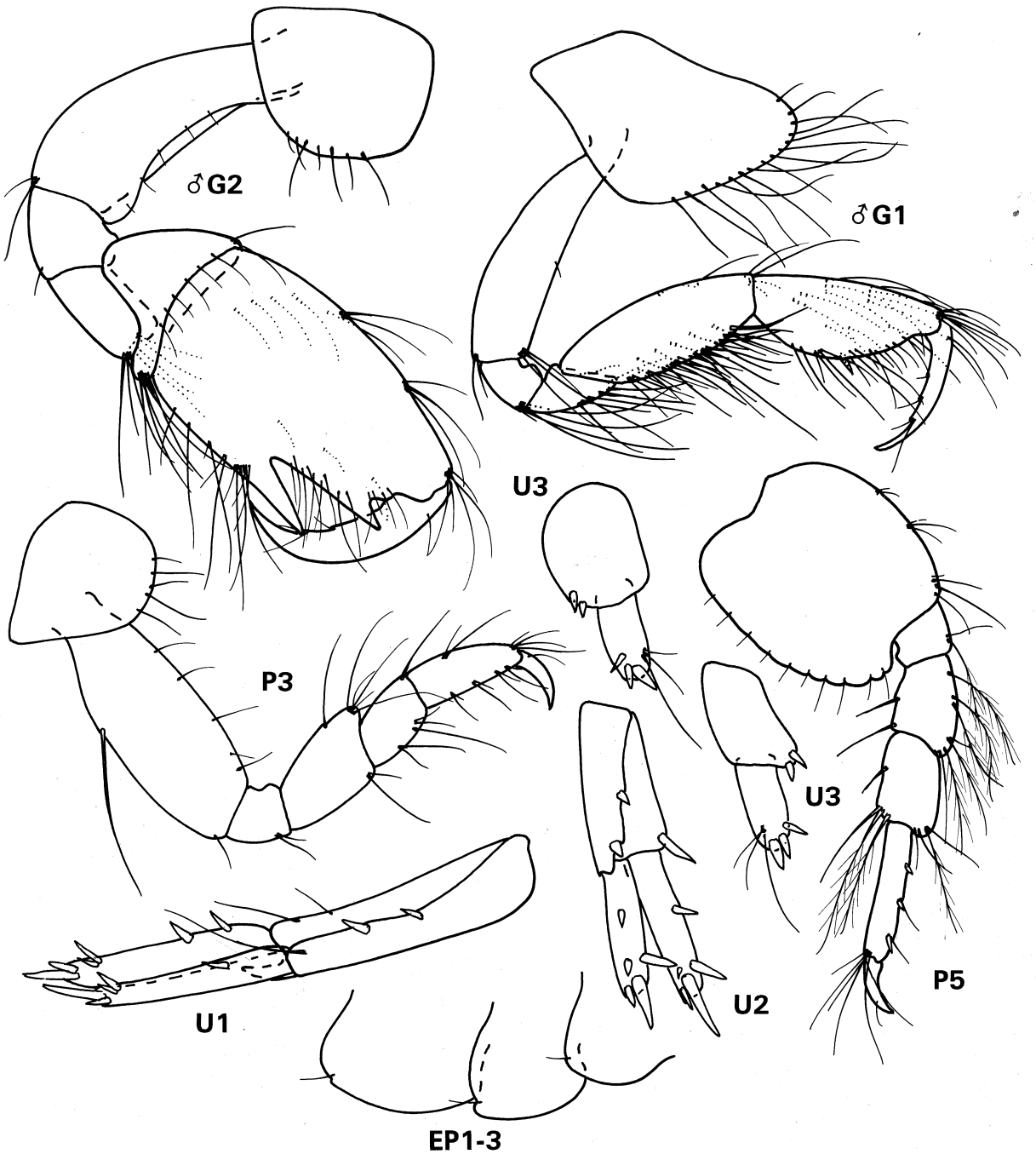

Fig. 11. *Cheiriphotis pediformis* n.sp., Nagada River sand bar, Madang Lagoon, Papua New Guinea, JDT/PNG-61.

outer plate with distal but no lateral setae; mandible palp article 3 shorter than article 2, spatulate; labium outer plate anterior margin incised, mandibular processes acute, recurved; maxilliped palp article 3 posterodistal margin produced into rounded lobe, article 4 dactyliform, falcate; coxa 1 with posterodistal tooth; gnathopod 2 larger than 1, subchelate; pereopods 5–7 stout, basis posterior margin toothed; urosome segment 1 with dorsal teeth.

Type species. *Falcigammaropsis excavata* n.sp.

Included species. *Gammaropsis latipalma* Ledoyer, 1979b.

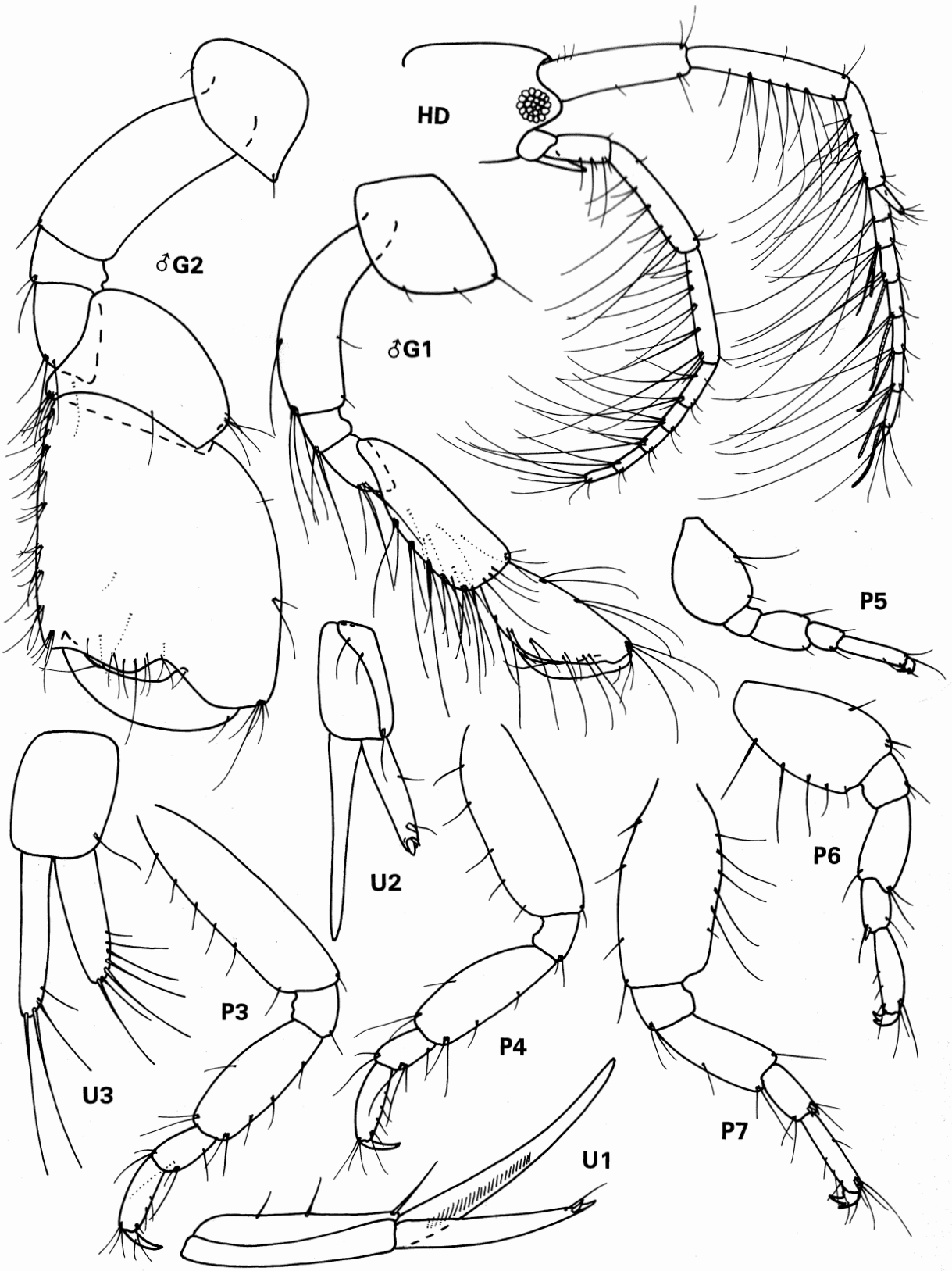

Fig. 12. *Chevalia pacifica* n.sp., barrier reef near Wongad, Madang Lagoon, Papua New Guinea, JDT/PNG-59.

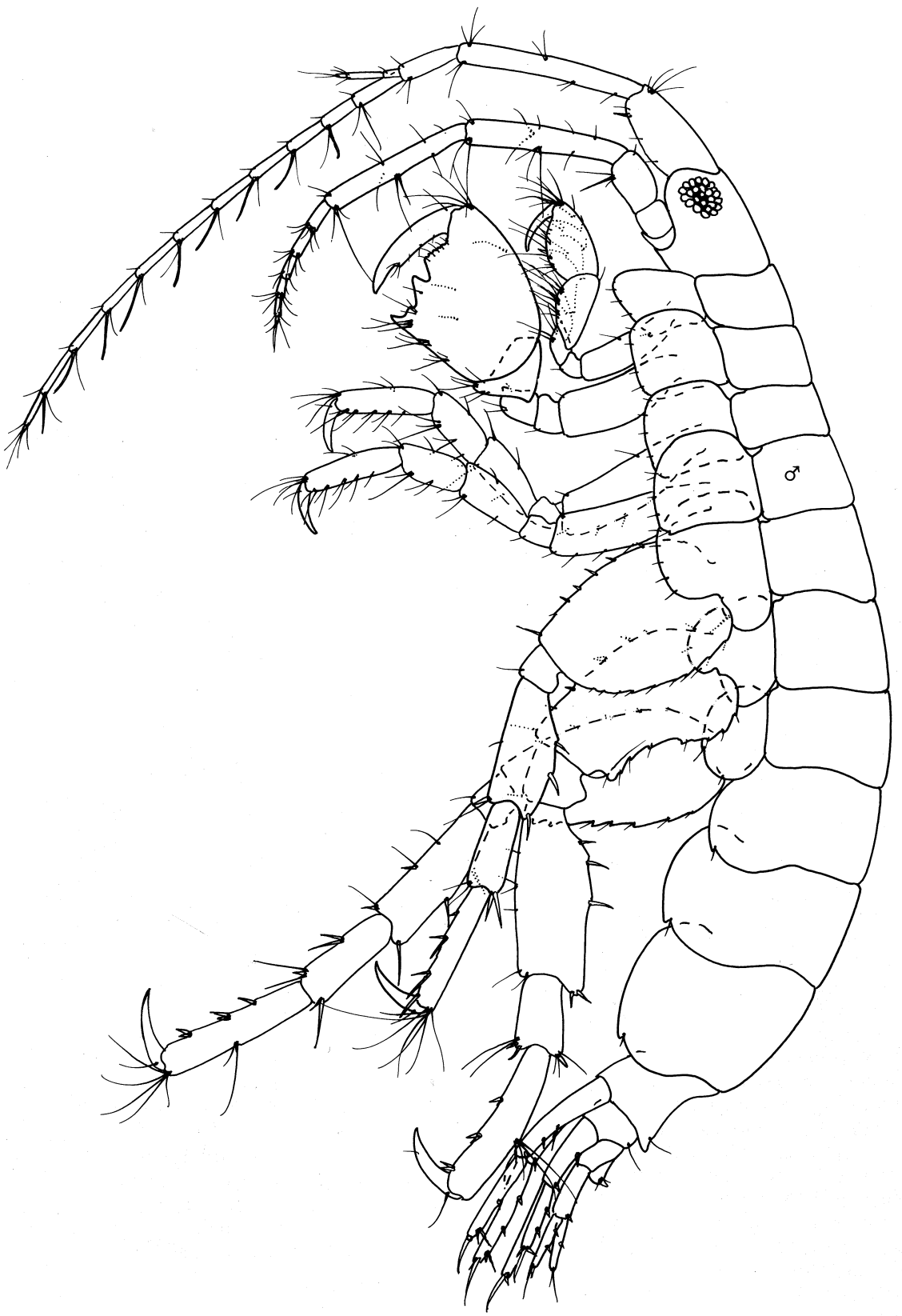

Fig. 13. *Falcigammaropsis excavata* n.sp., barrier reef near Wongad, Madang Lagoon, Papua New Guinea, JDT/PNG-59.

Etymology. From the Latin *falcifer* = carrying a sickle (referring to the shape of maxilliped palp article 4), prefixed to *Gammaropsis* Liljeborg, a related genus.

Remarks. This genus is characterised chiefly by the *Ampithoe*-like labium, and subchelate maxilliped palp, with falcate article 4. In its toothed coxa 1, urosome segment 1, and pereopod 5–7 bases and its acute, produced epistome. This genus resembles the toothed species of *Gammaropsis*, such as *G. dentata* Chevreux, 1900 and *G. siara* described herein. In these latter species, however, the eye lobes are acute, and the mouthparts, labrum excepted, conform to those of non-toothed *Gammaropsis*.

Falcigammaropsis excavata n.sp.

Figs 13, 14

Type material. HOLOTYPE male, 2.1 mm, AM P42441; PARATYPES, 8 males, 8 females, AM P42442; barrier reef near Wongad (5°08.11'S 145°49.53'E), rubble, encrusted dead *Acropora* plates, also some pieces from caves and overhangs, 36 m and 21 m, J.D. Thomas, 22 February 1990, stn JDT/PNG-59.

Other material examined. AM P42443 to P42447; JDT/PNG-67 (1 male, 1 female), JKL/PNG-185 (1 male), JKL/PNG-213 (6 females), JKL/PNG-239 (1 male, 2 females), JKL/PNG-240 (1 male, 1 female).

Diagnosis. Length 2.1 mm. Head lobes moderately produced, rounded, eye large; antenna 1 over three-quarters body length, peduncular articles in the basi-distal ratios 5:8:3, flagellum longer than peduncle with 12 articles, nine bearing aesthetascs; accessory flagellum 3-articulate; antenna 2 much shorter than antenna 1, peduncular articles 4 and 5 subequal in length, flagellum shorter than peduncular article 5; labrum with well-developed, acute epistome; mandible palp article 3 shorter than article 2, spatulate; labium outer plate anterior margin incised, mandibular processes acute, recurved; maxilla 1 inner plate asetiferous, palp article 2 with 4 distal spines; maxilla 2 outer plate with distal but no lateral setae; maxilliped palp article 3 posterodistal margin produced into rounded lobe, article 4 dactyliform, falcate; gnathopod 1 coxa with small posterodistal tooth, carpus and propodus slender, propodus slightly the longer, palm oblique defined by two spines, dactylus fitting palm; male gnathopod 2 coxa untoothed, basis slender, carpus short, cup-shaped, propodus enlarged, broader distally, palm variable, complexly toothed, with deep medioproximal sinus and 1–2 posterodistal teeth, posterior margin almost straight, dactylus large, falcate, fitting palm; female gnathopod 2 similar to gnathopod 1, but carpus much shorter, propodus stouter, palm distinct, less oblique; pereopods 3–4 similar, normal; pereopod 5–7 basis posterior margin toothed; pereopod 5 basis posterior margin convex; male pereopod 6 basis posterior margin proximally and distally convex, medially concave, merus stout; female pereopod 6 basis posterior margin evenly convex; pereopod 7 basis posterior margin weakly convex; epimera 1–3 with tooth at posterodistal corner, urosome segment 1 with small, distal, dorsal tooth on either side; uropod 1 peduncle a little longer than rami with inter-ramal tooth, one third length of peduncle, inner ramus longer than outer; uropod 2 peduncle shorter than rami, lacking inter-ramal tooth; uropod 3 peduncle a little shorter than rami, inner ramus a little longer than outer ramus; telson with a very stout spine on each dorsolateral crest.

Etymology. From the Latin *excavo* = to hollow out, referring to the concave basis of pereopod 6.

Remarks. This species differs from its congener *F. latipalma* (Ledoyer, 1979b) from Madagascar in the quite different configuration of the male gnathopod 2 palm, the more elongate mandibular palp article 3 and in the excavate posterior margin of the male pereopod 6.

Habitat. On rubble bottoms, in 1 m to at least 36 m, among dead coral, *Halimeda* or in anastomosing red algae.

Gammaropsella n.gen.

Diagnosis. Like basic *Gammaropsis*, but antenna 1 peduncular article 3 much longer than peduncular article 1; mandibular palp article 3 slender, narrowing distally, maxilla 1 inner plate asetiferous or with a few setae; coxa 2 the largest, male gnathopod 2 propodus enlarged, but lacking any significant palmar ornamentation.

Type species. *Gammaropsella simplex* n.sp.

Included species. *Gammaropsella pilosa* n.sp., *G. simplex* n.sp.

Etymology. Diminutive of *Gammaropsis*.

Remarks. This genus appears to be related to *Megamphopus* Norman in having coxa 2 the largest. The remarkably elongate peduncular article 3 of antenna 1 is very similar to that of *Megamphopus brevidactylus*. *Gammaropsella* differs however from *Megamphopus* by the non-clavate mandibular palp article 3.

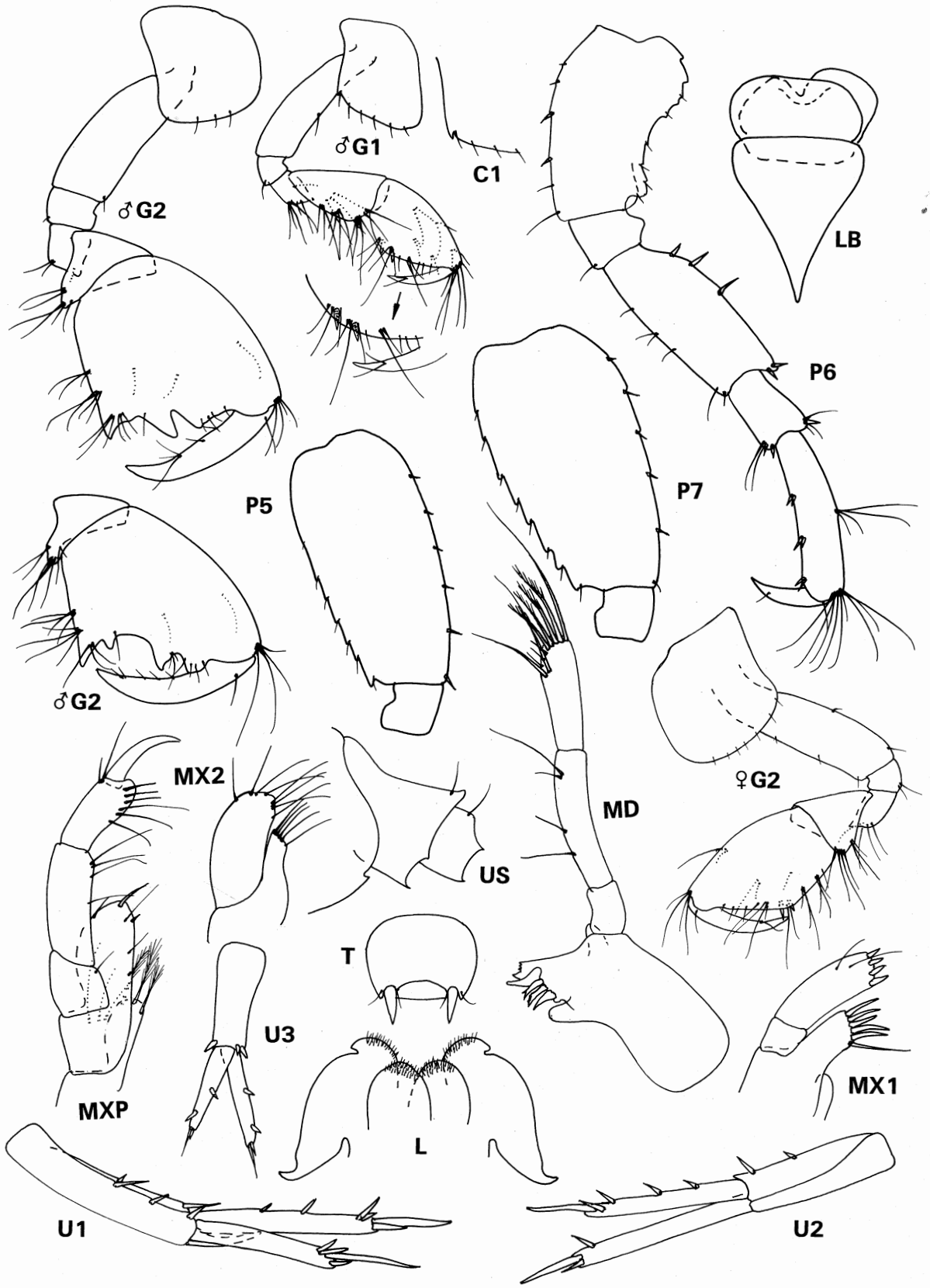

Fig. 14. *Falcigammaropsis excavata* n.sp., barrier reef near Wongad, Madang Lagoon, Papua New Guinea, JDT/PNG-59.

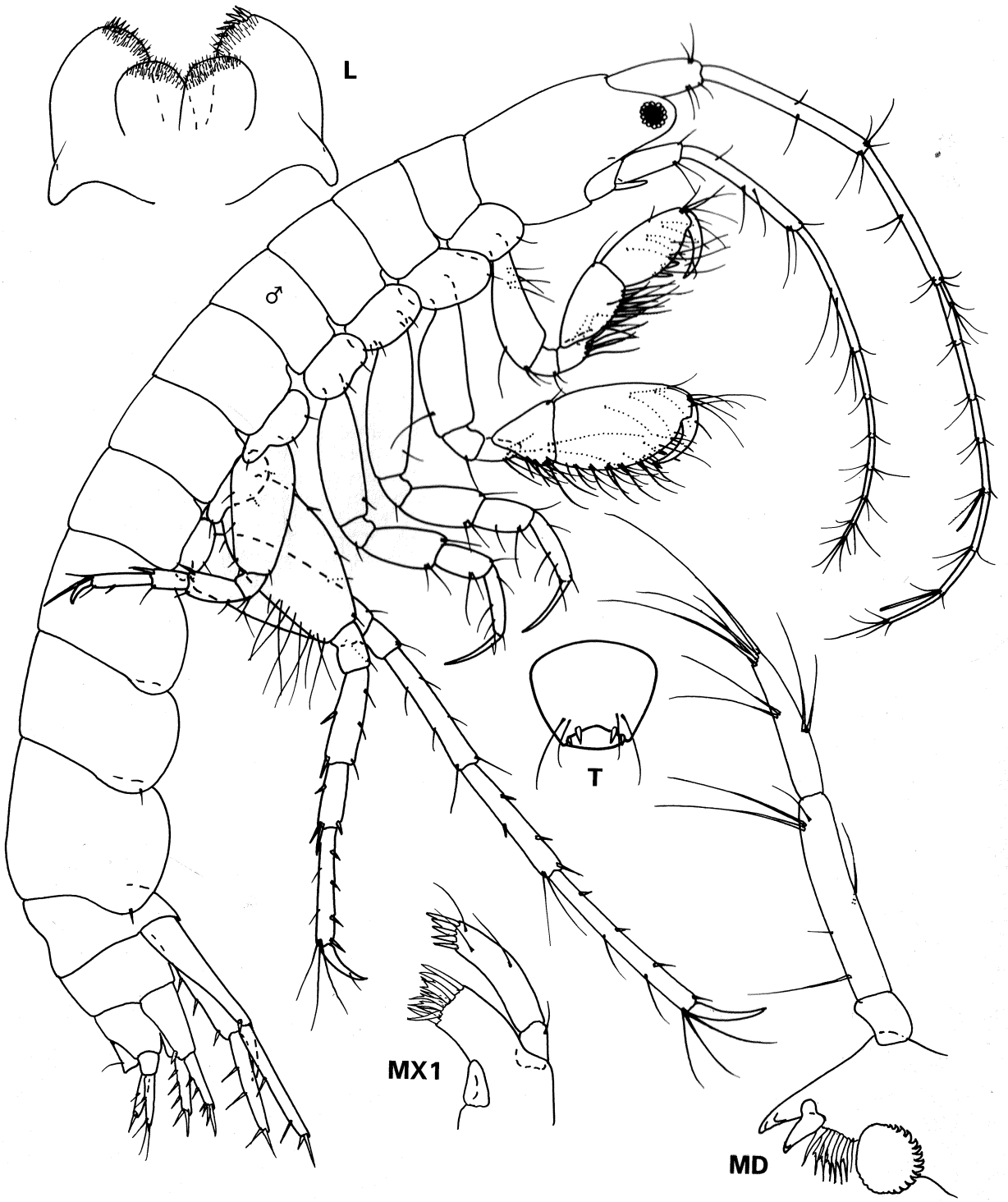

Fig. 15. *Gammaropsella simplex* n.sp., Padoz Natun reef, Madang Lagoon, Papua New Guinea, JDT/PNG-67.

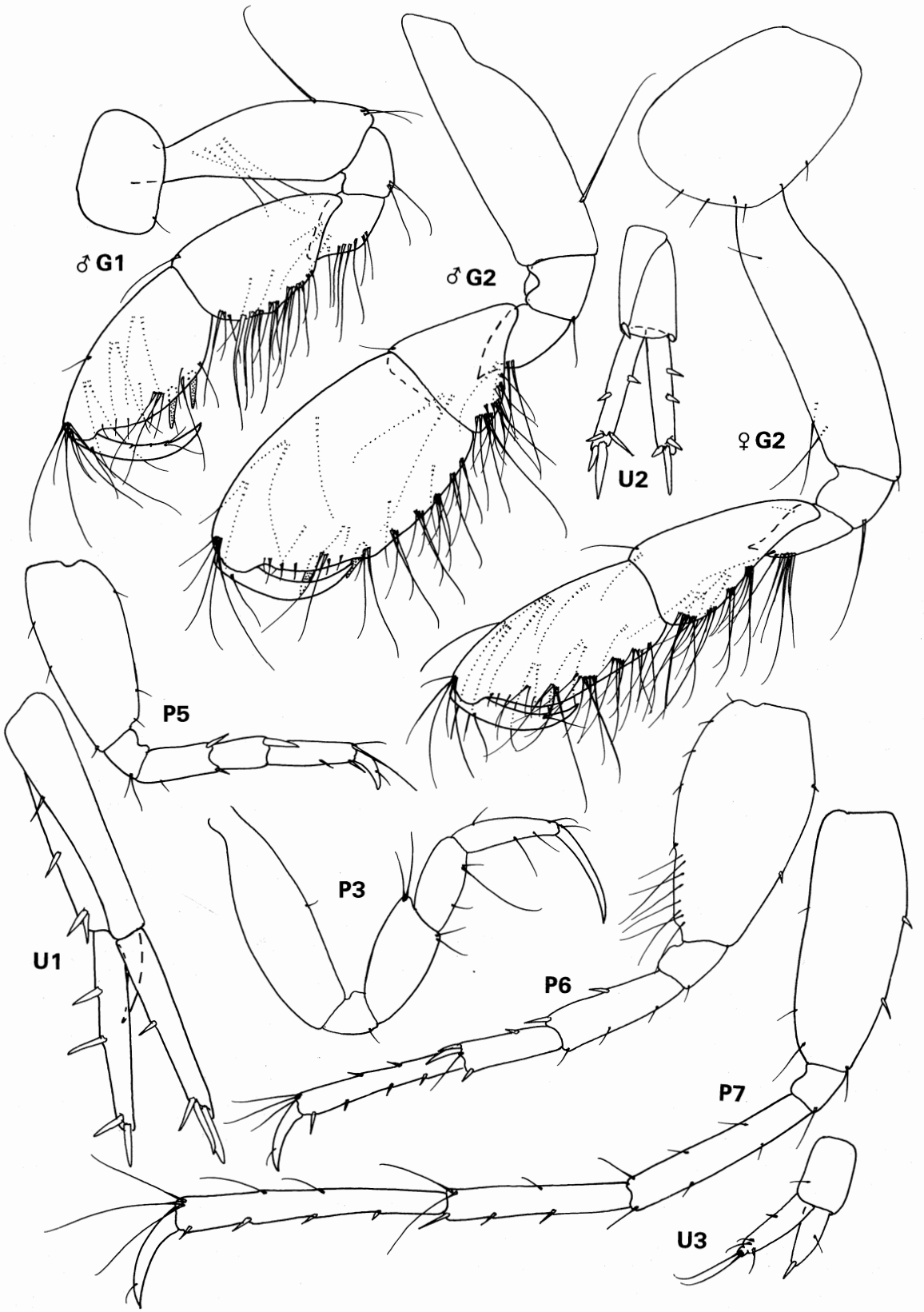

Fig. 16. *Gammaropsella simplex* n.sp., Padoz Natun reef, Madang Lagoon, Papua New Guinea, JDT/PNG-67.

Gammaropsella simplex n.sp.

Figs 15, 16

Type material. HOLOTYPE male, 4.0 mm, AM P42448, PARATYPE female, AM P42449; Padoz Natun reef (5°09.60'S 145°48.77'E), formalin wash of cemented rubble in shallow part of reef near centre and northern edge, J.D. Thomas, 28 February 1990, stn JDT/PNG-67.

Diagnosis. Length 4.0 mm. Head elongate, eye lobes strongly produced, eye red, round, small; antenna 1 a little over half body length, peduncular articles in the ratio 2:4:3, flagellum shorter than peduncle with about 8 articles, the terminal articles with aesthetascs, accessory flagellum composed of one long and one rudimentary article; antenna 2 shorter than antenna 1, peduncular articles 4 and 5 subequal, flagellum longer than peduncular article 5 with about 7 articles; mandible palp article 3 slender, shorter than article 2, narrowing distally, with 4 long distal setae and a pair of setae on the posterior margin; labium outer plate with strong distal spines, mandibular processes short, subacute; maxilla 1 inner plate asetiferous; coxae small, weakly overlapping; gnathopod 1 basis flask-shaped, propodus scarcely longer than carpus, subovoid, palm evenly continuous with posterior margin, but defined by two strong spines, dactylus slender, fitting palm; male gnathopod 2 enlarged, moderately setiferous, carpus short, triangular, propodus twice length of carpus, palm oblique, weakly sinuous, defined by a spine, dactylus fitting palm; female gnathopod 2 much more slender than that of male, propodus only a little longer than elongate carpus, palm evenly convex, distinct from posterior margin and defined by a spine, dactylus overlapping palm; pereopods 3–4 normal, dactylus slender, equal in length to propodus; pereopods 5–7 normal, in the length ratios 2:3:4; pereopod 6 basis, posterior distal margin with long setae; epimera 1–3 rounded, epimera 2–3 with posterodistal seta; uropod 1 peduncle longer than rami, with stout, inter-ramal tooth about one third length of peduncle, rami subequal in length; uropod 2 peduncle shorter than rami, lacking an inter-ramal tooth, rami subequal; uropod 3 peduncle subequal with inner ramus, outer ramus longer than inner with a small second article tipped with two long setae; telson with each dorsolateral crest bearing two spines and two unequal setae.

Etymology. From the Latin *simplex* = simple, referring to the male gnathopods.

Remarks. This species differs from *G. pilosa* principally in its shorter antennae and much less setose gnathopods.

Habitat. On cemented rubble bottoms in shallow water.

Gammaropsella pilosa n.sp.

Figs 17, 18

Type material. HOLOTYPE male, 2.4 mm, AM P42450; Barracuda Point, reef just east of Tab (Pig Island), (5°10.26'S 145°50.61'E), moderate current flow, extensive coral cover in shallower depths, sediment sample from isolated accumulations of *Halimeda*/mud, 36 m, and rubble sample from underlays and rubble, 27–30 m, J.D. Thomas, 8 February 1990, stn JDT/PNG-37.

Other material examined. AM P42451, JKL/PNG-67 (1 male mounted on 6 slides).

Diagnosis. Length 2.4 mm. Head with well-developed eye lobes, eyes large, filling and entirely situated within the head lobes; antennae very slender only a little shorter than body length; antenna 1 peduncular article 3 twice length of article 1, article two only a little longer than article 3, flagellum a little longer than the peduncle, with 14 articles, some with aesthetascs; accessory flagellum with three articles, the terminal article rudimentary; antenna 2 peduncular article 5 longer than 4, flagellum a little shorter than the combined length of peduncular articles 4 and 5 with 9 articles; mandible palp article 3 shorter than article 2, widest medially, posterodistal margin straight, setose, posteroproximal margin weakly concave, asetiferous; labium outer plate with fine distal setae, mandibular processes acute; maxilla 1 inner plate with three short marginal setae; maxilliped palp article 3 with posterodistal margin produced forward into a rounded lobe, article 4 with very short distal spine; gnathopod 1 basis posterodistal margin bearing a brush of long setae, carpus and propodus setose, subequal, propodus palm very oblique, dactylus overlapping palm; gnathopod 2 coxa enlarged, basis stout, anterior margin and posterodistal margin with very long setae, carpus short, triangular, propodus nearly three times length of carpus, palm very oblique, defined by a small hump and a spine, posterior margin of carpus and anterior and posterior margins of carpus and propodus with long setae, dactylus shorter than palm; pereopods 3–7 normal, slender, pereopods 5–7 in the length ratios 7:11:15; epimera 1–3 rounded; uropod 1 peduncle longer than rami with inter-ramal tooth about one third length of peduncle, rami subequal in length; uropod 2 peduncle and inner ramus subequal in length, outer ramus a little shorter than inner ramus; uropod 3 peduncle shorter than rami, outer ramus a little shorter than inner ramus, with a small second article bearing two setae, article 1 also with a distal seta; telson with a strong seta on each dorsolateral crest.

Etymology. From the Latin *pilosa* = hairy, referring to the highly setose gnathopods.

Remarks. *Gammaropsella pilosa* appears to be quite similar to *Megamphopus brevidactylus* from the Medi-

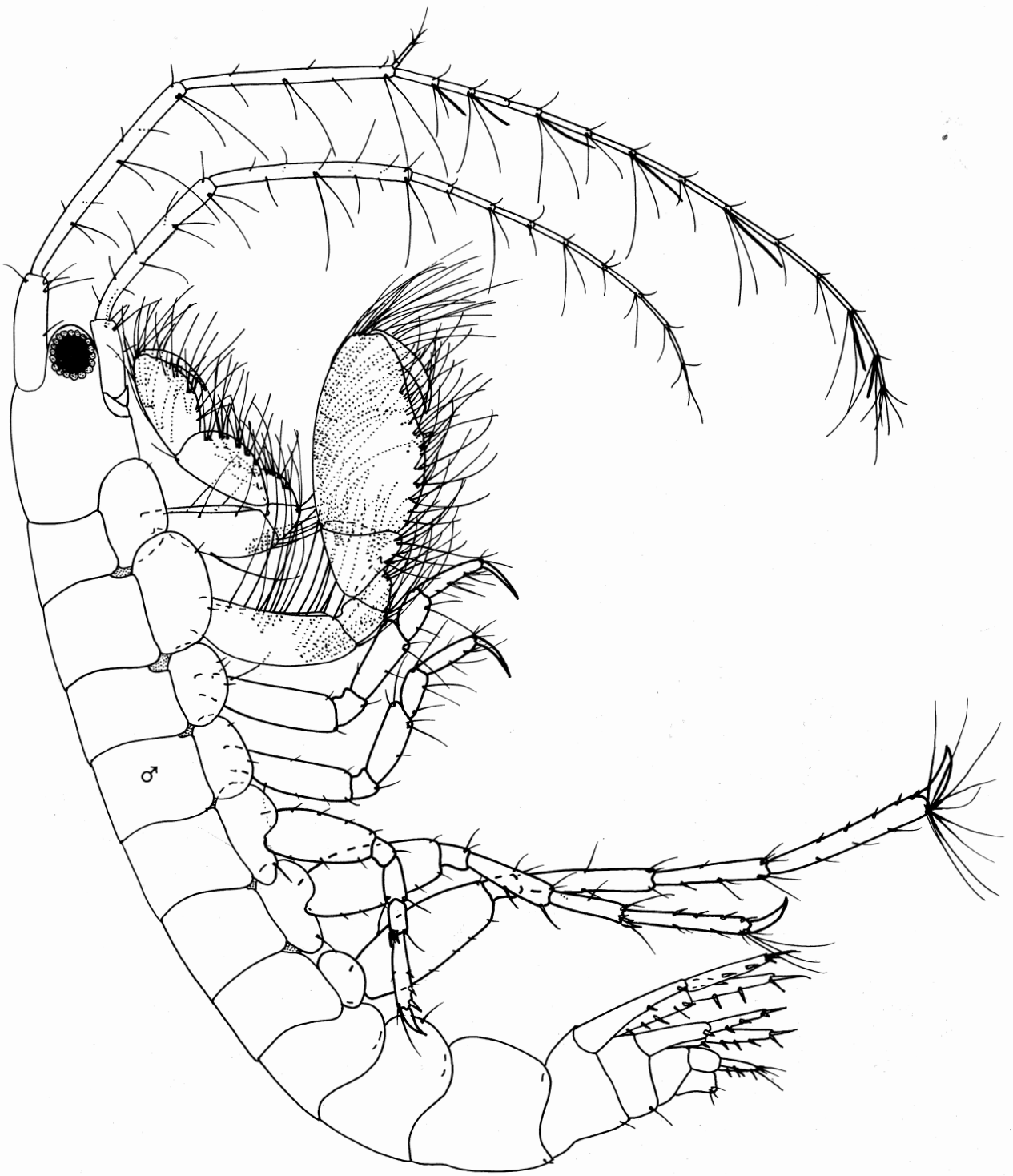

Fig. 17. *Gammaropsella pilosa* n.sp., Padoz Natun reef, Madang Lagoon, Papua New Guinea, JDT/ PNG-67.

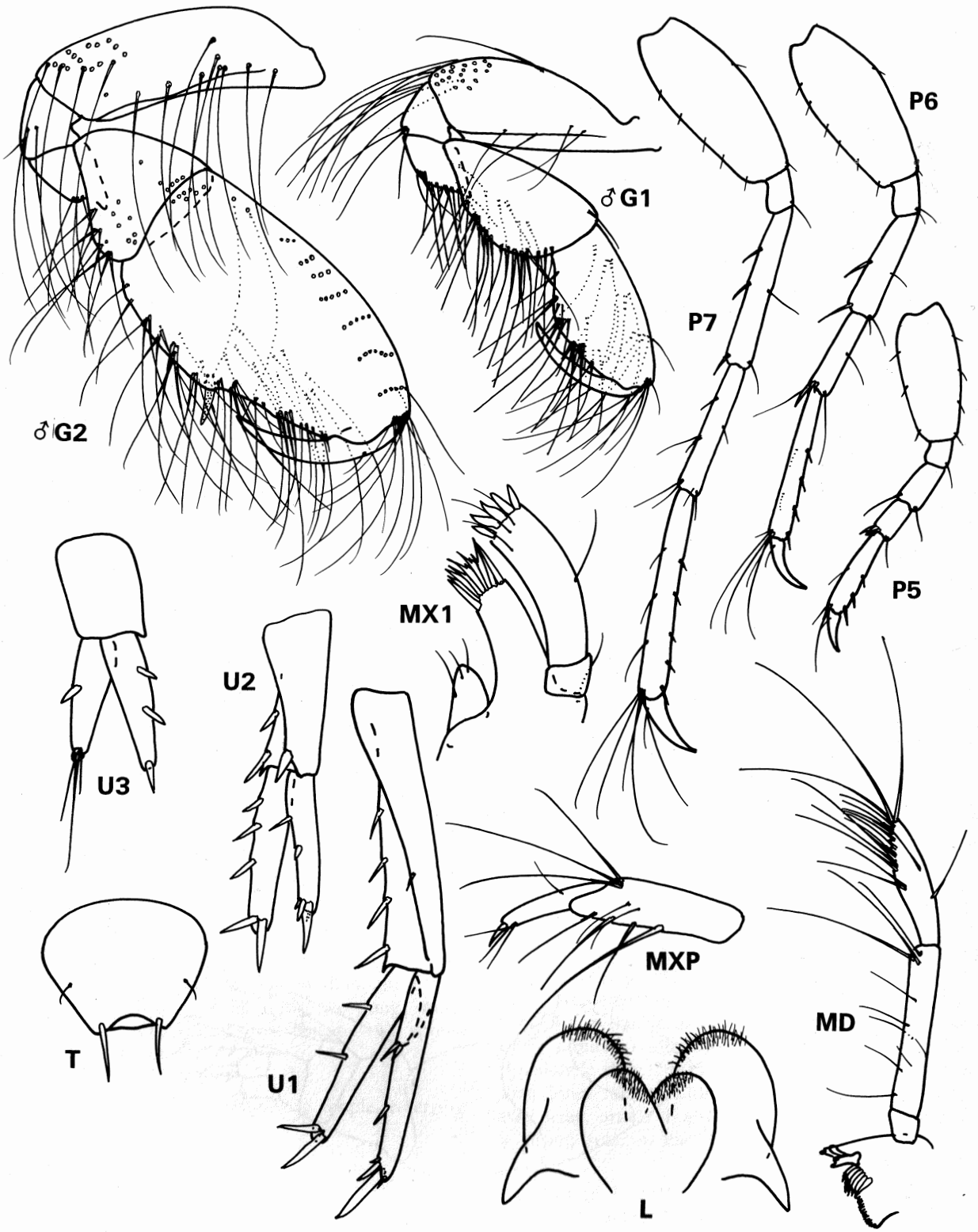

Fig. 18. *Gammaropsella pilosa* n.sp., Padoz Natun reef, Madang Lagoon, Papua New Guinea, JDT/PNG-67.

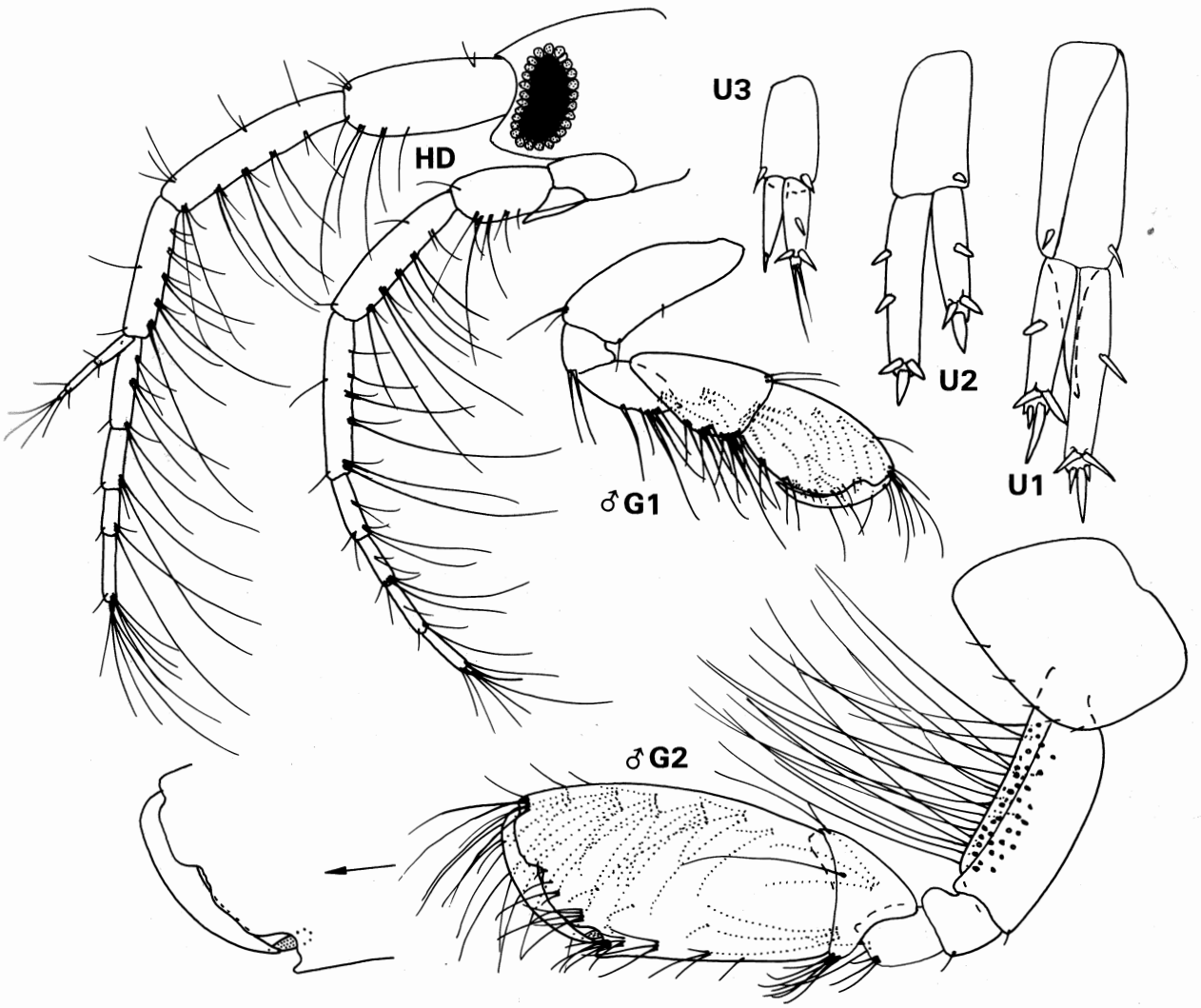

Fig. 19. *Gammaropsis afra* Stebbing, Barracuda Point, Tab, Madang Lagoon, Papua New Guinea, JDT/PNG-66.

terranean Sea. However, *G. pilosa* differs from that species and all other *Megamphopus* species by the non-clavate mandible palp article 3.

Habitat. Among *Halimeda*, rubble and mud in 36 m.

Gammaropsis Liljeborg

Gammaropsis abbotti (Barnard)

Megamphopus abbotti Barnard, 1965: 537, fig. 32.
Gammaropsis abbotti.–Ledoyer, 1972: 237, pl. 50.–Ledoyer, 1978: 238.–Ledoyer, 1979a: 155.–Ledoyer, 1979b: 31.–Ledoyer, 1982: 211, fig. 73.

Material examined. AM P42473 to P42474; JDT/PNG-66 (1 female), JDT/PNG-67 (3 males).

Habitat. Among coral rubble in 1–13 m.

Distribution. Indo-west Pacific.

Gammaropsis afra Stebbing

Fig. 19

Gammaropsis afra Stebbing, 1888: 1097, pl. 113.–Barnard, 1970: 170, fig. 108.–Ledoyer, 1978: 239, fig. 16 (form "A").–Ledoyer, 1982: 214, fig. 74.
Eurystheus afer Stebbing, 1906: 612.–Stebbing, 1908: 87.–Barnard, 1916: 249, pl. 28.–Pillai, 1957: 55, fig. 13.–Sivaprakasam, 1970: 568, fig. 9.–Rabindranath, 1971: 79, figs 7, 8.

Material examined. AM P42475 to P42476; JDT/PNG-66 (2 males), JDT/PNG-67 (1 male, 1 female).

Habitat. Among coral rubble in 1–13 m.

Distribution. Indo-west Pacific.

? *Gammaropsis atlantica* Stebbing

Fig. 20

Material examined. AM P42477 to P42491; JDT/PNG-47 (3 females), JDT/PNG-55 (1 male, 1 female), JDT/PNG-59 (10 males, 12 females), JDT/PNG-66 (6 males, 6 females), JDT/PNG-67 (2 females), JDT/PNG-68 (2 males, 2 females), JKL/PNG-182 (1 male, 1 female), JKL/PNG-183 (3 males, 1 female), JKL/PNG-184 (5 males, 10 females), JKL/PNG-185 (1 male, 1 female), JKL/PNG-212 (14 males, 24 females), JKL/PNG-213 (18 males, 23 females), JKL/PNG-239 (1 male), JKL/PNG-240 (1 male, 2 females), JKL/PNG-258 (6 males, 8 females), JKL/PNG-259 (7 males, 8 females).

Remarks. It is probable that a number of species currently exist under the name *G. atlantica* (see under *G. gemina* n.sp.). Resolution of the problem will only emerge after detailed study of materials of world-wide origin. Figures are here provided of Papua New Guinean material for comparison with *G. gemina* n.sp. and with other "*G. atlantica*" materials. No attempt at synonymy is made.

Habitat. On rubble and sand/mud bottoms, often with *Halimeda, Padina* or anastomosing red algae, in depths of 3 m to at least 36 m.

Gammaropsis christenseni n.sp.

Figs 21, 22

Type material. HOLOTYPE male, 2.1 mm, AMP42806; PARATYPE female AM P42493; Padoz Natun reef (5°09.60'S 145°48.77'E), formalin wash of cemented rubble in shallow part of reef near centre and northern edge, J.D. Thomas, 28 February 1990, stn JDT/PNG-67.

Other material examined. AM P42492 AAM/PNG-11 (1 male).

Diagnosis. Length 2.1 mm. Head with well-developed eye lobes, eyes sub-round; antenna 1 and 2 setose, subequal, over half body length; antenna 1 peduncular articles in the basi-distal ratios 2:4:3; flagellum shorter than peduncle with about 6 articles; accessory flagellum with three articles the terminal article rudimentary; antenna 2 peduncular article 4 rather short, article 5 distinctly the longer, flagellum only a little shorter than combined lengths of peduncular article 4 and 5, with about 6 articles; mandible palp article 3 only a little shorter than 2, strongly clavate; labium inner plate with three long marginal setae; labium outer plate mandibular processes subacute; gnathopod 1 slender, coxa produced forward, anterior margin evenly rounded, basis unexpanded, propodus a little shorter than carpus, palm evenly continuous with posterior margin, dactylus elongate, four-fifths length of propodus; male gnathopod 2 basis stout, anterior margin excavate for reception of carpus when folded, carpus subtriangular, propodus almost three times length of carpus, palmar platform short, cut-away distally to posterior margin, which is delimited by a stout spine, dactylus short, but overlapping palmar platform and opposable to delimiting spine; female gnathopod 2 scarcely differing from that of male, but basis a little less stout, propodus a little broader and dactylus somewhat longer; pereopods 3–7 normal; epimera 1–3 rounded; uropod 1 peduncle longer than rami with stout inter-ramal tooth less than half length of peduncle, rami subequal; uropod 2 peduncle shorter than rami, lacking an inter-ramal tooth, inner ramus a little longer than outer; uropod 3 peduncle shorter than rami, rami subequal in length, inner ramus with small second article bearing a pair of long setae, outer ramus with a single small distal spine and a single marginal spine; telson with each dorsolateral crest bearing a spine and a pair of unequal length setae.

Etymology. Named after the Research Institute at Madang from which the work was carried out.

Remarks. This rather unremarkable species lacks very distinctive characters. It shows some similarity to *Gammaropsis pali* Barnard, 1970, but that species has a much more well developed palmar excavation on gnathopod 2 and is generally much more stout, with short, compact urosome and uropods, much shorter antennae and notched epimera. In the shape of gnathopod 2 it also resembles sub-mature male *G. togoensis* (Schellenberg, 1925a), but that species has quite different head shape and antennae and strongly sexually dimorphic gnathopod 2.

Habitat. On cemented rubble bottoms in shallow waters, to about 2 m, sometimes among *Halimeda*.

Gammaropsis gemina n.sp.

Figs 23, 24

Eurystheus atlanticus Stebbing, 1906: 611.–Barnard, 1965: 534, fig. 29 (aberrant form);
not *Gammaropsis atlanticus* Stebbing, 1888: 1101, pl. 114.

Type material. HOLOTYPE male, 5.0 mm, AM P42495; PARATYPES, 10 males, 15 females, AM P42496; Planet Rock (5°15.48'S 145°49.14'E), dead *Acropora* plates with epiphytes, about 6 m, J.K. Lowry & S.J. Keable, 16 March 1991, stn JKL/PNG-213.

Other material examined. AM P42497 to P42504; AAM/PNG-6 (5 males, 6 females), JDT/PNG-47 (2 males, 5 females), JDT/PNG-57 (6 males, 4 females), JDT/PNG-59 (5

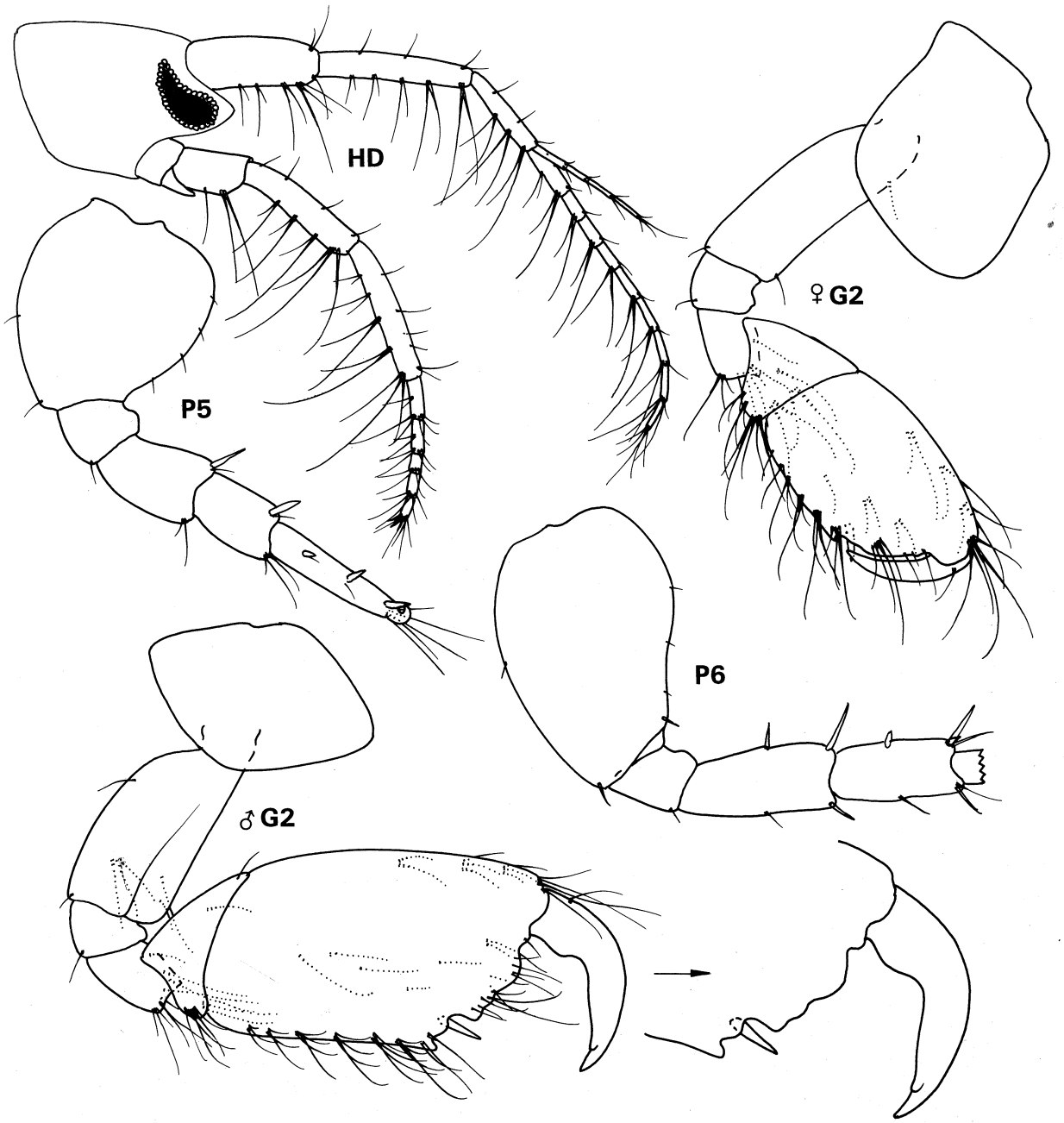

Fig. 20. ? *Gammaropsis atlantica* Stebbing, barrier reef near Wongad, Madang Lagoon, Papua New Guinea, JDT/PNG-59.

males), JDT/PNG-66 (1 male), JDT/PNG-67 (7 males, 10 females), JKL/PNG-212 (3 males, 4 females), JKL/PNG-238 (1 male).

Diagnosis. Length 5.0 mm. Head with rather slender eye lobes, eyes oval, red, situated entirely in head lobes; antennae setose, antenna 1 two-thirds body length, peduncular articles 1 and 3 subequal, flagellum shorter than peduncle with about 14 articles, accessory flagellum with 4 articles the terminal article rudimentary; antenna 2 shorter than antenna 1, peduncular article 5 longer than 4, flagellum longer than peduncular article 5 with about 8 articles; mandible palp articles in the basi-distal ratios 4:10:9, article 3 weakly spatulate; maxilla 1 inner plate with numerous setae; gnathopod 1 small, slender, carpus and propodus subequal in length, propodus subovoid, palm evenly continuous with posterior margin, dactylus slender, curved; gnathopod 2 alike in both

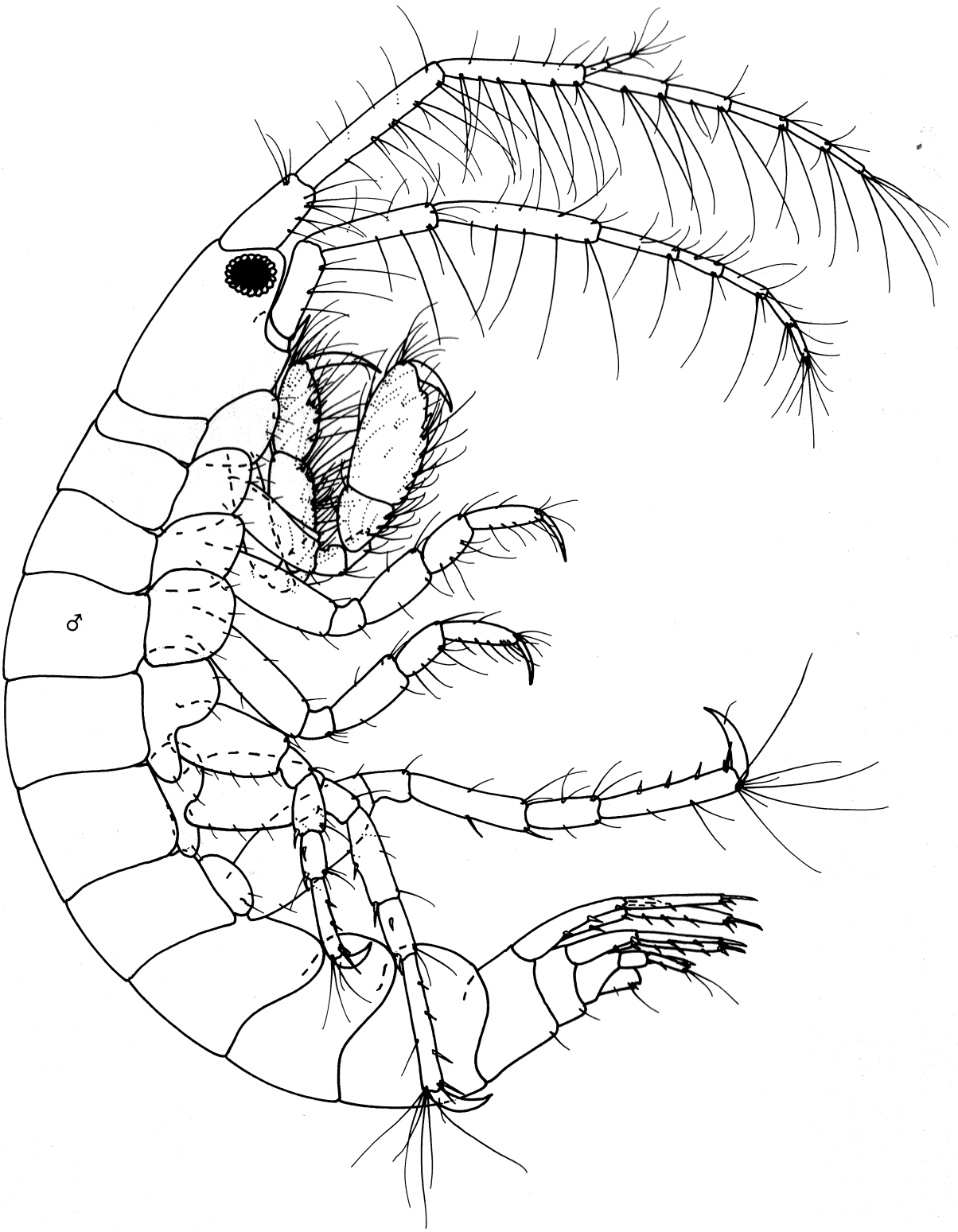

Fig. 21. *Gammaropsis christenseni* n.sp., Padoz Natun reef, Madang Lagoon, Papua New Guinea, JDT/PNG-67.

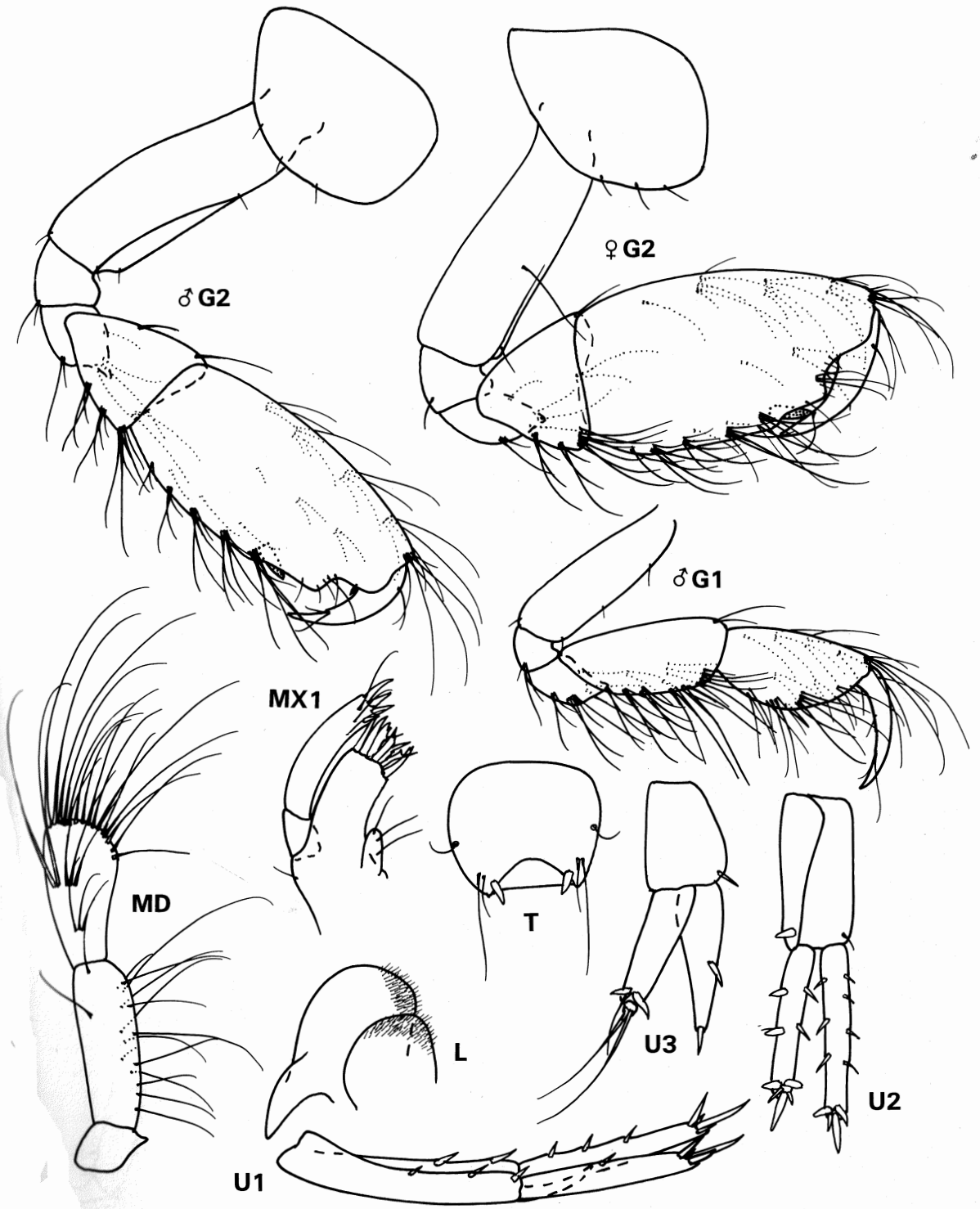

Fig. 22. *Gammaropsis christenseni* n.sp., Padoz Natun reef, Madang Lagoon, Papua New Guinea, JDT/PNG-67.

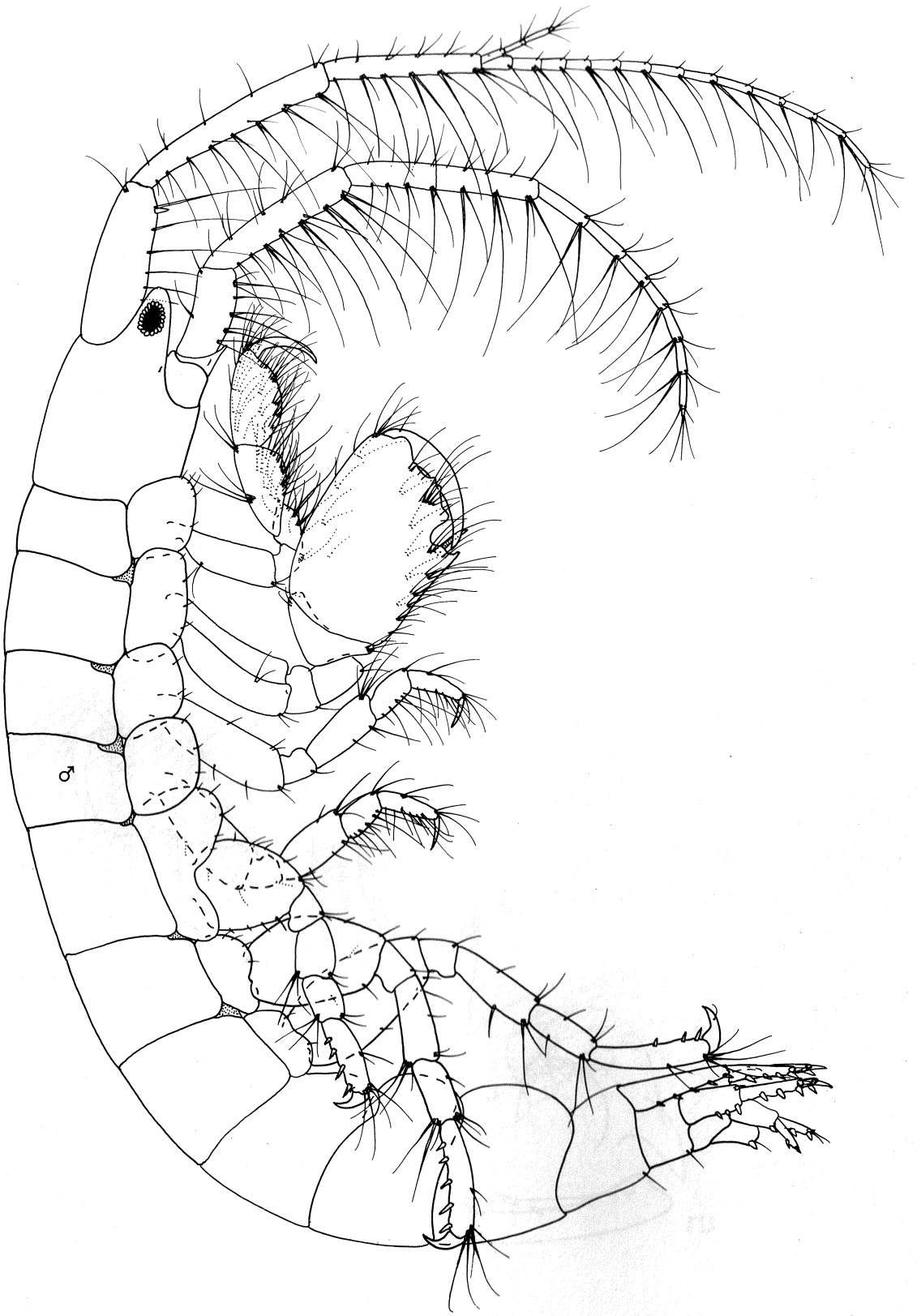

Fig. 23. *Gammaropsis gemina* n.sp., Kranket lagoon, Madang Lagoon, Papua New Guinea, AAM/PNG-6.

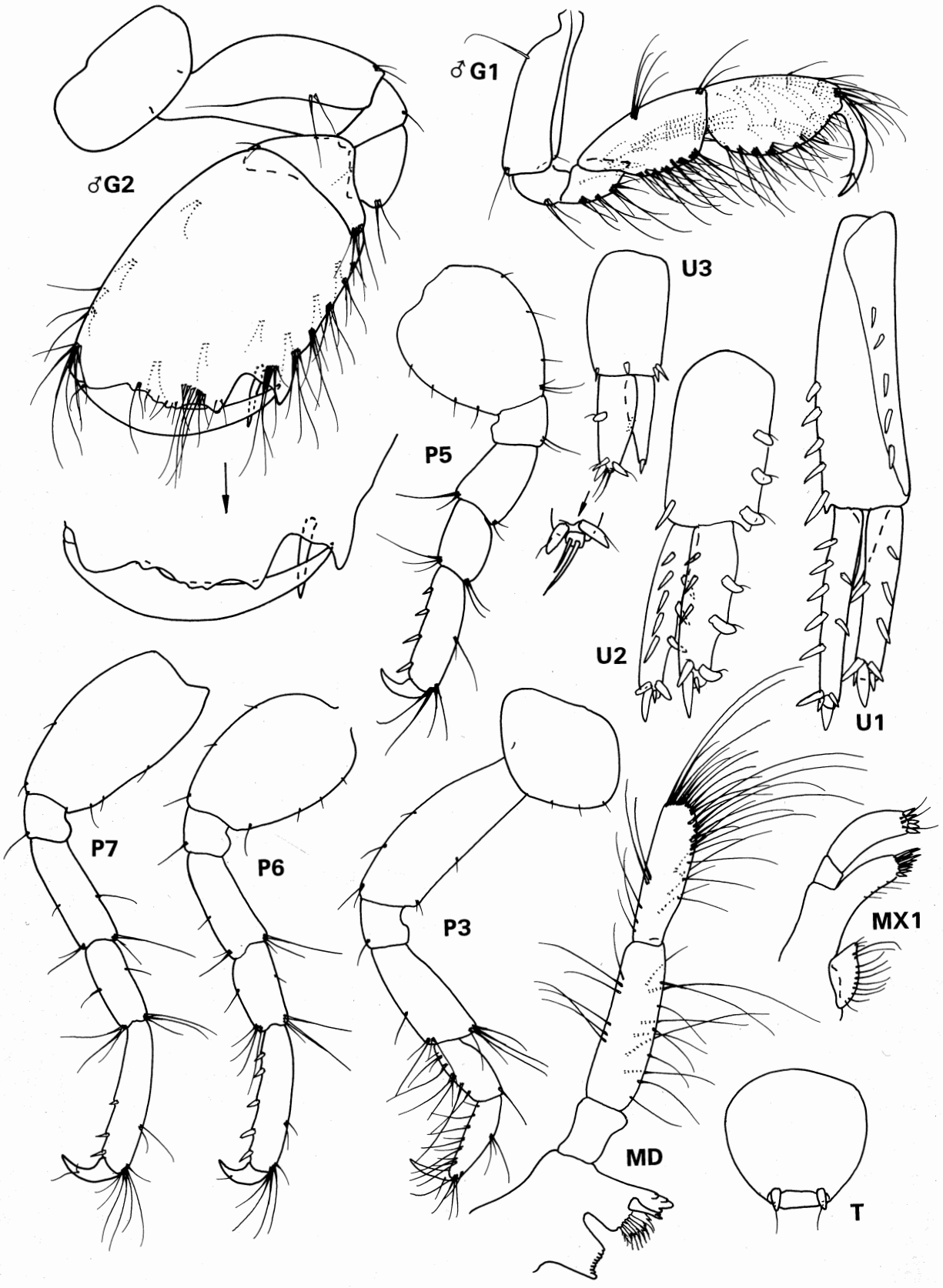

Fig. 24. *Gammaropsis gemina* n.sp., Kranket lagoon, Madang Lagoon, Papua New Guinea, AAM/PNG-6.

sexes, basis stout, excavate on anterior margin for reception of carpus when folded, carpus very short, cup-shaped, propodus massive, palm irregular, a strong posterodistal tooth separated from the palmar platform by a deep, flat-bottomed excavation bearing a spine, dactylus opposable to posterodistal tooth; pereopods 3–7 normal for the genus, pereopods 5–7 in the length ratios 7:9:10; epimera 1–3 rounded; uropod 1 spinose, peduncle longer than rami with an inter-ramal tooth, inner ramus longer than outer; uropod 2 spinose, peduncle subequal with rami, lacking an inter-ramal process, inner ramus a little longer and more slender than outer; uropod 3 peduncle longer than rami, inner ramus a little longer and broader than outer, with a small second article; telson with a stout spine on each dorsolateral crest.

Etymology. From the Latin *geminus* = twin, referring to the geminate nature of this species and *G. atlantica sensu lato*.

Remarks. The *Gammaropsis atlantica* complex has caused considerable difficulties to taxonomists and has led to a number of "forms" being described (see Barnard, 1965, 1970 and Ledoyer, 1982, forms "A" and "B"). Barnard (1970) also describes *afra-atlantica* hybrids. Barnard (1965) noted the occurrence (in Micronesia) of a phenotype in which the females had gnathopods identical to those of the males. Present material appears to be identical to that described by Barnard (1965), in having similar, non sexually-dimorphic gnathopods. The consistent differences between present material and ? *G. atlantica*, which has sexually-dimorphic gnathopods and which frequently occurs in the same samples, merits recognition of the above material as a distinct species. In mixed fresh samples they are readily distinguished without dissection by the red oval eye when compared with the yellow lageniform eye of *G. atlantica* and this is not size related and therefore not due to differences in growth stage. In preserved samples, when the eye pigments have faded, separation requires closer examination. A more extensive study of the *G. atlantica* complex is required before any full resolution of its taxonomy. No attempt is made here, therefore, to determine the full synonymy of *G. gemina*. Only the Micronesian material of Barnard (1965) is placed with confidence in the synonymy.

Habitat. On rubble and sand/mud bottoms, sometimes with *Halimeda* or sponges from 1m to at least 36 m.

Gammaropsis lacinia n.sp.

Figs 25, 26

Type material. HOLOTYPE female, 3.0 mm, AM P42505; barrier reef near Wongad (5°08.11'S 145°49.53'E), rubble, encrusted dead *Acropora* plates, also some pieces from caves and overhangs, 36 m and 21 m, J.D. Thomas, 22 February 1990, stn JDT/PNG-59. PARATYPE female, AM P42506; Planet Rock, (5°15.48'S 145°49.14'E), dead *Acropora* plates with epiphytes, about 10 m, M. Jebb, 15 March 1991, stn JKL/PNG-212.

Other material examined. AM P42507 to P42508; JKL/PNG-213 (1 female), JKL/PNG-240 (1 female).

Diagnosis. Length 3.0 mm. Head lobes only moderately produced, eye of medium size; antennae stout, setiferous; antenna 1 less than half body length, peduncular articles 1 and 3 subequal, article 2 only slightly longer, flagellum short, less than half length of peduncle, with 4–5 articles; accessory flagellum composed of one long and one rudimentary article; antenna 2 longer than antenna 1, peduncular articles 4 and 5 subequal, flagellum longer than peduncular article 5 with 4–5 articles; labrum with short epistome; mandible spine row of 4 spines, palp article 3 spatulate, three quarters length of article 2; labium outer plates with moderately produced, rounded mandibular processes; maxilla 1 inner plate with one distal seta; maxilla 2 normal; maxilliped palp article 4 with two strong unequal distal spines and two smaller sub-distal setae; gnathopod 1 slender, propodus only slightly shorter than carpus, palm convex, evenly continuous with posterior margin, dactylus overlapping palm; male gnathopod 2 unknown; female gnathopod 2 coxa subquadrangular, basis anterodistal margin produced into a rounded lobe overlapping ischium, carpus short, cup-shaped, inner face with anterodistal extension extending at right-angles to face of propodus, anterodistal margin of carpus and distal extremity of extension, each with a stout spine, propodus enlarged, anterior margin with flange, widest proximally, narrowing distally, which extends at right-angles to face of propodus and joins proximally with similar extension on carpus, palm oblique, with three triangular teeth, one sub-distally (the longest), one medioproximally and one proximally with defining spine, dactylus stout, fitting palm; pereopods 3–4 normal, articles 4–7 short; pereopod 5 basis expanded on posterior margin, largest proximally with a weak, rounded posterodistal lobe; pereopod 6 basis evenly expanded with strong, acute, posterodistal lobe; pereopod 7 basis expanded, broadest medially, with strong acute posterodistal lobe; epimera 1–3 subquadrate with small posterodistal notch bearing a fine seta; uropod 1 peduncle elongate, with strong inter-ramal tooth, rami short, scarcely half length of peduncle, the inner ramus the longer; uropod 2 peduncle with strong but short inter-ramal tooth, rami shorter than peduncle, with stout spines, inner ramus the longer; uropod 3 peduncle elongate, rami short, only a little more than half length of peduncle, lacking marginal spines, inner ramus slightly the longer with a single terminal spine but no setae, outer ramus with one marginal seta, and a single terminal spine; telson with each dorsolateral crest bearing a single long sub-distal seta and a small medial seta.

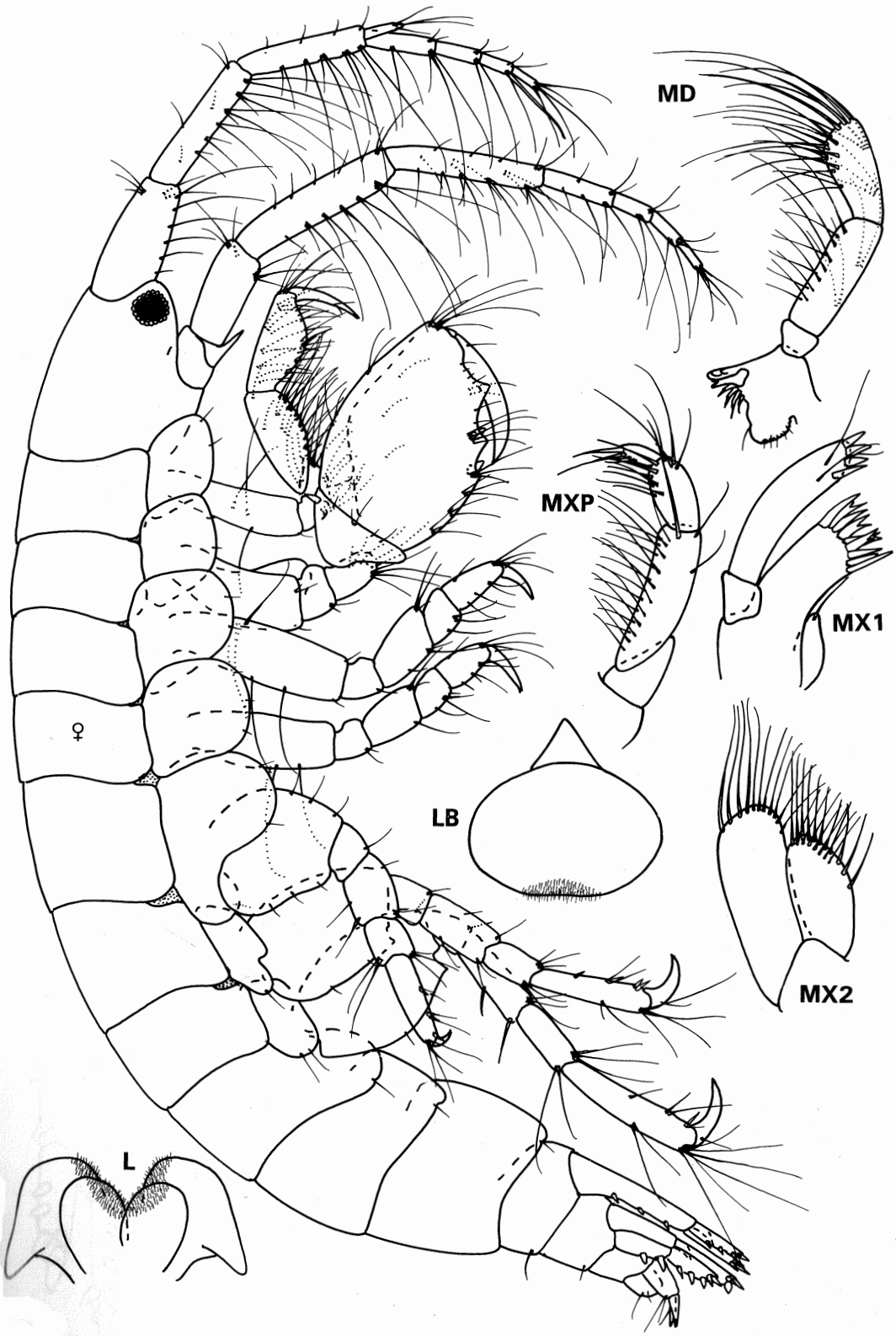

Fig. 25. *Gammaropsis lacinia* n.sp., Planet Rock, Astrolabe Bay, Papua New Guinea, JKL/PNG-213.

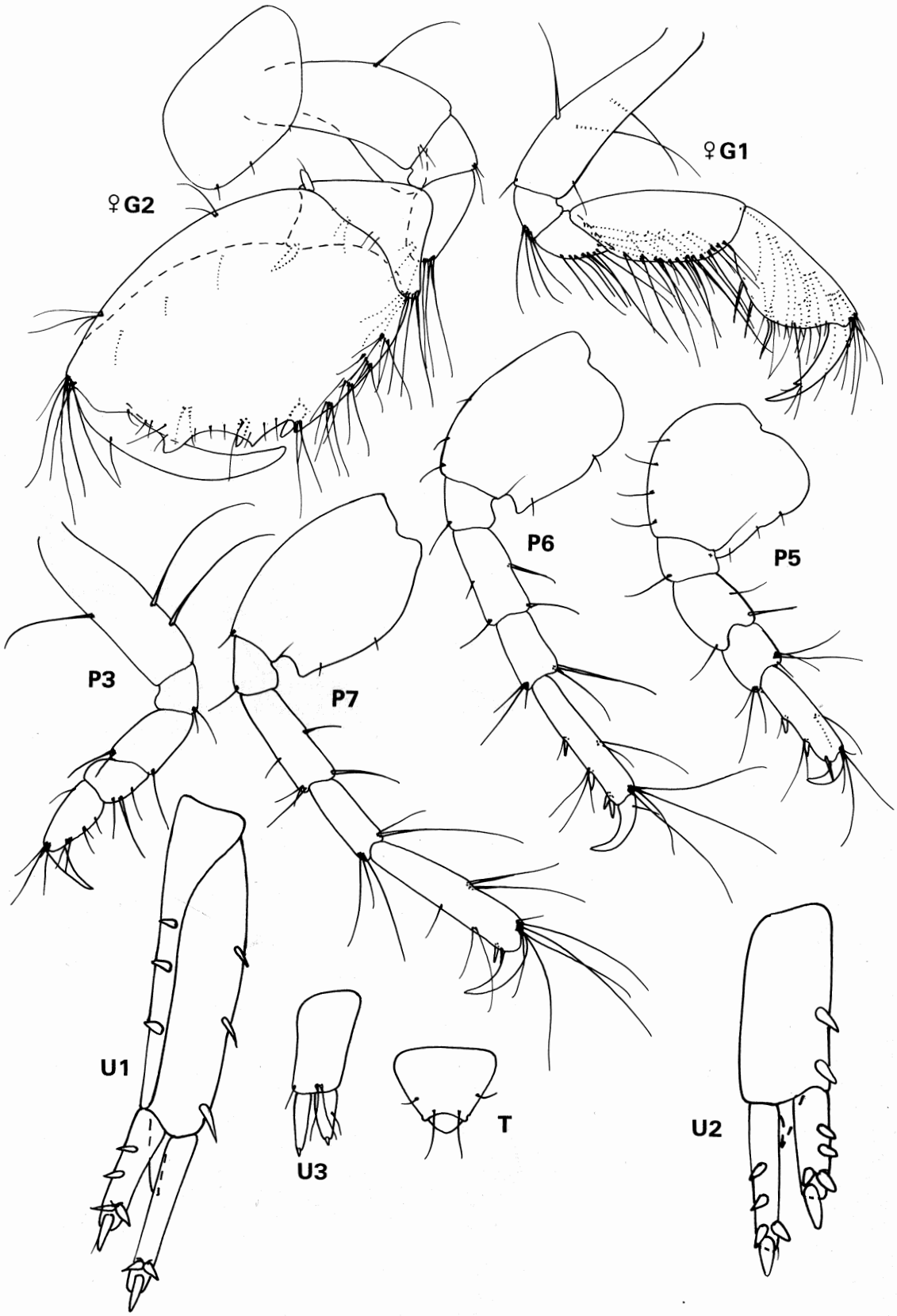

Fig. 26. *Gammaropsis lacinia* n.sp., Planet Rock, Astrolabe Bay, Papua New Guinea, JKL/PNG-213.

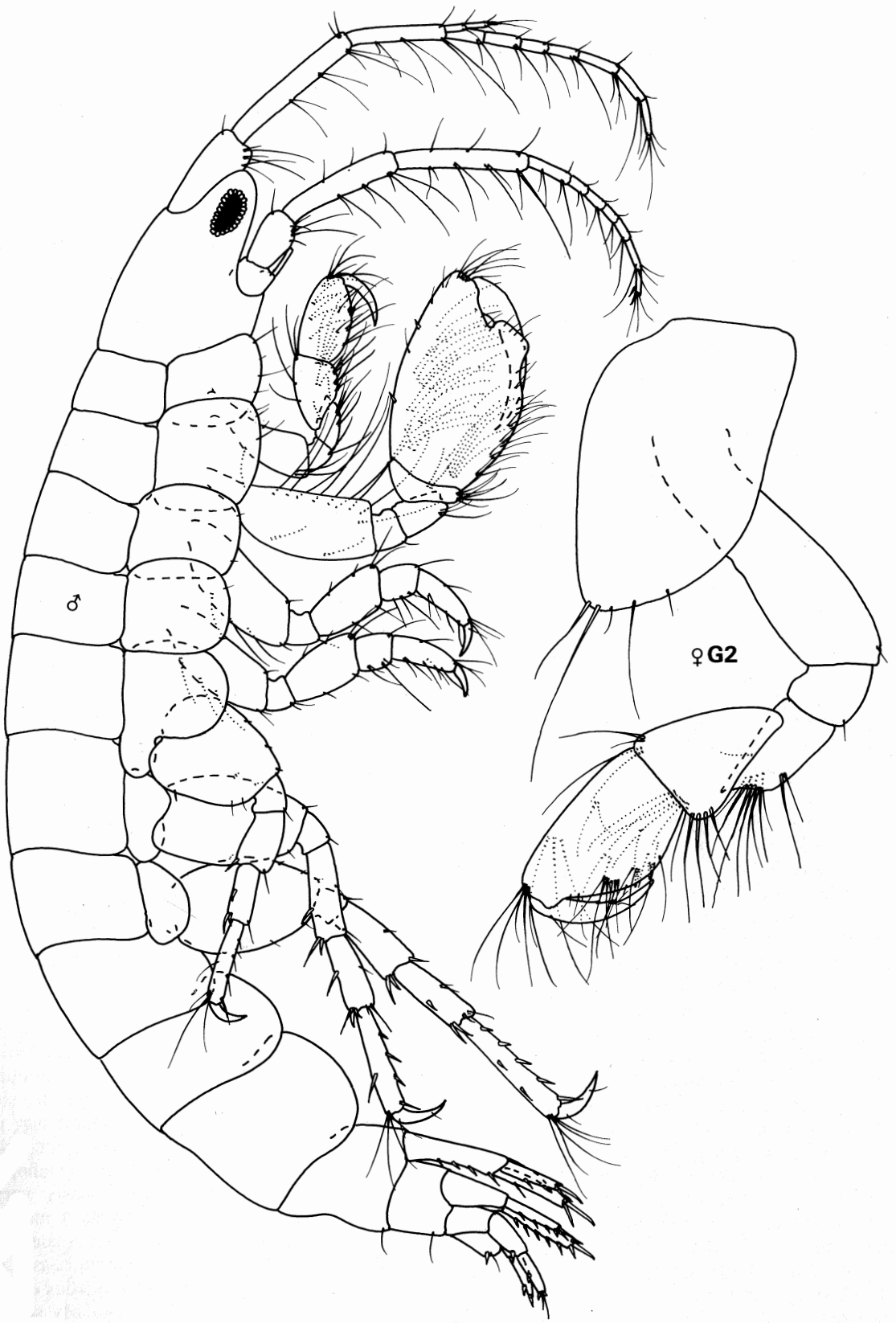

Fig. 27. *Gammaropsis planodentata* n.sp., Kranket, Madang Lagoon, Papua New Guinea, AAM/PNG-1.

Etymology. Noun in apposition from the Latin *lacinia* = the flap of a garment, referring to the extension on the gnathopod 2 carpus and propodus.

Remarks. The most remarkable feature of this species is the curious gnathopod 2 with the anterior margins of the carpus and propodus produced into a flange which curves over at right angles to the inner faces of these podomeres. It can only be seen clearly by manipulation of the specimen under the dissecting microscope since the flange becomes deformed when the appendage is mounted on a slide. It is a stout species with a compact urosome and with short, spiny uropods. Males of this species have not yet been collected.

Habitat. Among rubble and dead coral, from 1m to at least 36 m.

Gammaropsis planodentata n.sp.

Figs 27, 28

Type material. HOLOTYPE male, 3.0 mm, AM P42513; PARATYPES, 8 males, 13 females, AM P42514; channel at north end of Jais Aben Resort (5°09.06'S 145°48.20'E), coral rubble, A.A. Myers, 2 April 1991, stn AAM/PNG-16.

Other material examined. AM P42515 to P42523; AAM/PNG-1 (7 males, 12 females), AAM/PNG-13 (2 males, 2 females), AAM/PNG-17 (4 males, 18 females), JDT/PNG-47 (1 female), JDT/PNG-57 (1 male, 4 females), JDT/PNG-59 (1 female), JDT/PNG-68 (7 males, 7 females), JDT/PNG-70 (1 male), JKL/PNG-261 (2 males, 8 females).

Diagnosis. Length 3.1 mm. Head with well-developed eye lobes, eye elongate-ovate; antennae subequal, short, much less than half body length; antenna 1 peduncular articles in the ratios 2:3:2, flagellum shorter than peduncle with 8–9 articles, accessory flagellum composed of three articles, the terminal article rudimentary; antenna 2 peduncular article 5 a little longer than 4, flagellum shorter than the combined length of peduncular articles 4 and 5, with 8–9 articles; mouthparts typical of the genus; gnathopod 1 coxa anterodistal corner produced, subacute, basis lageniform, propodus longer than carpus, palm evenly convex, defined by a spine, dactylus overlapping palm; male gnathopod 2 coxa subquadrangular, basis stout, anterior margin with an array of long setae, carpus extremely reduced, propodus more than ten times length of carpus, palm with small, round-bottomed sinus near dactylus hinge, followed by a large flat-topped tooth, followed by a shallow concavity at junction with posterior margin, inner face of propodus densely setose, dactylus strongly falcate, overlapping palm and closing over inner face of posterior margin; female gnathopod 2 coxa deeper than broad, basis without long setae, carpus triangular, propodus about 25% longer than carpus, palm evenly rounded, defined by two small spines, dactylus fitting palm; pereopods 3–4 stout, dactylus short about half length of propodus; pereopod 5 basis posterior margin expanded into flange, broadest proximally; pereopods 6–7 normal, basis only moderately expanded proximally; epimera 1–3 rounded; uropod 1 peduncle longer than rami with an extremely long inter-ramal tooth, almost two-thirds length of peduncle, inner ramus longer than outer; uropod 2 peduncle shorter than inner ramus, with a strong inter-ramal tooth nearly two-thirds length of peduncle, inner ramus spinose, much longer and stouter than outer ramus; uropod 3 peduncle longer than rami, outer ramus the longer, with a small second article; telson with each dorsolateral crest bearing a stout spine and a small seta.

Etymology. From the Latin *planus* = flat and *dentatus* = toothed, referring to the shape of the tooth on the male gnathopod 2 propodus.

Remarks. This species is immediately recognisable in mixed samples of *Gammaropsis* from Madang, by the peculiar elongate-oval eye. The male gnathopod 2, with its flat-topped tooth, is also characteristic.

Habitat. In coral rubble and among *Halimeda, Halophila, Padina* and sponges in 1 m to at least 36 m.

Gammaropsis siara n.sp.

Figs 29, 30

Type material. HOLOTYPE male, 2.8 mm, AM P42525; PARATYPES, 3 males, 2 females, AM P42526; Awan Biziwan, (5°11.06'S 145°49.70'E); channel at bottom of reef face, rubble, 27 m, J.K. Lowry & S.J. Keable, 19 March 1991, stn JKL/PNG-258.

Diagnosis. Length 2.8 mm. Head lobes strongly produced, acute; eye reniform; antennae subequal, a little over half body length; antenna 1 peduncular articles in the basi-distal ratios 8:13:10, flagellum shorter than peduncle with about 6 articles, accessory flagellum with three articles; antenna 2 peduncular article 4 a little longer than 5, flagellum longer than peduncular article 5 with 6–7 articles; labrum with strongly produced, acute epistome; mandible palp article 3 clavate, shorter than article 2; labium outer plate mandibular projections moderately produced, acute; maxilla 1 inner plate setose; maxilliped palp article 4 slender; gnathopod 1 coxa distal margin with three teeth, basis very slender, propodus shorter than carpus, broadest medially due to very oblique palm, dactylus falcate; male gnathopod 2 coxa with single posterodistal tooth, basis moderately slender, carpus short triangular, propodus enlarged, three times length of carpus, palm irregularly scalloped, with two excavations, defined by a short, triangular tooth, dactylus strongly falcate, closing over inner face of

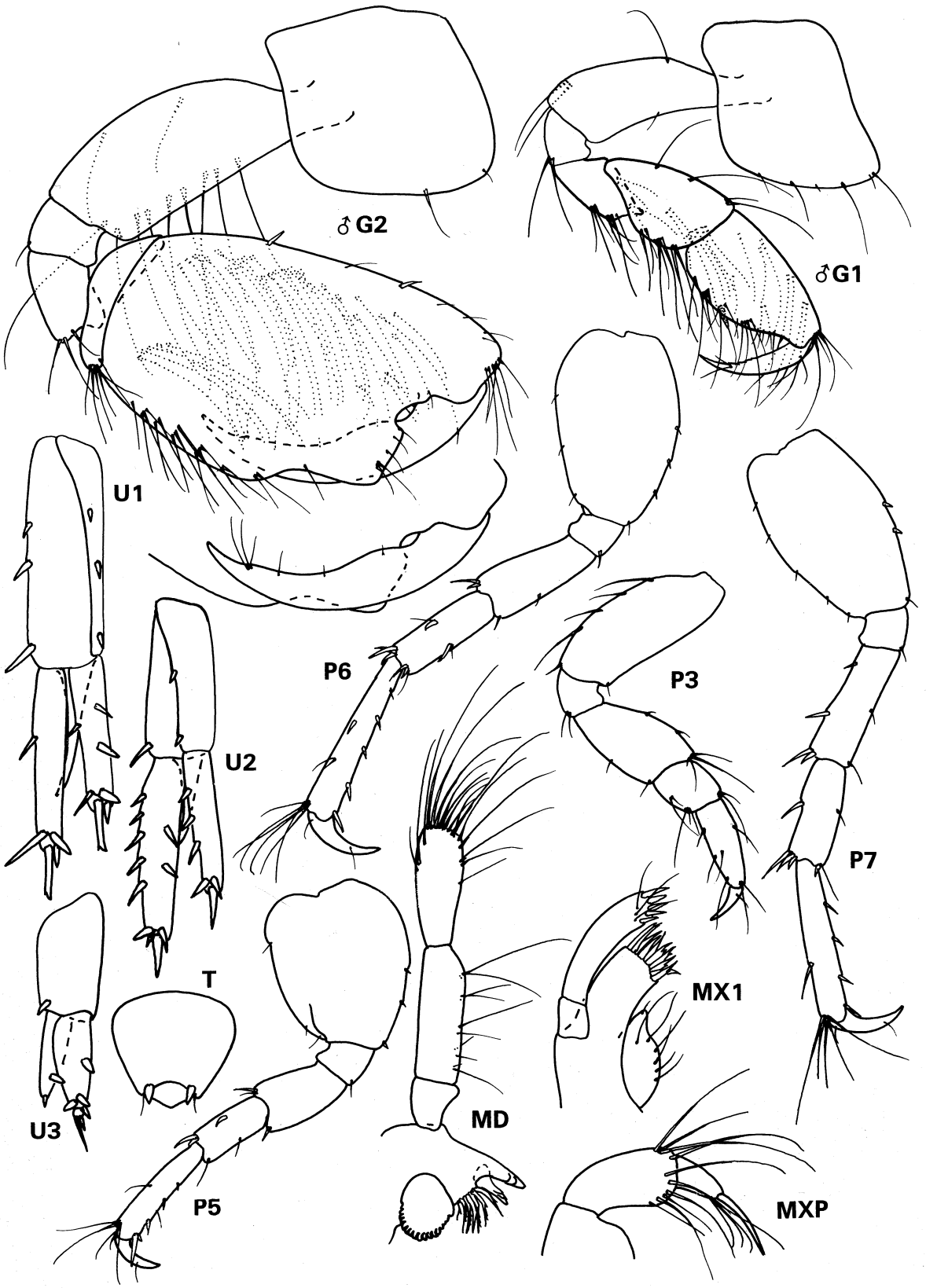

Fig. 28. *Gammaropsis planodentata* n.sp., Kranket, Madang Lagoon, Papua New Guinea, AAM/PNG-1.

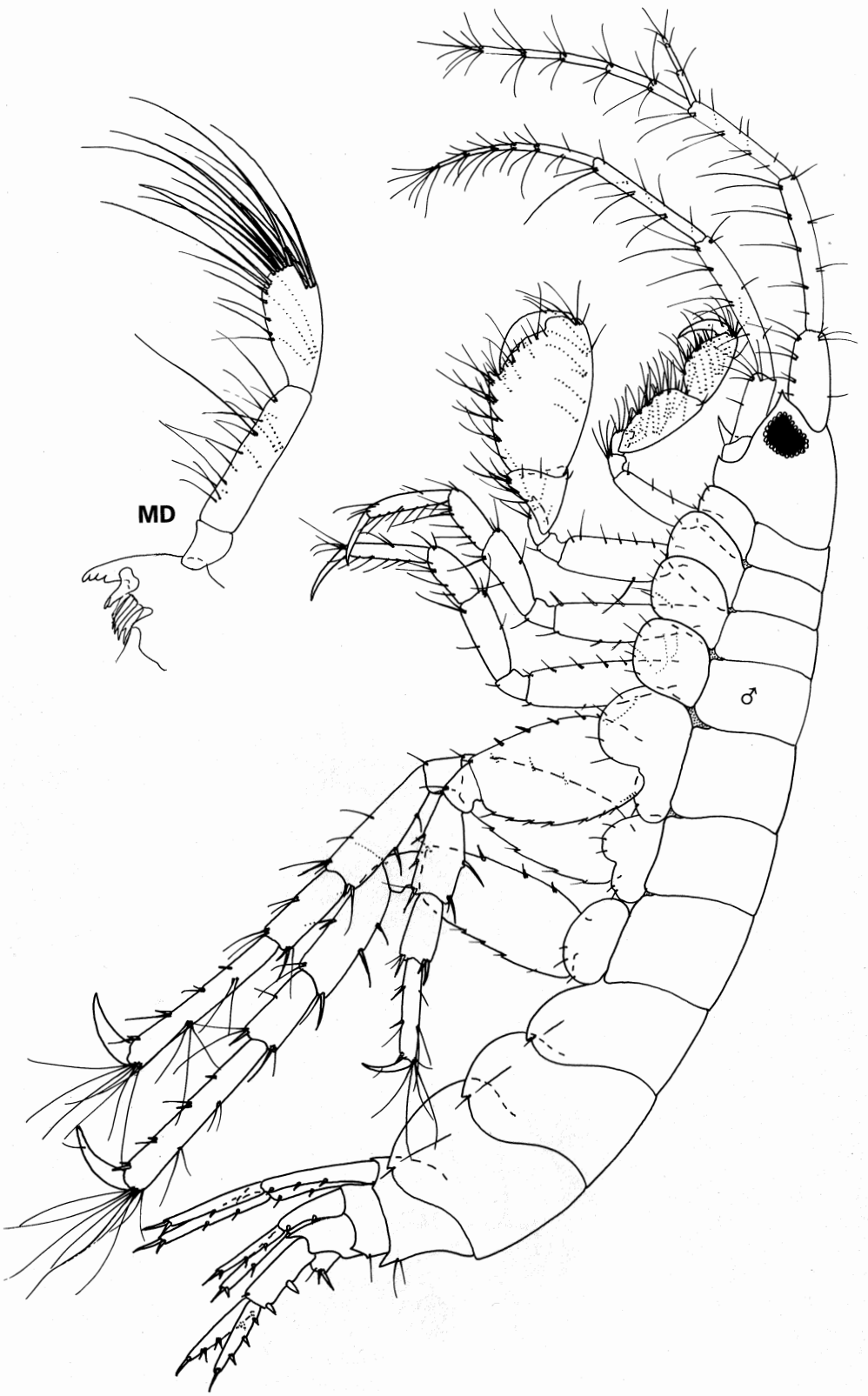

Fig. 29. *Gammaropsis siara* n.sp., Awan Biziwan, Madang Lagoon, Papua New Guinea, JKL/PNG-258.

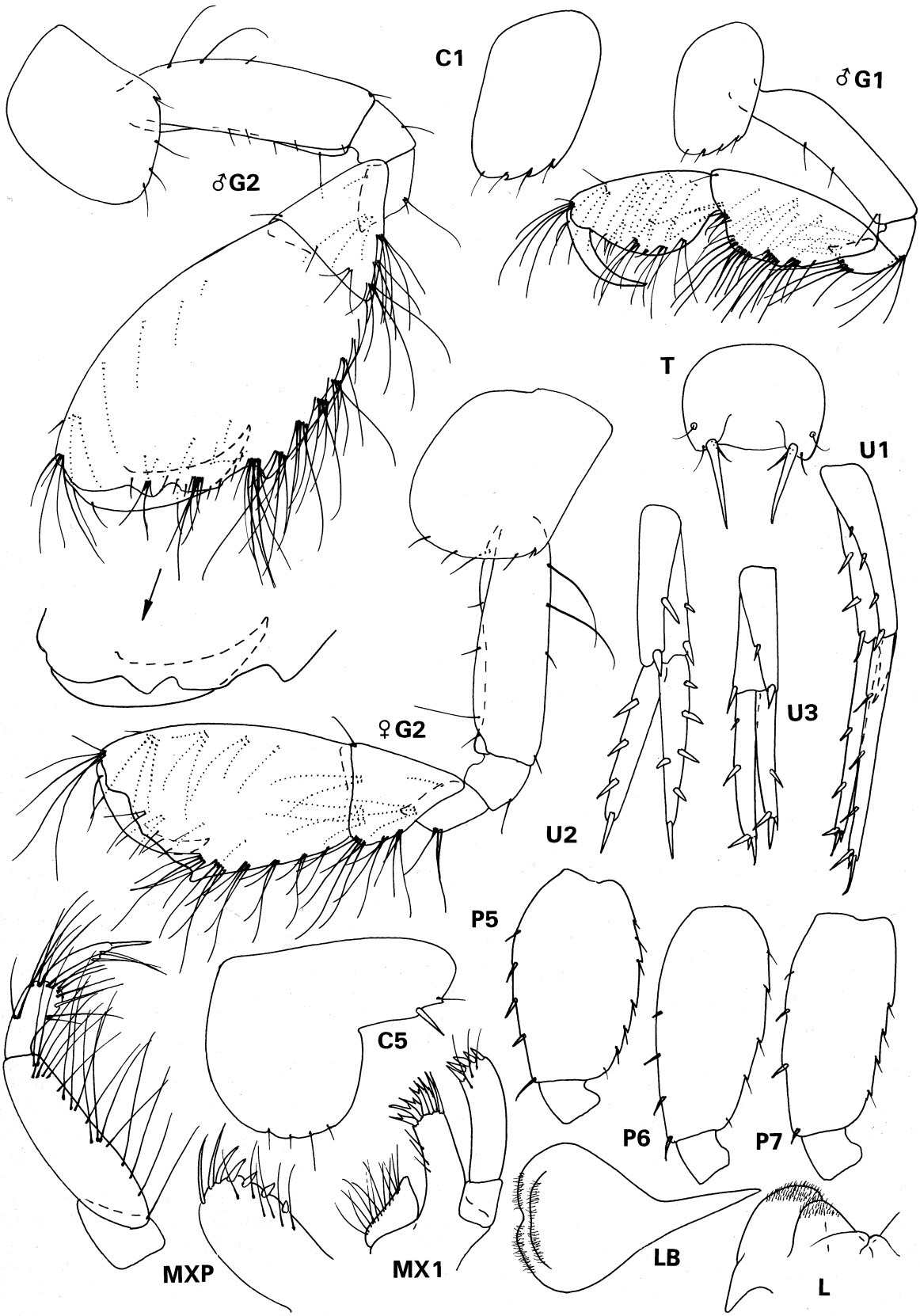

Fig. 30. *Gammaropsis siara* n.sp., Awan Biziwan, Madang Lagoon, Papua New Guinea, JKL/PNG-258.

propodus; female gnathopod 2 similar to that of male, but weaker, palm lacking distinct excavations; pereopods 3–4 normal, dactylus three-quarters length of propodus; pereopods 5–7 basis posterior margin toothed, pereopod 5 basis somewhat expanded, posterior margin convex; pereopods 6–7 basis scarcely expanded; epimera 1–3 with posterodistal tooth; urosome segment 1 with a pair of strong dorsal teeth; urosome segment 2 with a pair of much smaller, dorsolateral teeth; uropod 1 peduncle shorter than rami, with inter-ramal process less than half length of peduncle, rami extremely slender; uropod 2 peduncle a little longer than rami, lacking an inter-ramal process; uropod 3 rami subequal in length with each other and with peduncle, rami spinose, lacking setae; telson with each dorsolateral crest bearing a long, strong spine.

Etymology. Noun in apposition, after the Siar clan of the type locality.

Remarks. This species is clearly very close to *Gammaropsis denticulata* Ledoyer, 1979b from Madagascar, of which it may ultimately prove to be conspecific. It does, however, differ in several ways, in particular, the strongly acute eye lobes, the presence of three teeth on coxa 1, the less oblique palm of both the male and the female gnathopod 2, the convex posterior margin of pereopod 5 basis, and the much more strongly toothed pereopod 5–7 basis. It seems sensible at this time, therefore, to allocate present material to a new taxon.

Habitat. Rubble in 27 m.

Gammaropsis setifera (Schellenberg)

Eurystheus setiferus Schellenberg, 1938: 82, fig. 43.–Myers, 1985b: 84, fig. 65.
Gammaropsis pali.–Ledoyer, 1982: 234, fig. 85;
not *Gammaropsis pali* Barnard, 1970: 183, figs 117, 118.

Material examined. AM P42528 to P42529; JKL/PNG-184 (1 male, 1 female), JKL/PNG-238 (2 males, 2 immature).

Habitat. In rubble and coral debris, sometimes in association with *Padina*, red alga, *Halimeda* or sponges.

Distribution. Kiribati, Fiji, Papua New Guinea.

Papuaphotis n.gen.

Diagnosis. Head ocular lobes well developed, eye entirely within lobes. Antenna 1 and 2 short, subequal, antenna 1 peduncular articles 1 and 3 equal in length, accessory flagellum missing. Mandible palp article 3 parallel-sided, shorter than article 2. Coxae deep, coxa 2 narrower distally, coxa 5 posteriorly unexcavate. Gnathopod 2 enlarged, subchelate, propodus much longer than carpus. Pereopod 5 propodus with stout palmar spine. Uropod 3 with single ramus.

Type Species. *Papuaphotis regis* n.sp. monotypic.

Etymology. Compound name, formed from a cognate genus suffixed by the general locality of capture.

Remarks. This genus shares characteristics of *Photis* Krøyer (Antenna 1, article 1 = 3, no accessory flagellum) and *Microprotopus* Norman (very short, weakly setiferous Antennae 1 and 2, non-clavate mandible palp article 3, Uropod 3 uniramous). It differs from both genera in its non-excavate coxa 5.

Papuaphotis regis n.sp.

Figs 31, 32

Type material. HOLOTYPE male, 1.6 mm, AM P42452, PARATYPES, 1 male, 5 females, P42453; silty clay bottom with about 10% sand near the *Coral Queen*, Madang Lagoon, (5°09.57'S 145°49.93'E), 31 m, J.K. Lowry & S.J. Keable, 26 February 1991, stn JKL/PNG-132.

Other material examined. AM P42454; JKL/PNG-139 (2 males, 2 females).

Diagnosis. Length 1.6 mm. Head ocular lobes well developed, eye round, a central core surrounded by clear ommatidia, situated entirely within head lobe; antennae short, subequal, much less than half body length; antenna 1 peduncular articles 1 and 3 subequal; article 2 the longest, flagellum with 3 articles each bearing an aesthetasc; antenna 2 peduncular article 5 a little longer than article 4, flagellum with three articles; labrum with produced, acute epistome; mandible palp article 3 longer than 2, parallel-sided, with three distal and 2 posterior marginal setae; labium outer plate mandibular processes subacute; maxilla 1 inner plate asetiferous; maxilliped palp article 4 coniform with distal spine seta; gnathopod 1 coxa more than twice as deep as broad, distally crenulate, carpus a little longer than propodus, palm obsolete; male gnathopod 2 coxa more than twice as deep as broad, basis elongate, carpus short, propodus elongate, parallel-sided, slender, more than twice length of carpus, palm very oblique, with one small medial and one small defining tooth, dactylus short, falcate, opposable to defining tooth; female gnathopod 2 less slender, propodus less than twice length of carpus, palm oblique, evenly curved, continuous with posterior margin, but defined by a spine, dactylus short and stout, opposable to spine; coxae 3–4 large, subrectangular; pereopod 3 merus with long setae on the anterodistal margin, dactylus short, about half length of propodus, pereopod 4 similar to pereopod 3 but lacking long setae on merus; coxa 5 the largest, posterior margin unexcavate; pereopod

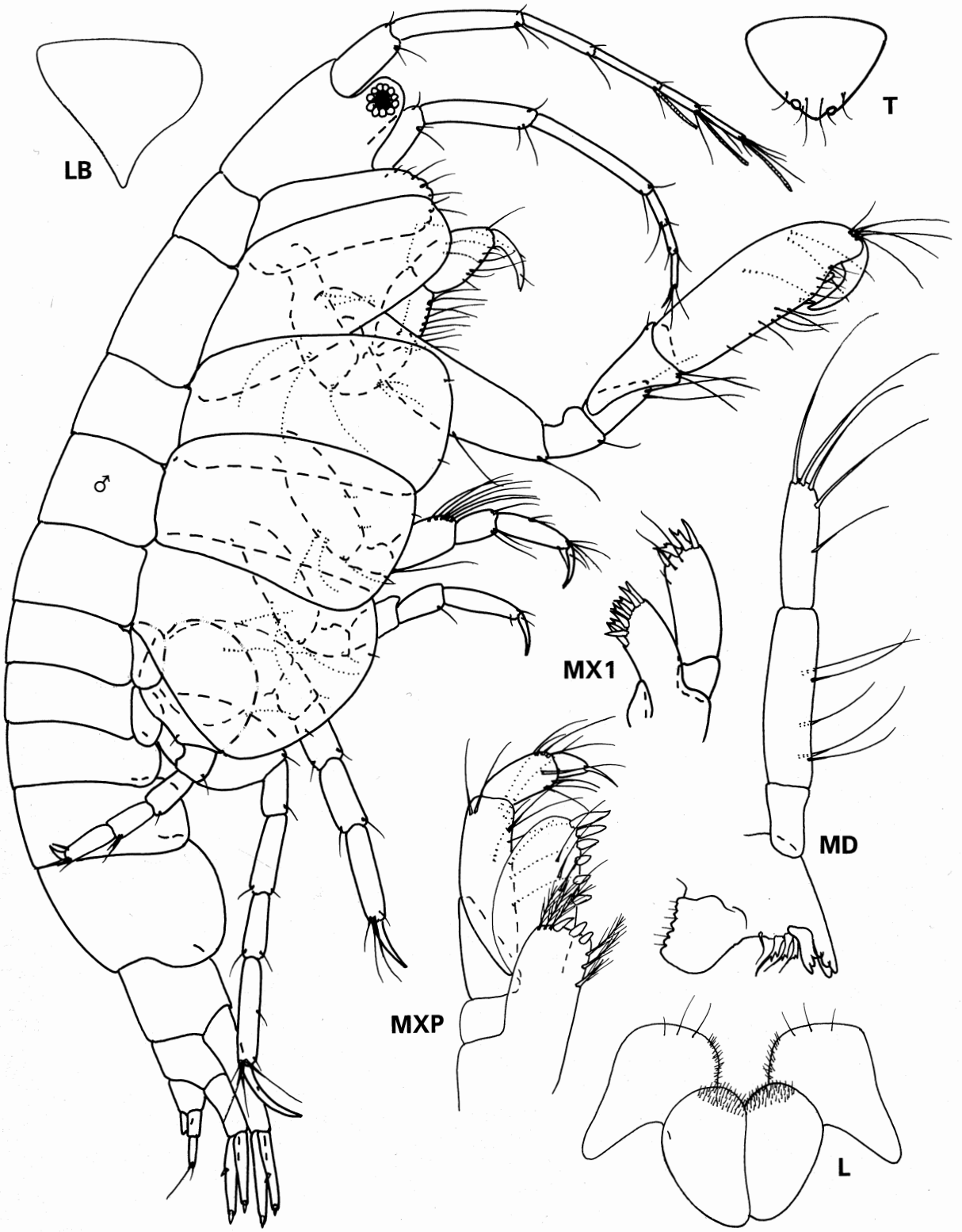

Fig. 31. *Papuaphotis regis* n.sp., hull of "Coral Queen", Madang Lagoon, Papua New Guinea, JKL/ PNG-139.

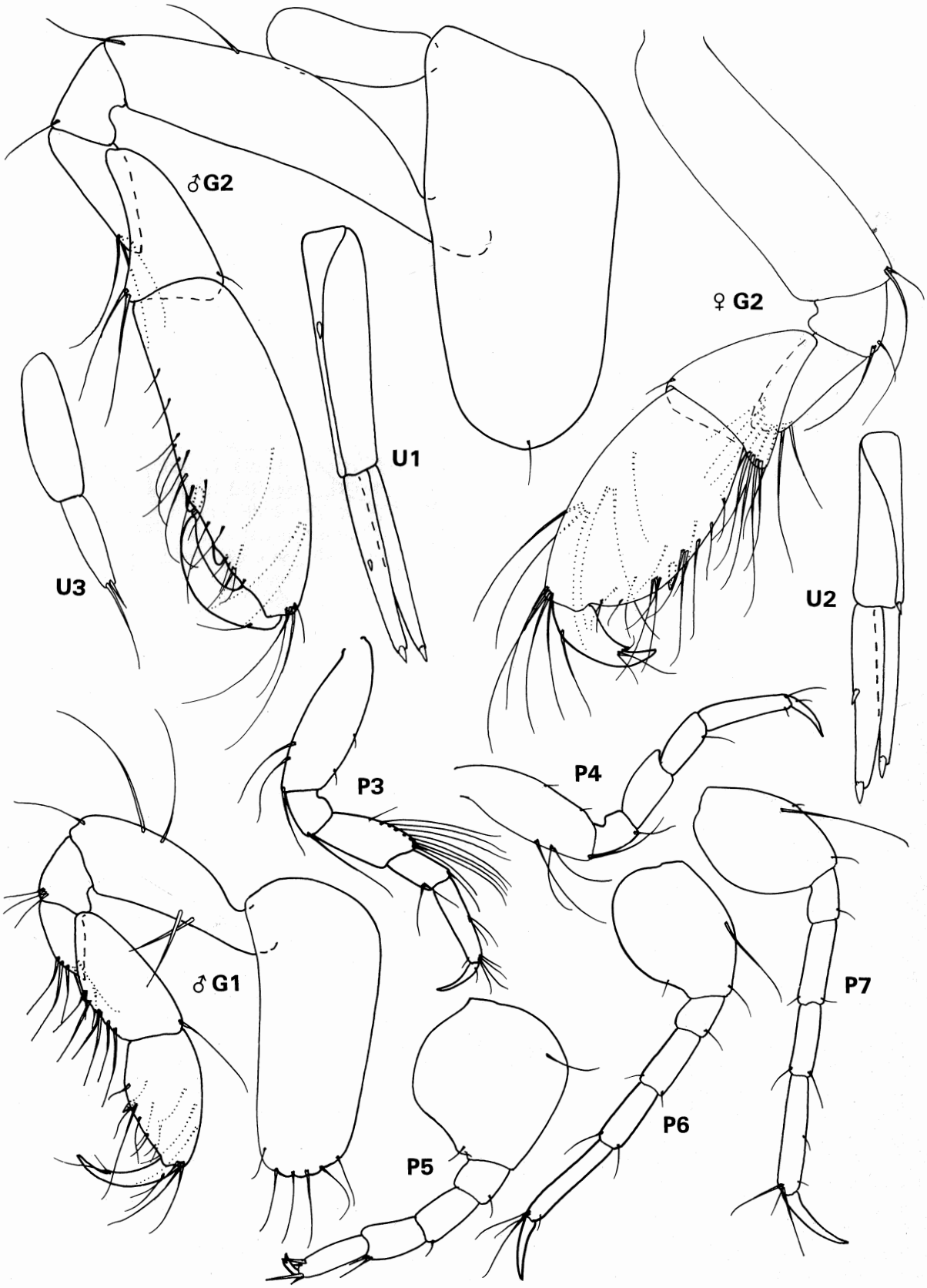

Fig. 32. *Papuaphotis regis* n.sp., hull of "Coral Queen", Madang Lagoon, Papua New Guinea, JKL/PNG-139.

5 basis expanded, almost as broad as long, propodus with two strong palmar spines, dactylus with accessory tooth on anterior margin; pereopods 6–7 similar, basis expanded, anterior margin with long medial seta, dactylus elongate, simple; epimera 1–3 rounded; uropod 1 peduncle longer than rami, rami slender, subequal, with terminal spine, outer ramus with one medial spine; uropod 2 similar to uropod 1, but peduncle shorter than inner ramus, outer ramus shorter than inner; uropod 3 peduncle longer than single ramus, ramus lacking spines and terminating in two unequal length setae; telson sub-triangular, with a small knob on either side.

Etymology. From the Latin *regis* = royal, referring to the collection site near the hull of the sunken vessel *Coral Queen*.

Habitat. On silty-sand bottom in about 30 m.

Paraloiloi n.gen.

Diagnosis. Head with ocular lobes strongly extended, narrow, eye situated entirely in ocular lobe; mandible palp article 2 the longest, article 3 straight, rod-shaped; maxilla 1 inner plate with several setae; maxilliped palp article 4 elongate; antennae slender, subequal, flagellum subequal with peduncle; antenna 1 peduncular article 3 longer than 1, accessory flagellum 3-articulate; male gnathopod 1 much larger than 2, subchelate, male gnathopod 2 basis expanded, carpus and propodus small, subequal; uropods 1–2 with strong inter-ramal tooth; uropod 3 rami subequal, longer than peduncle.

Type species *Paraloiloi vaga* n.sp., monotypic.

Remarks. This genus is closest to *Aloiloi* Barnard, but differs in a number of ways, notably in its much more elongate eye lobes, rod-shaped mandible palp article 3, elongate maxilliped palp article 4, slender antennae with flagellum equal in length to peduncle; enlarged basis and small, subequal carpus and propodus of the male gnathopod 2; uropod 2 with inter-ramal tooth and uropod 3 with rami longer than peduncle.

Etymology. From the Latin *para* = similar (to *Aloiloi* Barnard).

Paraloiloi vaga n.sp.

Figs 33, 34

Type material. HOLOTYPE male, 4.1 mm, AM P42461, PARATYPES, 2 males, 11 females, AM P42462; Planet Rock (5°15.48'S 145°49.14'E), dead *Acropora* plates with epiphytes, about 6 m, J.K. Lowry & S.J. Keable, 16 March 1991, stn JKL/PNG-213.

Other material examined. AM P42463; JDT/PNG-40 (1 male).

Diagnosis. Length 4.1 mm. Head with strongly projecting, slender eye lobes; eye mottled brown and white, situated entirely in eye lobe; antenna 1 slender, two-thirds body length, peduncular articles in the basi-distal ratios 2:4:3, flagellum subequal with peduncle, with about 12 articles, accessory flagellum 3-articulate; antenna 2 slender, subequal in length with antenna 1, peduncular articles 4 and 5 subequal, flagellum a little shorter than peduncle, with about 10 articles; mandible palp articles in the basi-distal ratios 2:7:5, article 3 rod-shaped with distal and marginal setae; maxilla 1 inner plate with about 7 setae, inner plate with 10 spines, palp with 5 spines and several fine setae; maxilliped palp article 3 with hook-shaped tooth, article 4 elongate bearing short apical spine; male gnathopod 1 coxa smaller than the following three coxae, basis with anterior margin concave, carpus small, cup-shaped, propodus three times length of carpus, palm short, straight, a shallow concavity on the posterodistal margin forming a sharp tooth, delimiting the concavity from the palmar shelf above it, dactylus strongly overlapping reduced palm; female gnathopod 1 slender, carpus and propodus subequal, propodus subovoid, palm continuous with posterior margin, dactylus opposable to two spines on posterior margin of propodus; male gnathopod 2 coxa much larger than coxa 1 and only a little shorter than coxae 3–4, basis enlarged, anterior margin straight, carpus and propodus small, subequal, propodus with palm very oblique, dactylus fitting palm; female gnathopod 2 basis slender, carpus a little longer than propodus, dactylus slightly overlapping poorly defined palm; pereopods 3–4 slender, coxae enlarged; pereopods 5–7 in the length ratios 3:5:6, basis weakly expanded; epimera 1–3 rounded; uropod 1 peduncle longer than rami, with strong inter-ramal tooth, rami subequal; uropod 2 peduncle shorter than rami, with strong inter-ramal tooth, inner ramus a little longer than outer; uropod 3 peduncle expanded proximally shorter than rami, inner ramus longer than outer with a small second article bearing a pair of long, unequal setae, inner ramus with an apical spine; telson lacking spines, each dorsolateral crest with one long and one very short seta.

Etymology. From the Latin *vaga* = wandering, used to describe a planet and referring to the collection site (Planet rock) of some of the material.

Habitat. On dead *Acropora* and cemented coral rubble in shallow water, to 6 m.

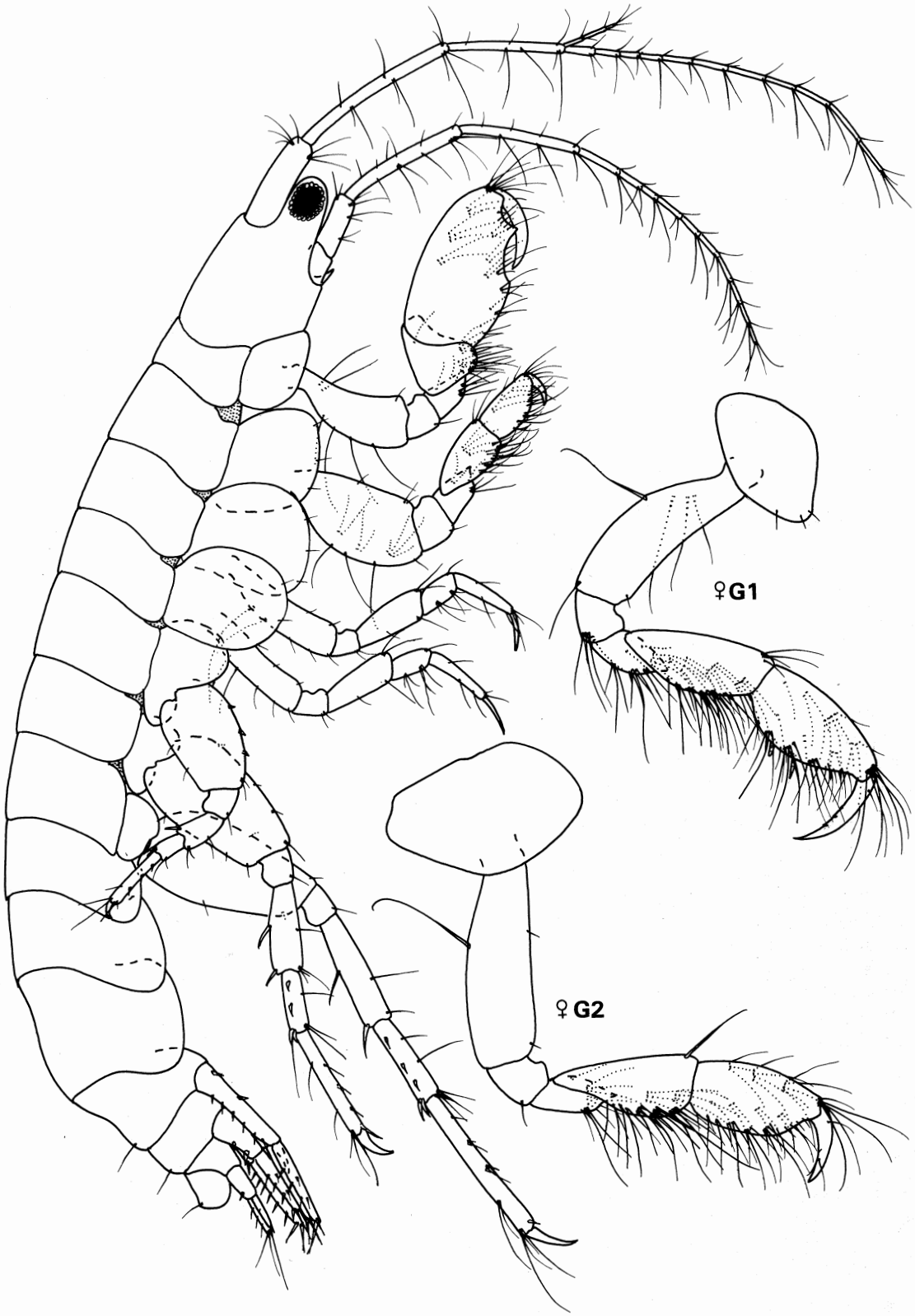

Fig. 33. *Paraloiloi vaga* n.sp., Planet Rock, Astrolabe Bay, Papua New Guinea, JKL/PNG-213.

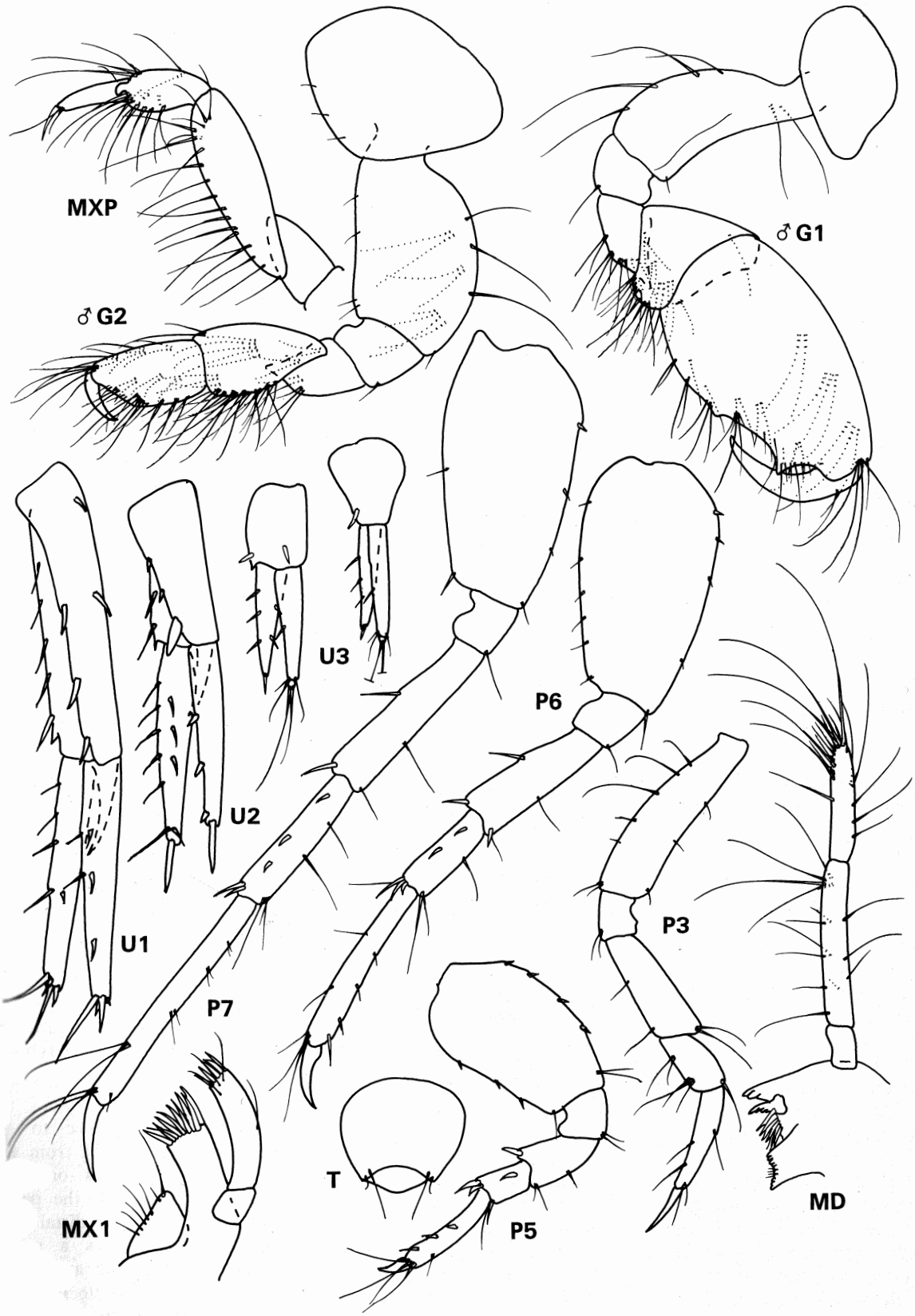

Fig. 34. *Paraloiloi vaga* n.sp., Planet Rock, Astrolabe Bay, Papua New Guinea, JKL/PNG-213.

Photis Krøyer

Photis kapapa Barnard

Photis kapapa Barnard, 1970: 192, figs 124, 125.–Myers, 1985b: 88, fig. 67.
? *Photis kapapa*.–Griffiths, 1973: 299, fig. 8.–Ledoyer, 1979b, 45, fig. 23II.

Material examined. AM P42464 to P42466; JDT/PNG-57 (1 male), JKL/PNG-258 (1 male), JKL/PNG-259 (6 males, 7 females).

Habitat. Among rubble, 3–27 m.

Distribution. Hawaii, Fiji, Papua New Guinea, ?South Africa and ?Madagascar.

Photis paeowai n.sp.

Figs 35, 36

Photis sp. Pirlot, 1938: 337, figs 151–153.

Type Material. HOLOTYPE male, 2.9 mm, AM P42467; PARATYPES, 6 males, 21 females, AM P42468; off the front face of Padoz Natun reef towards Paeowai (5°09.60'S 145°49.77'E), diver dredge for 40 m on soft mud bottom with small cones, many burrows and *Ampelisca* tubes on the surface, 35 m, J.K. Lowry & S.J. Keable, 17–18 March 1991, stn JKL/PNG-257.

Diagnosis. Length 2.9 mm; head lobes moderately strongly produced, eye large, chocolate brown; antennae slender, weakly setiferous, antenna 1 about two-thirds body length, antenna 2 a little longer; antenna 1 peduncular articles in the basi-distal ratios 2:4:3, flagellum equal in length to the combined length of peduncular articles 2 and 3, with 10 articles, alternate articles with aesthetascs; accessory flagellum minute, tipped with two setae; antenna 2 peduncular article 5 a little longer than 4, flagellum equal to combined length of peduncular articles 4 and 5, with 9 articles; mandible palp article 3 spatulate, shorter than 2; maxilla 1 inner plate asetiferous; maxilliped palp with long distal spine; gnathopod 1 slender, carpus and propodus subequal in length, palm very oblique, evenly continuous with posterior margin; male gnathopod 2 basis stout, inner margin excavate and produced into an anterodistal lobe, carpus triangular, propodus longer than carpus, palm very oblique, delimited by a spine and two teeth, the inner tooth recurved, posterior margin strongly convex, dactylus stout, fitting palm; female gnathopod 2 basis more slender than that of male, carpus very short, cup-shaped, propodus palm very oblique, broadly scalloped, dactylus slender, fitting palm; pereopods 3–4 coxae with stridulating ridges, all articles slender, propodus up to eight times as long as broad, dactylus a little over half length of propodus; pereopods 5–7 normal; epimera 1–3 rounded; uropod 1 peduncle longer than rami, inner ramus a little longer than outer, outer ramus with a single small medial spine; uropod 2 peduncle shorter than inner ramus, rami lacking marginal spines; uropod 3 peduncle shorter than inner ramus, which bears a small second article; outer ramus about one quarter length of inner; telson broader than long, lacking spines, but with a long seta on each dorsolateral crest.

Etymology. Named after Paeowai near the site of collection.

Remarks. This species shows good agreement with the male described by Pirlot (1938) as *Photis* sp. It can now be seen that Myers (1985b) was incorrect in attributing a single female specimen from Fiji to Pirlot's species.

Habitat. In soft mud in 40 m.

Photis pirloti Myers

Figs 37, 38

Photis pirloti Myers, 1985b: 88, fig. 68.

Material examined. AM P42469 to P42472; AAM/PNG-13 (2 males, 4 females), AAM/PNG-16 (2 females), JDT/PNG-47 (1 female), JDT/PNG-57 (3 females), JDT/PNG-59 (2 males, 3 females), JKL/PNG-258 (3 males, 1 female), JKL/PNG-260 (1 female). Author's collection: AAM/PNG-13, AAM/PNG-16 and JDT/PNG-57.

Description. Antennae relatively stout, subequal, setose, a little over half body length; antenna 1 peduncular articles in the basi-distal ratios 5:7:5, flagellum shorter than peduncle with about 9 articles bearing long aesthetascs, accessory flagellum absent; antenna 2 peduncular articles 4 and 5 subequal, flagellum longer than combined length of peduncular articles 4 and 5; male gnathopod 2 basis with well-developed anterodistal lobe bearing stridulating ridges; carpus triangular, propodus twice length of carpus, palm deeply excavate, delimited from posterior margin by rounded, ninety degree corner, dactylus stout, toothed, overlapping palmar corner.

Remarks. This species is very close to *Photis longicaudata* (Bate & Westwood, 1862), from which it differs in the more rounded process on the male gnathopod 2 propodus, which delimits the palm from the posterior margin. It also lacks the distal triangular process on the telson and possesses a more well developed brush of long setae on the anterior margin of the pereopod 3 merus. It is possible that all Indo-Pacific material previously ascribed to *P. longicaudata* is referable to the present species and that *P. longicaudata* is restricted to the North Atlantic-Mediterranean. *Photis*

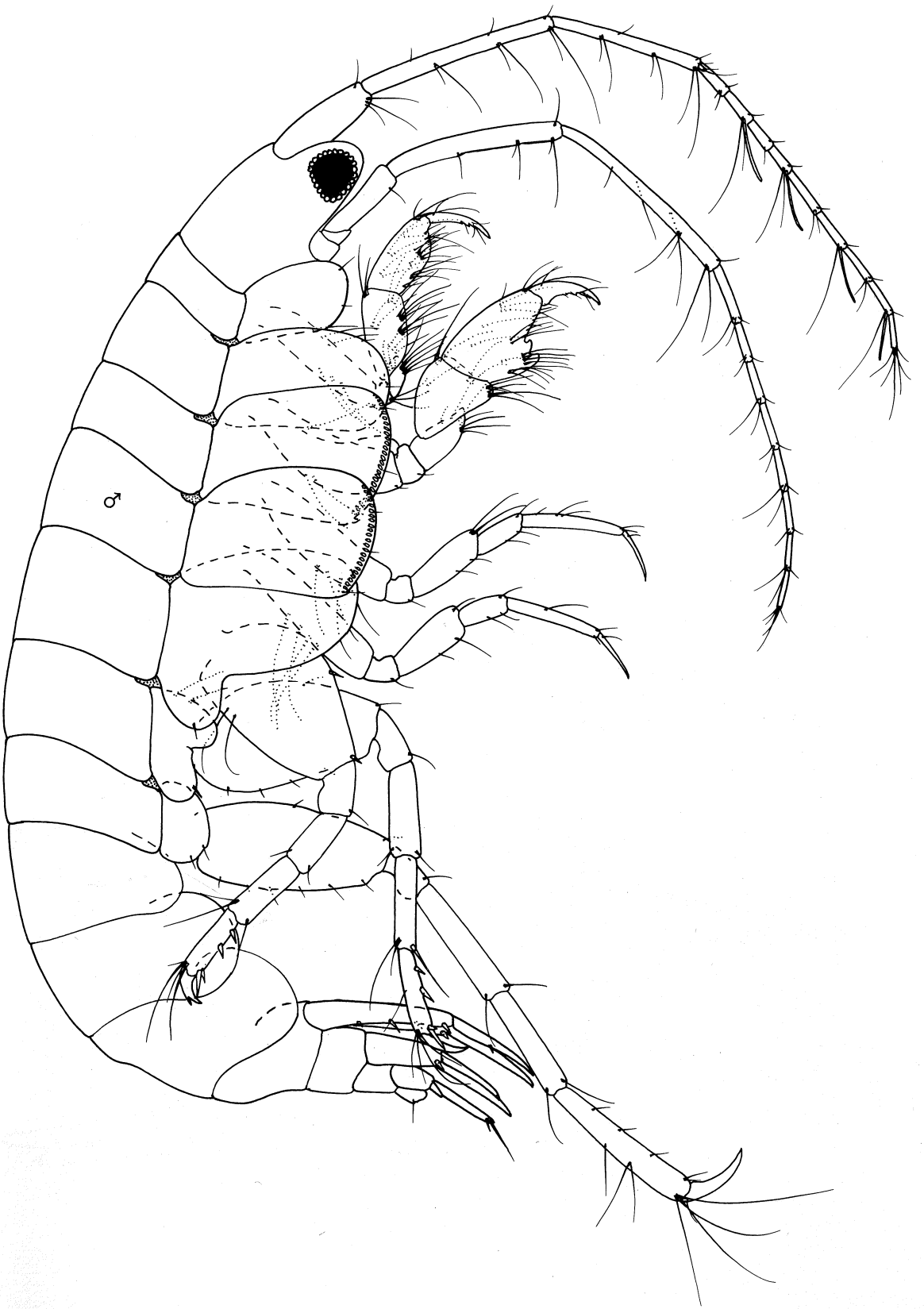

Fig. 35. *Photis paeowai* n.sp., Padoz Natun reef, near Paeowai, Madang Lagoon, Papua New Guinea, JKL/PNG-257.

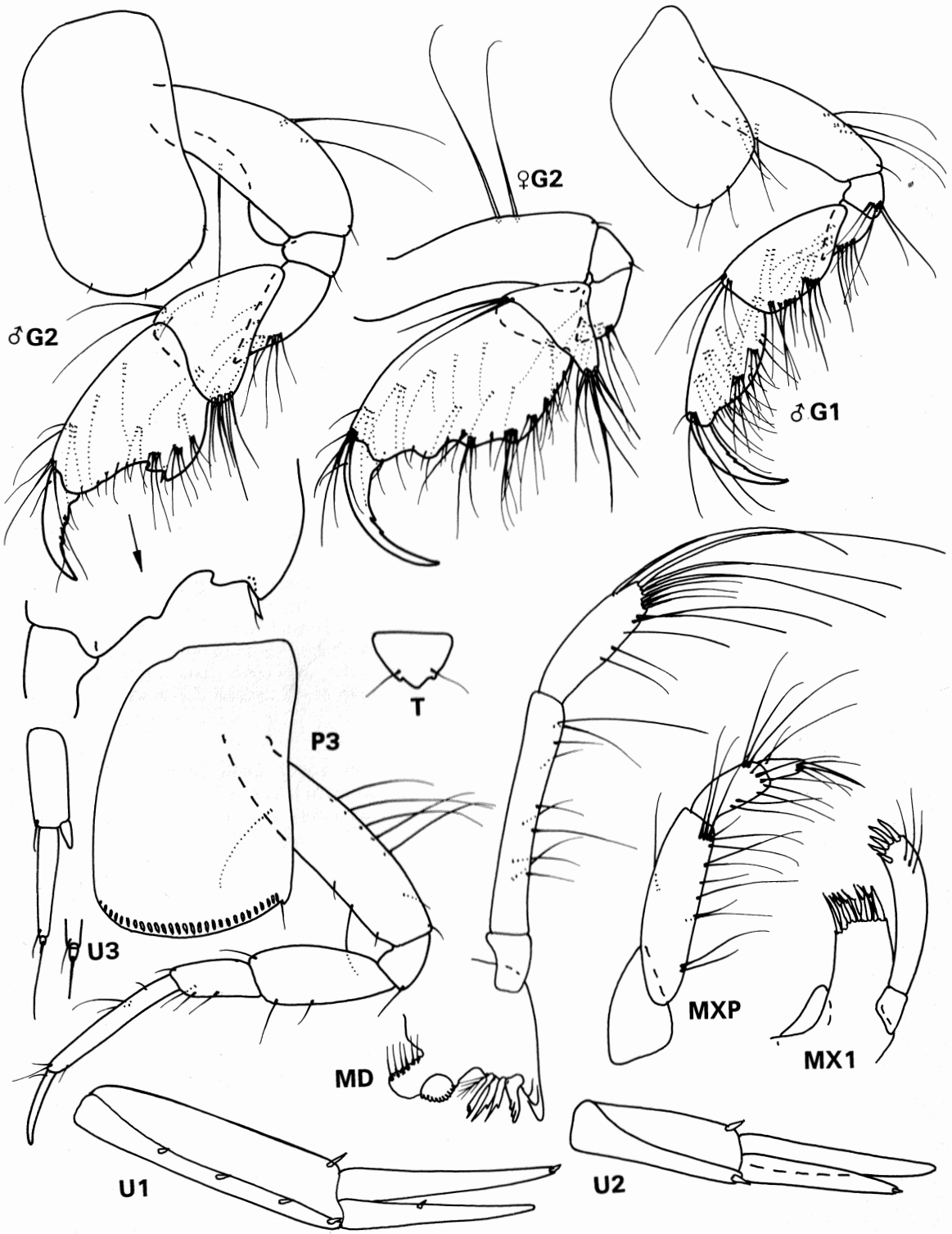

Fig. 36. *Photis paeowai* n.sp., Padoz Natun reef, near Paeowai, Madang Lagoon, Papua New Guinea, JKL/PNG-257.

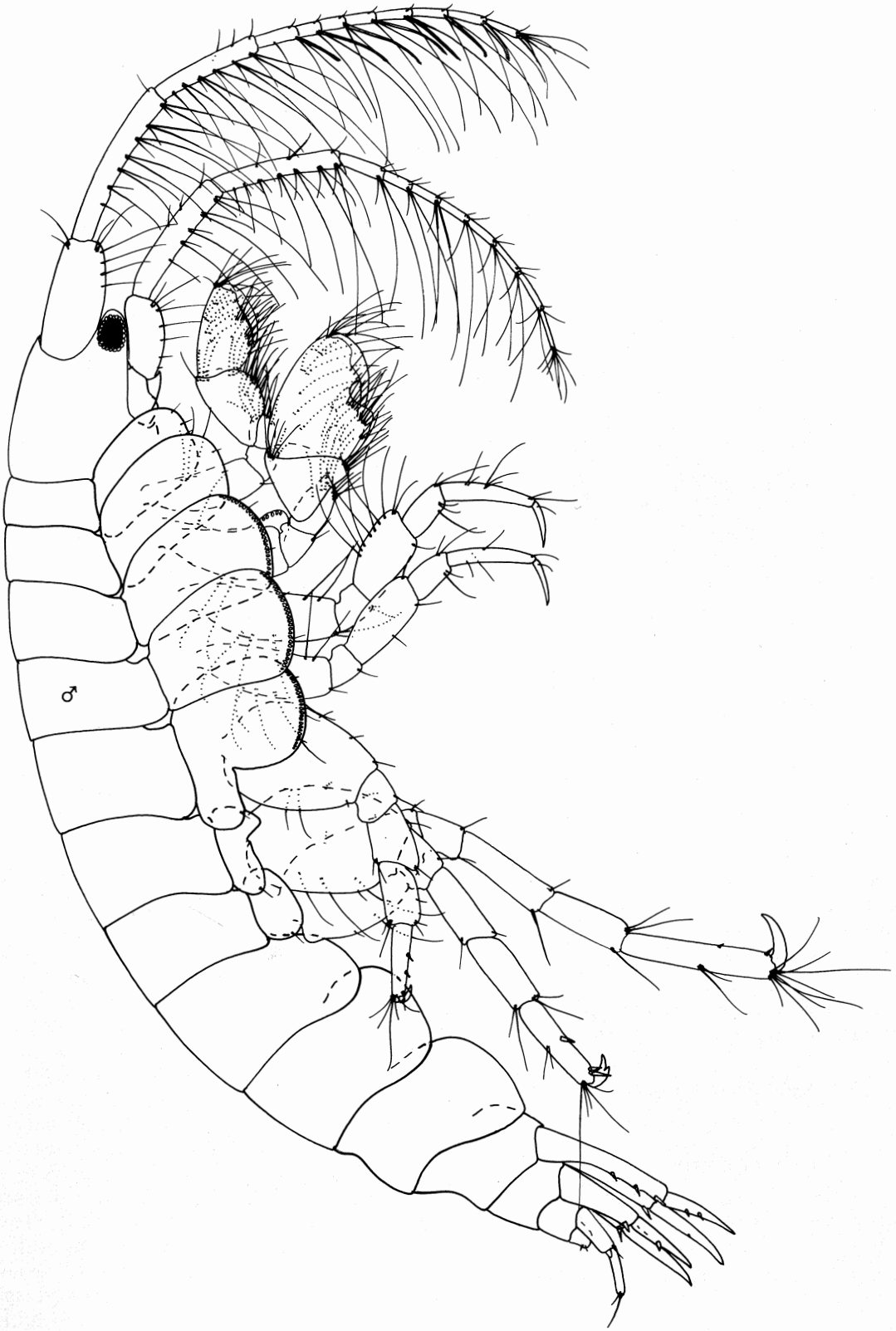

Fig. 37. *Photis pirloti* Myers, channel between Riwo village and Riwo island, Madang Lagoon, Papua New Guinea, AAM/PNG-13.

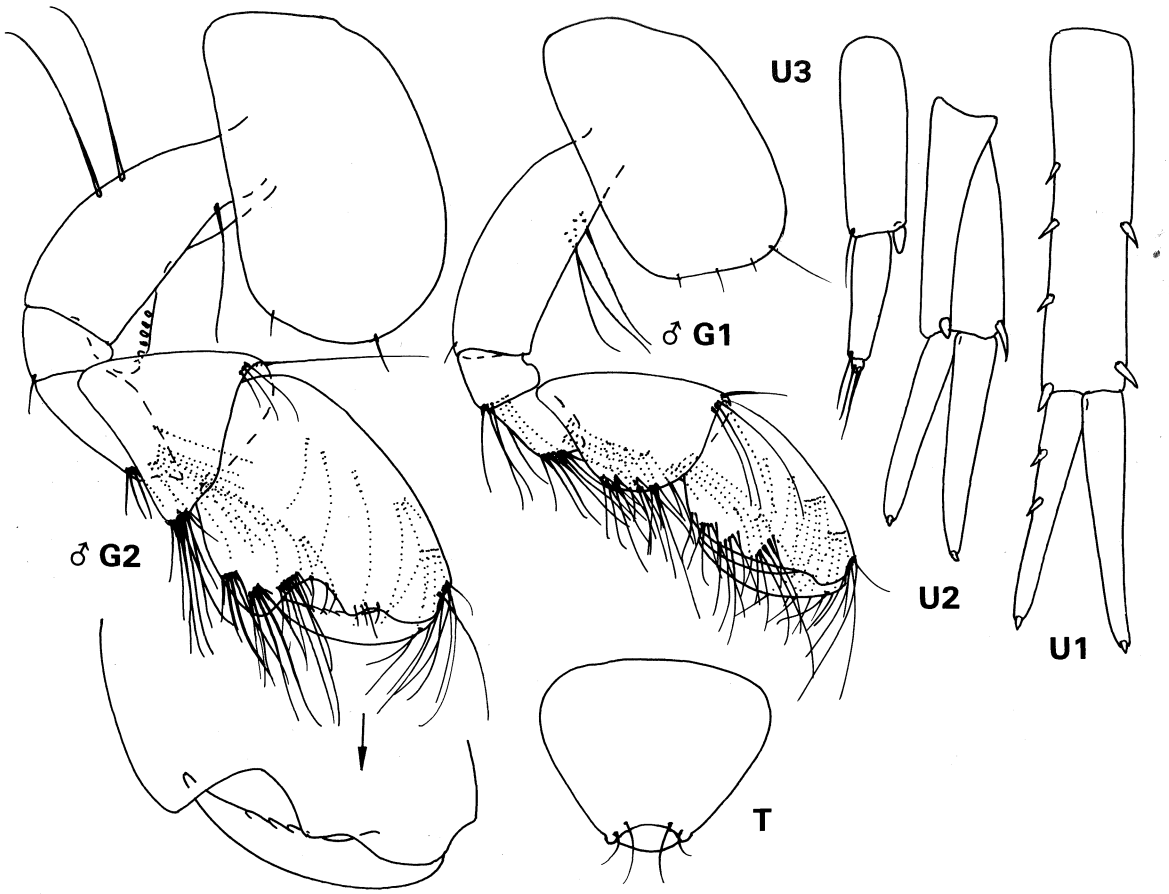

Fig. 38. *Photis pirloti* Myers, channel between Riwo village and Riwo island, Madang Lagoon, Papua New Guinea, AAM/PNG-13.

pirloti was previously known only from an incomplete female specimen. The original diagnosis has been amplified above, to include details of the male gnathopod 2 and the previously unknown antennae.

Habitat. Coral rubble, sand and mud bottoms, with dead *Acropora*, sponges or *Halimeda*.

Distribution. Fiji, Papua New Guinea.

Ischyroceridae

Borneoecetes Barnard & Thomas

Borneoecetes wongi Barnard & Thomas

Fig. 39

Borneoecetes wongi Barnard & Thomas, 1984, 873, figs 6–9.

Material examined. AM P42416; JDT/PNG-58 (20 males, 51 females).

Description. Length 2.7 mm. Head with well-developed slender rostrum extending beyond eye lobes, eyes small; antenna 1 slender, peduncular articles in the basi-distal ratios 4:4:3, flagellum shorter than peduncle with 7 articles; antenna 2 stout, longer than antenna 1, peduncular article 3 elongate, peduncular article 4 longer than 5, flagellum shorter than peduncular article 5 with two long and one short article; mandible palp composed of one long slender article tipped with long setae and with two marginal setae; gnathopod 2 coxa with extremely long setae, basis stout, propodus twice length of carpus, palm weakly excavate, with two strong spines; uropod 1 peduncle lateral margins finely setulose, distal lamella strongly fimbriate, inner ramus shorter and slimmer than outer, lacking marginal spines and terminating in one stout spine and one small accessory spine, outer ramus about two thirds length of peduncle with three marginal spines and two equal-sized distal spines and a small accessory spine; uropod 2 peduncle

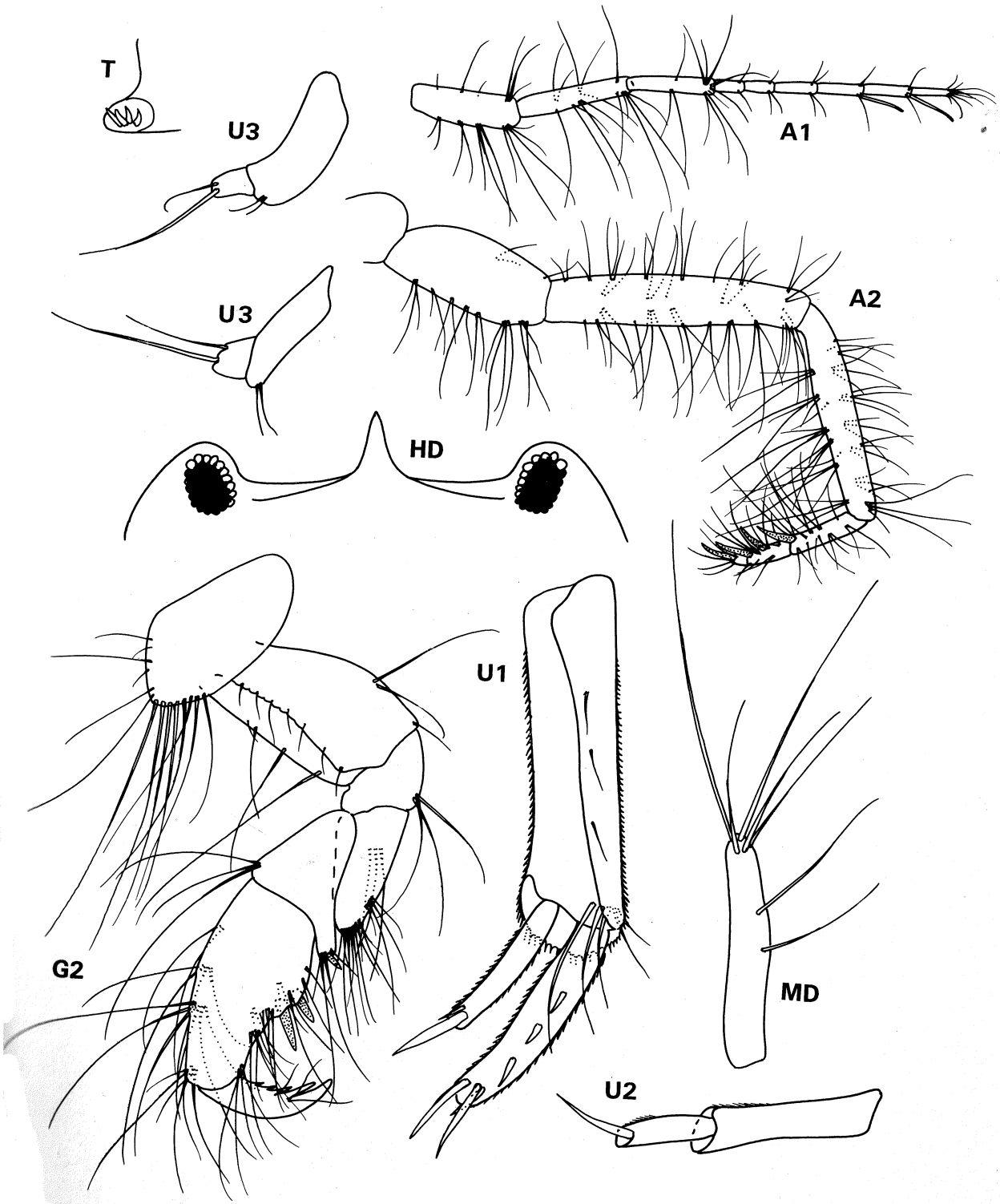

Fig. 39. *Borneoecetes wongi* Barnard & Thomas, Dam Awan, Madang Lagoon, Papua New Guinea, JDT/PNG-58.

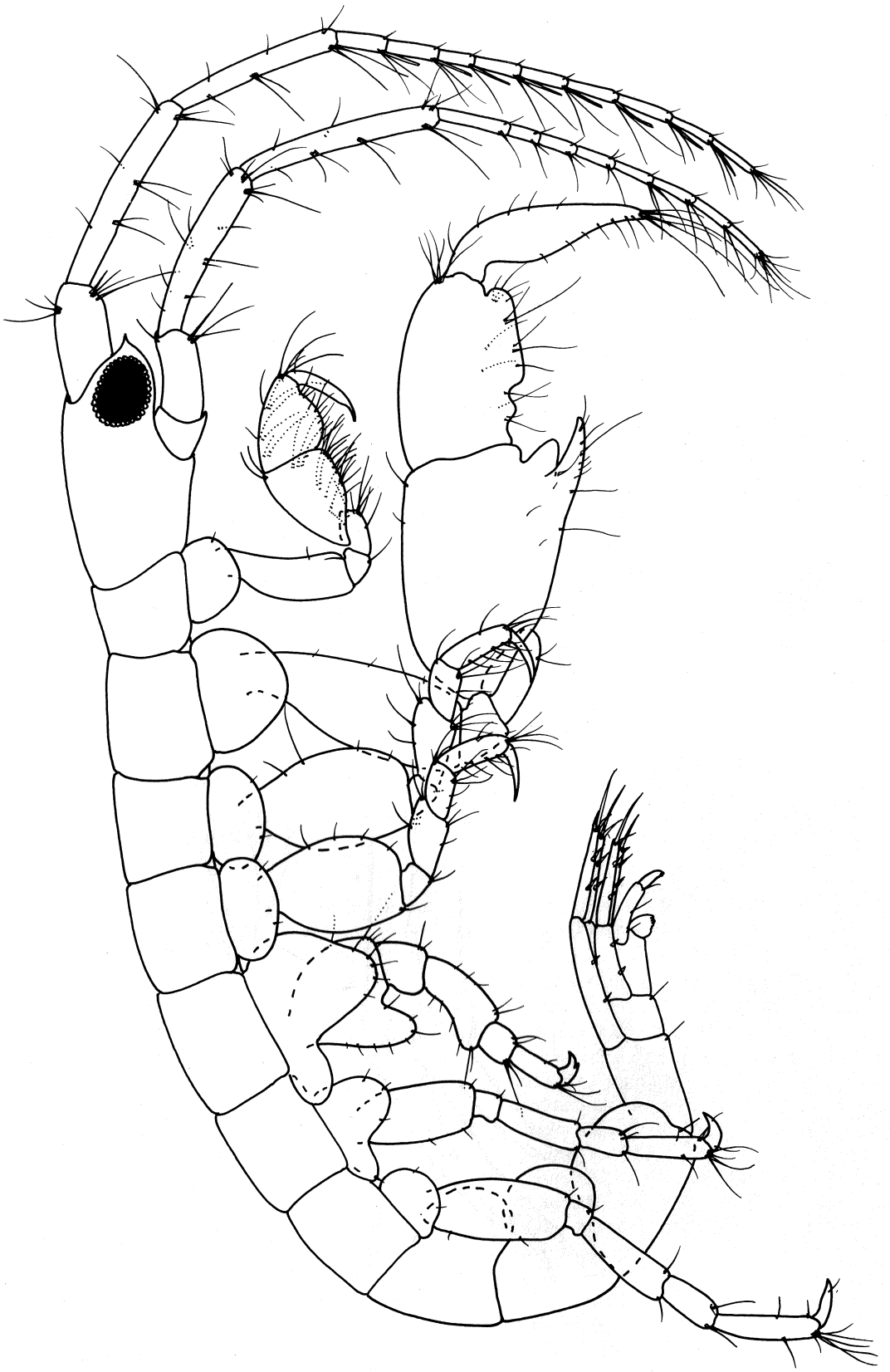

Fig. 40. *Ericthonius pugnax* Dana, near jetty of Christensen Research Station, Madang Lagoon, Papua New Guinea, AM/PNG-5.

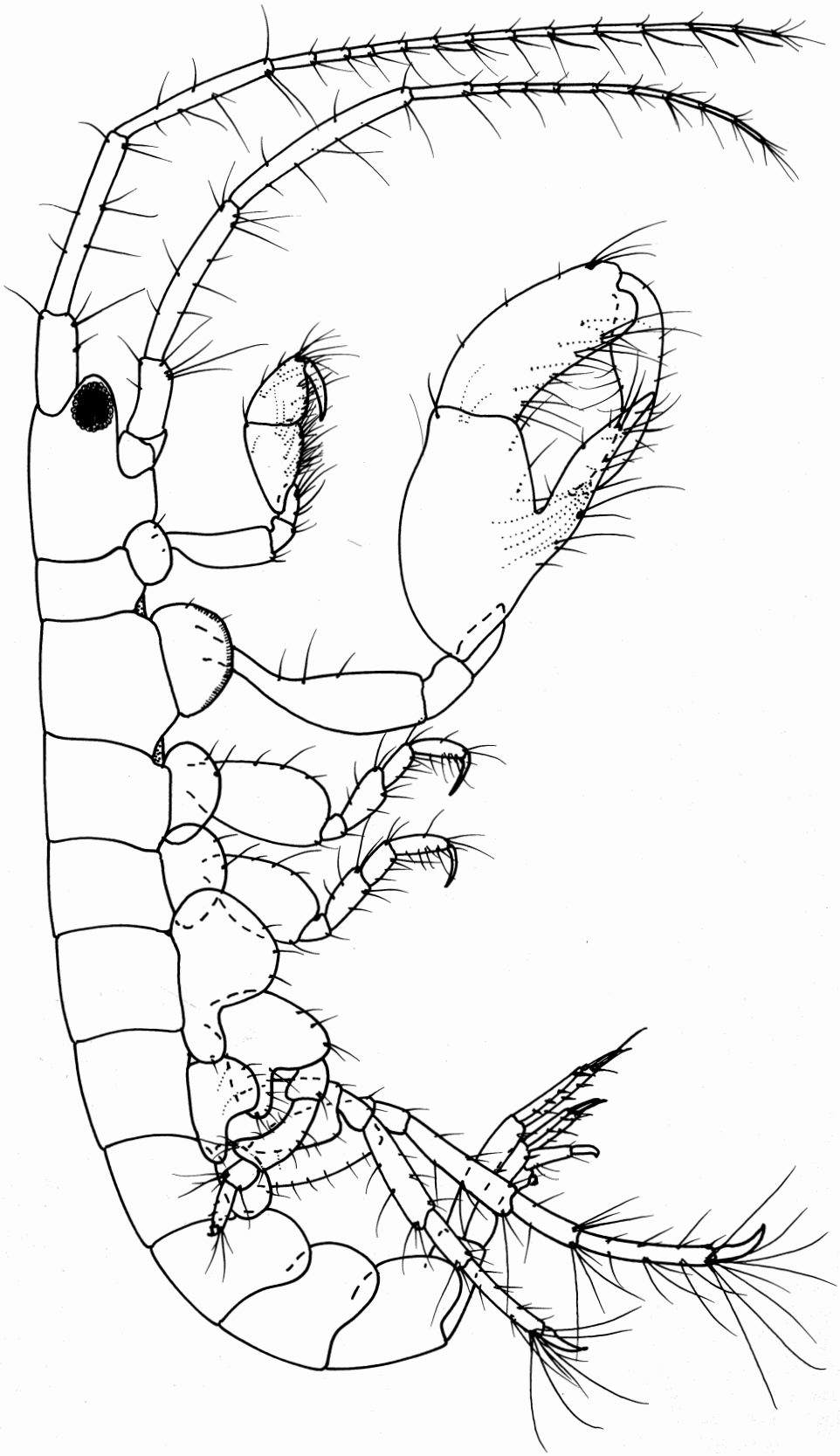

Fig. 41. *Ericthonius pugnax* Dana, near jetty of Christensen Research Station, Madang Lagoon, Papua New Guinea, AM/PNG-5.

without spines or setae but inner margin apically setulose, inner ramus absent, outer ramus without marginal spines, but with one distal spine; uropod 3 peduncle elongate and slender with a pair of distal setae, ramus short, about one quarter peduncle length, terminating in two long setae as long as or longer than peduncle.

Remarks. Present material agrees quite well with the descriptions of Barnard and Thomas (1984), although there are differences. It differs in the strong acute rostrum, which extends well beyond the eye lobes, in the more slender uropod 3 peduncle and longer ramus, in the slightly longer and more slender mandible palp, and in the somewhat shorter antenna 2. The differences are not great, however, and the overall similarity between the two materials suggest that present material is no more than a clinal variation of *B. wongi*.

Habitat. In soft sediments in 12–21 m.

Ericthonius Milne Edwards

Ericthonius pugnax Dana

Figs 40–42

Erichthonius [sic] *pugnax* Dana, 1852, 213.
Ericthonius pugnax.–Stebbing, 1906: 672.–Pirlot, 1938: 352.–Nagata, 1960: 179, pl. 17.–Nagata, 1965: 320, fig. 40.–Ledoyer, 1969: 179, fig. 1.–Ledoyer, 1986: 628, fig. 239.
Erichthonius [sic] *macrodactylus* Dana, 1852: 218.
Pyctilus pugnax Dana, 1853: 975, pl. 67, fig. 4a–d.
Pyctilus macrodactylus Dana, 1853: 974, pl. 67, fig. 3a–c.

Material examined. AM P42409 to P42415; AAM/PNG-1 (1 male, 1 female), AAM/PNG-5 (6 males, 12 females), AAM/PNG-10 (4 females), AAM/PNG-12 (1 male, 1 female), JDT/PNG-56 (1 female), JKL/PNG-182 (4 females), AAM/PNG-211 (23 males, 41 females), JKL/PNG-213 (1 male) JDT/PNG-258 (1 male, 2 females), JKL/PNG-259 (1 male), JKL/PNG-261 (11 males, 16 females).

Remarks. As pointed out by Ledoyer (1986), there is a need to examine *Ericthonius* material from diverse tropical localities to determine the relationships of the described taxa. He noted that Malagasy material ascribable to *E. pugnax* Dana was always smaller than that ascribable to *E. macrodactylus* Dana, and on the assumption that one was a growth stage of the other, synonymised these two taxa. The present study supports Ledoyer's view that "*E. macrodactylus*" is the hyperadult male of *E. pugnax* Dana. In addition to the changes in the male gnathopod 2 which are readily seen in the accompanying figures (Figs 40 and 41), the antennae become progressively more slender with more flagellar articles, the eye lobe becomes rounded, the sharp point disappearing, coxa 5 anterior lobe becomes more rounded and the stridulating ridges on male coxa 2 become more pronounced.

Habitat. In muds and silty rubble, among dead coral, seagrasses and *Caulerpa* from 1 m to at least 30 m.

Distribution. Indo-west Pacific, but apparently not recorded from the Pacific plate.

Ischyrocerus Krøyer

Ischyrocerus parma n.sp.

Figs 43, 44

Type material. HOLOTYPE male, 2.2 mm, AM P42417; PARATYPES, 5 males, 1 female, AM P42418; Mizegwadan reef, 5°09.57'S 145°49.36'E, formalin wash of rubble, bottom mostly rubble and soft corals, very little live coral cover, 3–4 m, J.D. Thomas, 2 February 1990, stn JDT/PNG-32.

Other material. Author's collection. JDT/PNG-48 (1 male), JDT/PNG-57 (1 male, 1 female).

Diagnosis. Length 2.2 mm, eye large; antenna 1 stout, peduncular article basi-distal ratios 5:9:6, flagellum equal to length of peduncular articles 2 and 3 combined, with 4 articles bearing numerous aesthetascs; antenna 2 subequal with antenna 1, peduncular article 5 a little longer than 4, flagellum with 4 articles; mandible palp with three stout articles in the basi-distal ratios 2:5:3, article 3 clavate; gnathopod 1 coxa sub-square, propodus longer than carpus, subovoid, palm continuous with posterior margin, delimited by a spine, dactylus elongate, slightly overlapping palm; male hyperadult gnathopod 2 coxa sub-triangular, the anterodistal corner subacute, basis flask-shaped, about three times as long as broad, ischium with large shield-like anterior expansion bearing recurved spines, merus very reduced, carpus tiny, slender, propodus elongate, nearly three times as long as broad, anterior margin evenly convex, posterior margin weakly concave and with weak sub-distal tooth, dactylus enlarged, strongly curved, with medial expansion of posterior margin, juvenile male propodus posterior margin with mediodistal excavation only, dactylus opposable to a spine; female gnathopod 2 with shorter, more slender basis, ischium lacking flange, merus normal, carpus moderately large, cup-shaped, propodus subovoid, palm continuous with posterior margin delimited by three strong spines, dactylus slender, fitting palm; pereopods 3–4 moderately stout, pereopods 5–7 increasing slightly in length anteroposteriorly, basis expanded with rounded or weakly crenulate posterior margin; epimera 1–3 rounded; uropods 1–2 elongate, uropod 3 peduncle five times length of rami, rami subequal, outer ramus with 5–6 recurved teeth, inner ramus without teeth, but terminating in two setae; telson with a pair of stout spines.

Etymology. From the latin "parma" = a small shield referring to the shield-like ischial flange.

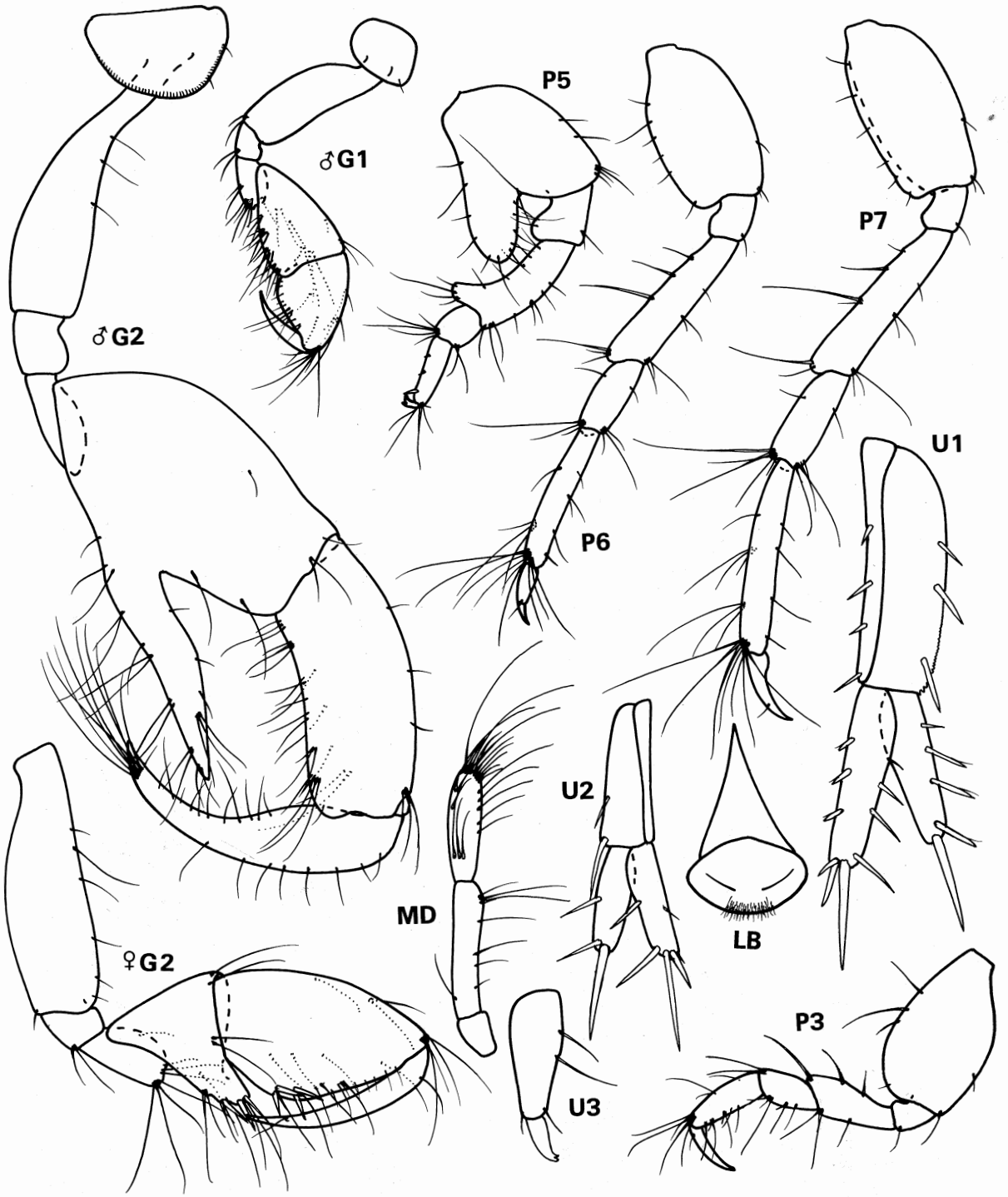

Fig. 42. *Ericthonius pugnax* Dana, near jetty of Christensen Research Station, Madang Lagoon, Papua New Guinea, AM/PNG-5.

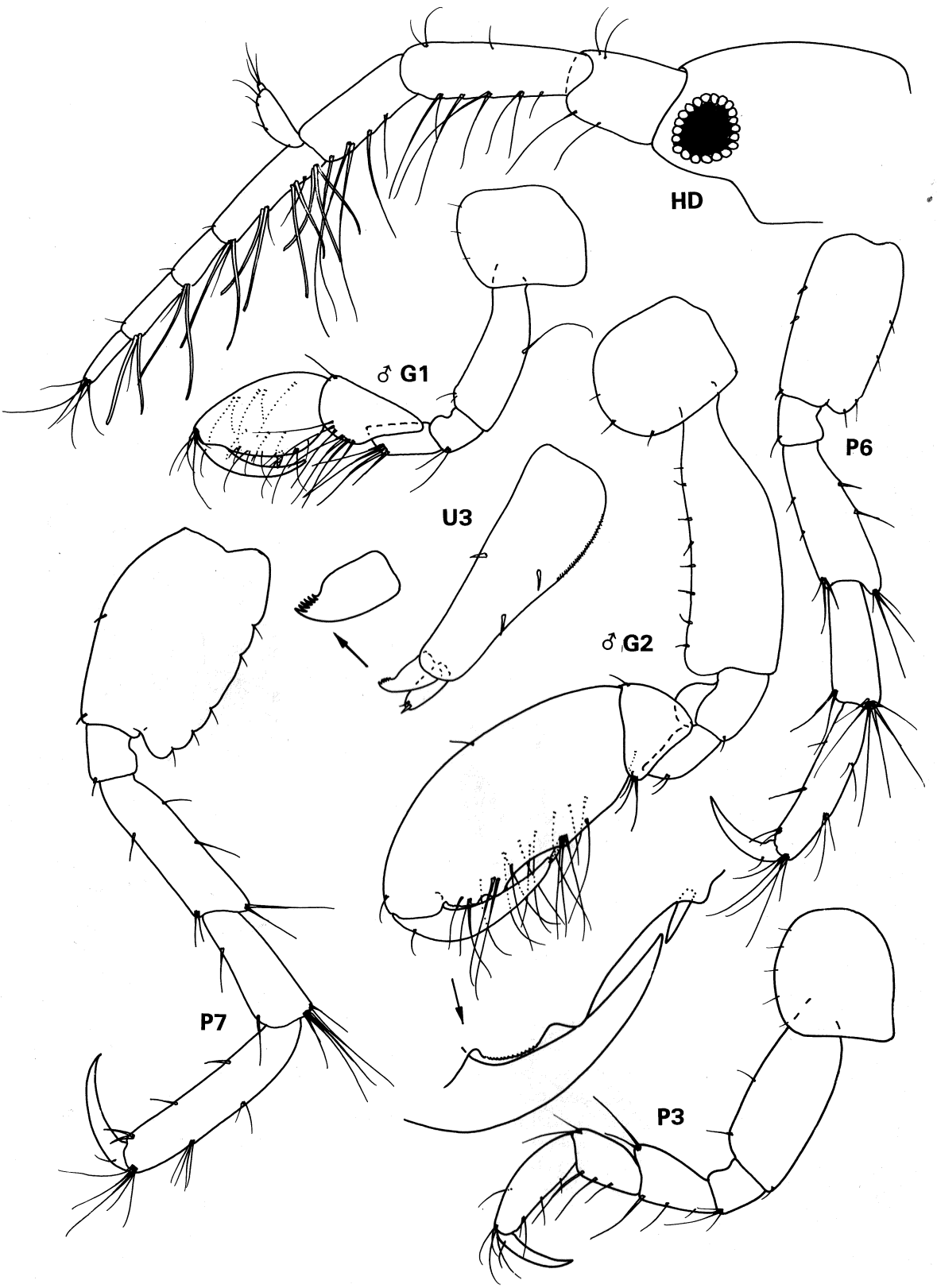

Fig. 43. *Ischyrocerus parma* n.sp., Mizegwadan reef, Madang Lagoon, Papua New Guinea, JDT/PNG-32.

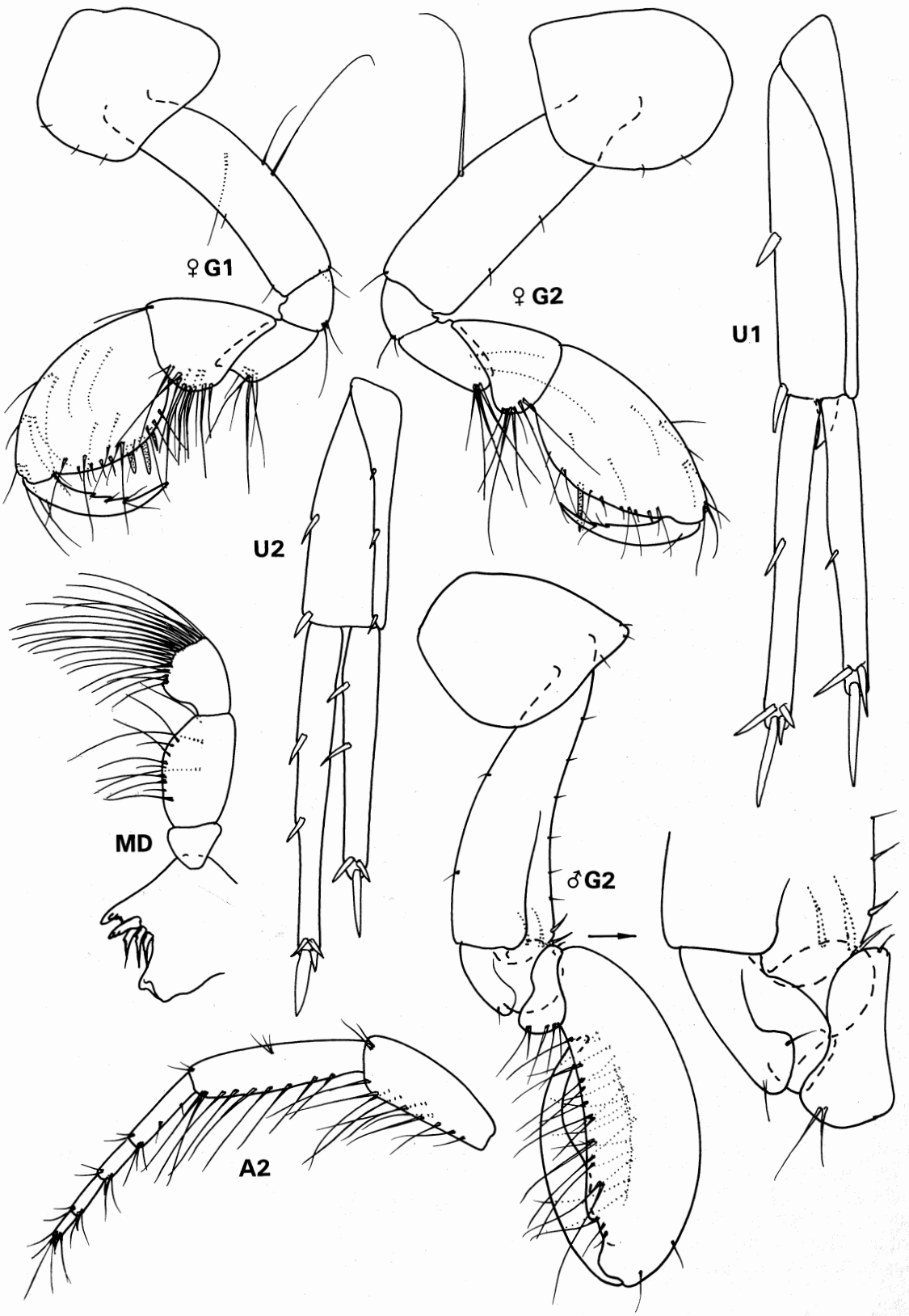

Fig. 44. *Ischyrocerus parma* n.sp., Mizegwadan reef, Madang Lagoon, Papua New Guinea, JDT/PNG-32

Remarks. This species is closest to the Hawaiian *Ischyrocerus oahu* Barnard, 1970. It differs from that species in the expansion of the posterior margin of the basis of pereopods 6 and 7, that of pereopod 7 being crenulate, and in the shorter, stouter, rami of uropod 3. There is a superficial similarity between the present material and that described by Ledoyer (1979b, 1986) from Madagascar, under the name *Ischyrocerus oaku* [sic] *armatus* Ledoyer. The different head shape and narrow mandible palp article 3 suggest that this latter material is not referable to *I. oahu*.

Habitat. In coral rubble in shallow water.

Ischyrocerus mediodens n.sp.

Fig. 45

Type material. HOLOTYPE male, AM P42420, 2.0 mm, Guzem reef, in portion of reef closest to Guzem, 5°09.35'S 145°48.43'E, formalin wash of rubble, partially cemented rubble, broken pieces of overturned *Acropora* and partially cemented rubble pieces from shallowest section of reef, J.D. Thomas, 10 February 1990, stn JDT/PNG-40.

Diagnosis. Length 2.0 mm. Eye large; antenna 1 stout, peduncular article basi-distal ratios 3:5:4, flagellum a little shorter than peduncular articles 2 and 3 combined, with 5 articles bearing numerous aesthetascs; antenna 2 a little longer than antenna 1, peduncular article 5 longer than 4, flagellum shorter than peduncular article 5, with 4 articles; mandible palp with three stout articles in the basi-distal ratios 2:5:3, article 3 clavate; gnathopod 1 coxa elongate, twice as deep as broad, narrowing distally, propodus larger than carpus, subovoid, palm continuous with posterior margin, defined by a spine, dactylus slightly overlapping palm; male gnathopod 2 coxa broader then deep, posterior margin sinuous, basis five times as long as broad, slender, anterior margin concave, merus blunt, carpus short, cup-shaped, propodus very elongate, inner face of posterior margin with medial tooth opposable to dactylus tip, dactylus short, adze-shaped; female gnathopod 2 like that of *I. parma* n.sp.; pereopods 3–4 stout, basis flask-shaped, propodus posterior margin with three strong spines; pereopods 5–7 increasing slightly in length anteroposteriorly, basis with well-developed posterior flange; pereopod 5 with anteroproximal margin of merus expanded into crenulate lobe bearing three strong spines; epimera 1–3 rounded, uropods 1–2 elongate and slender; uropod 3 peduncle elongate, five times length of rami, rami subequal, outer ramus with 4–5 recurved teeth, inner ramus slender; telson with a pair of stout spines.

Etymology. From the latin medio = middle, dens = tooth, referring to the tooth on the male gnathopod 2 propodus.

Remarks. This species is known to date from just a single specimen, but it differs significantly from any described species. In the presence of a tooth on the male gnathopod 2 propodus it resembles *Jassa lilipuna* Barnard, 1970 and *J. socia* Myers, 1989, but in both those species the tooth is proximal in position. The taxonomy of Pacific-plate *Ischyrocerus-Jassa* species requires revision (see Conlan, 1989, 1990). *Jassa lilipuna, J. socia, Ischyrocerus kapu* Barnard, 1970, *I. oahu, I. parma* n.sp. and *I. mediodens* are almost certainly congeneric. *Ischyrocerus mediodens* differs from described *Jassa* Leach and *Ischyrocerus* species by the curiously swollen and spinous proximal region on the anterior margin of the pereopod 5 merus.

Habitat. In rubble and coral debris in shallow water.

Parajassa Stebbing

Parajassa spinipalma Ledoyer

Figs 46, 47

Parajassa spinipalma Ledoyer, 1979b: 98, fig. 59.–Ledoyer, 1986: 639, fig. 243.

Material examined. AM P42407 to P42408; JDT/PNG-66 (2 males, 3 females), JDT/PNG-67 (22 males, 27 females).

Remarks. Present material agrees quite well with the description and figures of Malagasy specimens by Ledoyer (1979b, 1986). Minor differences are, the shape of the propodus of gnathopod 1 (in Ledoyer's figures, the propodus palm is almost sinuous, and the propodus is widest proximally, whereas in present material the palm is almost straight and the propodus is widest mediodistally and constricted proximally), the shape of the basis of pereopod 5 (much more expanded on the posterior margin in present material) and the distinctly less slender pereopod 7 basis of Papua New Guinea specimens. The shape of the propodus of gnathopod 1 is subtlety different also. The differences between the two materials are small and there does not appear to be good reason to erect a new species for the Papua New Guinea material at this point in time.

Habitat. In coral rubble in shallow water.

Distribution. Madagascar, Papua New Guinea.

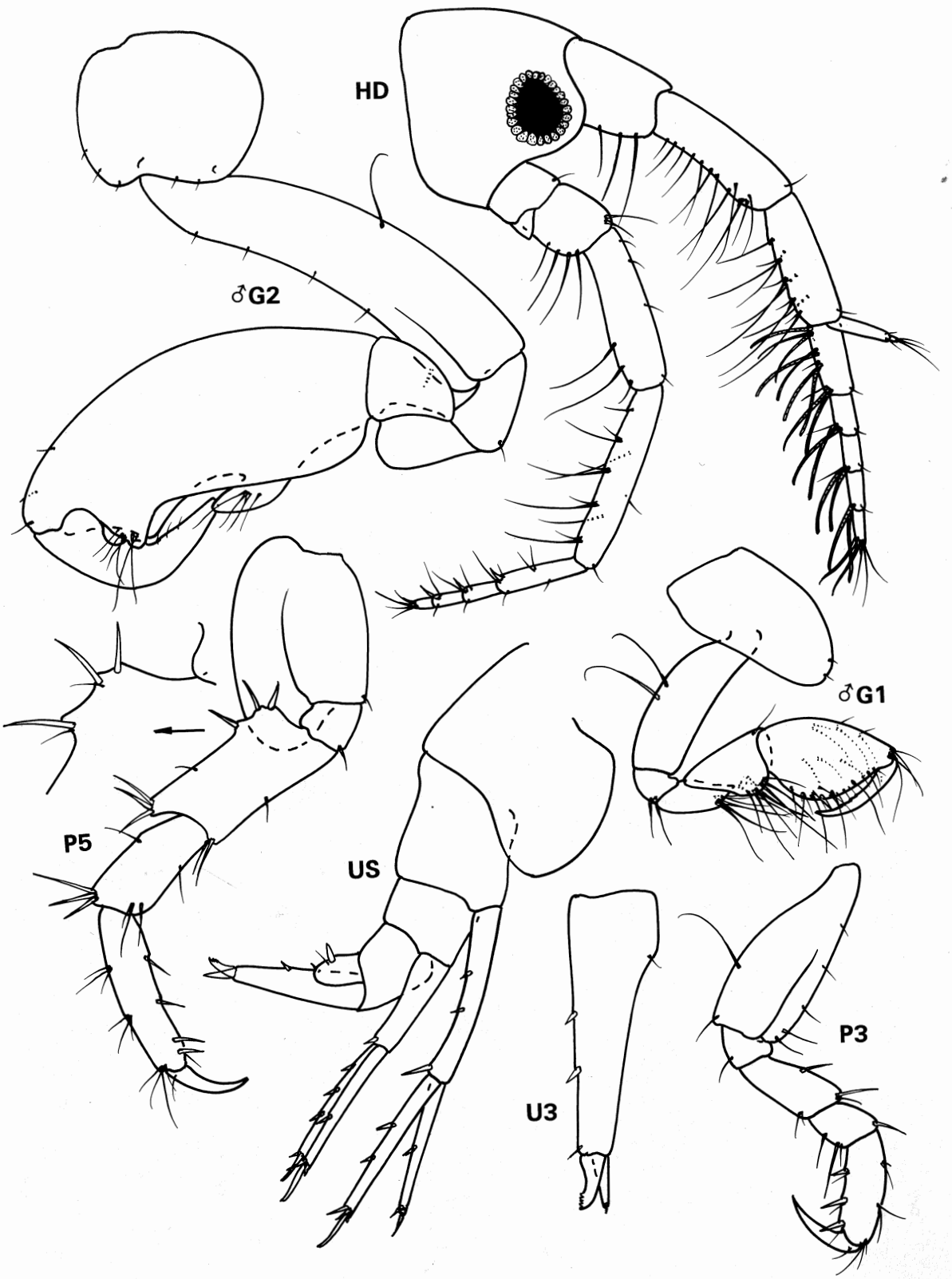

Fig. 45. *Ischyrocerus mediodens* n.sp., Guzem Natun, Madang Lagoon, Papua New Guinea, JDT/PNG-40

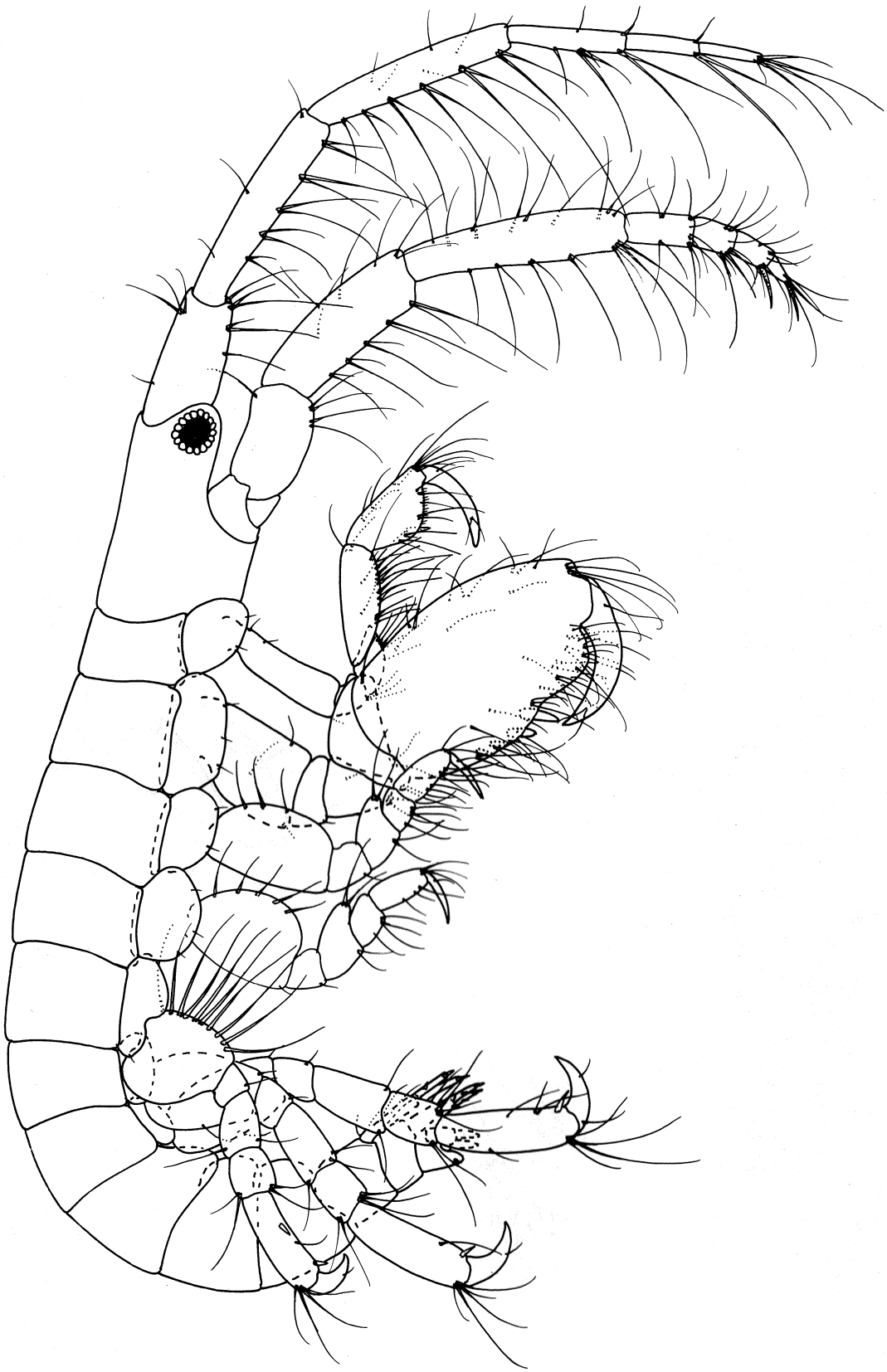

Fig. 46. *Parajassa spinipalma* Ledoyer, Padoz Natun reef, Madang Lagoon, Papua New Guinea, JDT/PNG-67.

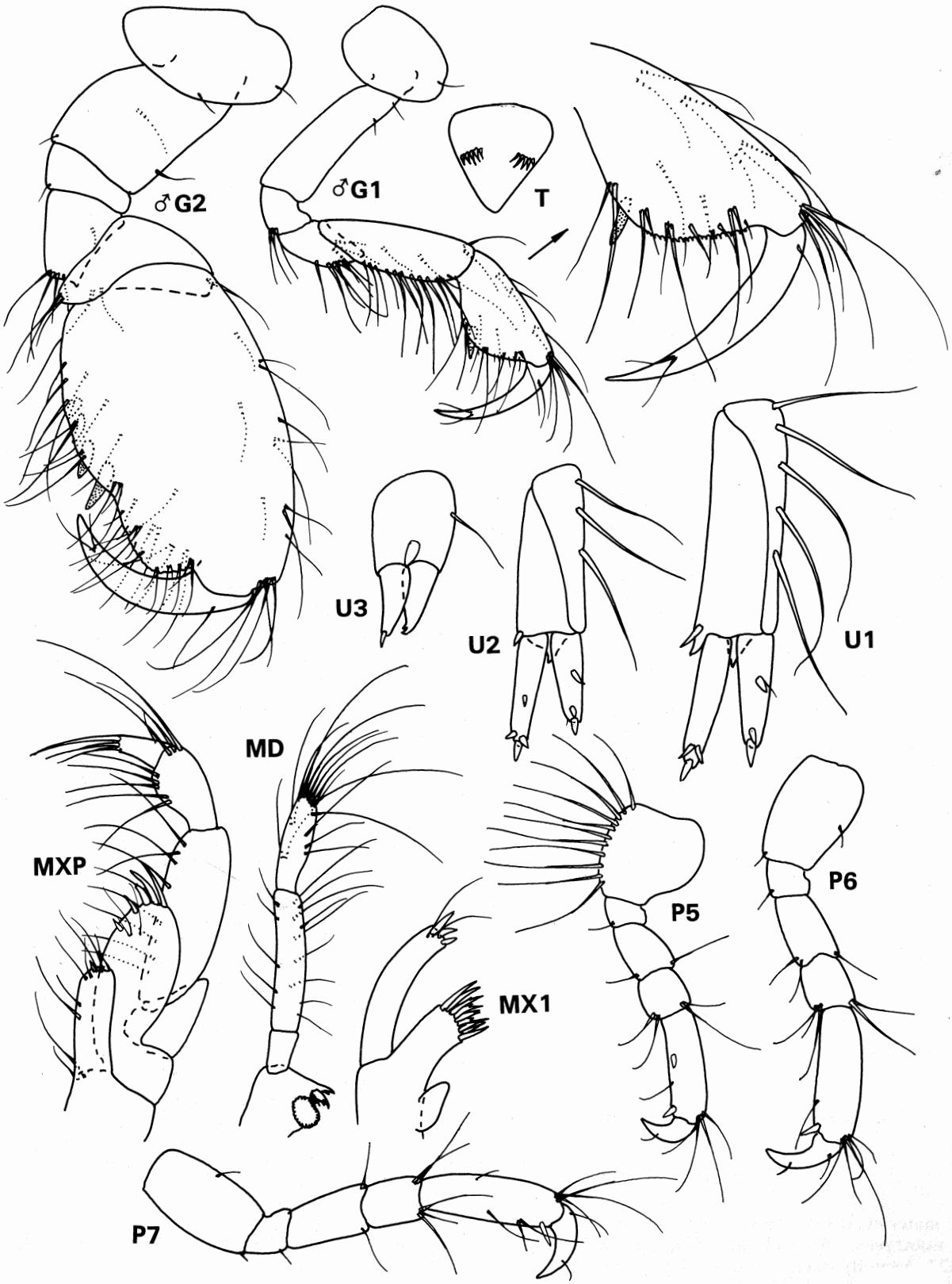

Fig. 47. *Parajassa spinipalma* Ledoyer, Padoz Natun, Madang Lagoon, Papua New Guinea, JDT/PNG-67.

Ventojassa Barnard

Ventojassa ventosa (Barnard)

Eurystheus ventosa Barnard, 1962: 20, figs 6, 7.
Ventojassa ventosa.–Barnard, 1970: 205, figs 133, 134.–Ledoyer, 1972: 244, pl. 57.–Ledoyer, 1978: 291.–Ledoyer, 1979b: 99, fig. 61(I).–Myers, 1985b: 90, fig. 70.–Ledoyer, 1986: 643, fig. 245.

Material examined. AM P42421; JDT/PNG-57 (2 males, 2 females).

Habitat. In rubble and sediment.

Distribution. Indo-Pacific from Madagascar to California.

Scutischyrocerus n.gen.

Description. Head anteroventral margin deeply recessed; antennae much shorter than body length, weakly setiferous; antenna 1 peduncular article 1 short, articles 2 and 3 elongate, accessory flagellum missing; mandibular palp three articulate, article two the longest, article three rod-shaped; maxilla 1 inner plate asetiferous; coxae 2–4 greatly enlarged, shield-like, coxa 5 with posterior excavation; gnathopod 2 larger than gnathopod 1, subchelate; pereopods 3–4 basis expanded, carpus partially telescoped into merus, dactylus elongate; uropod peduncles elongate, longer than rami, article 3 peduncle expanded, outer ramus with two hooks.

Type species. *Scutischyrocerus scutatus* n.sp.

Species composition. *Scutischyrocerus scutatus*.

Etymology. From the latin scutellum = a shield, referring to the shield-like coxae.

Remarks. This genus is similar to *Pseudischyrocerus* Schellenberg, 1931 from Antarctica and adjacent islands, but differs in a number of ways: the rounded eye lobes, no accessory flagellum, enlarged strongly overlapping coxae 2–5, almost siphonoecetine pereopods 3–4, and elongate uropod peduncles.

Scutischyrocerus scutatus n.sp.

Figs 48, 49

Type material. HOLOTYPE male, 2.6 mm, AM P42422, 2.5 mm; PARATYPES, 25 males, 36 females, 15 immature, AM P42423; Awan Biziwan, 5°11.06'S 145°49.70'E, mat of sand tubes at base of reef, 27 m, J.K. Lowry & S.J. Keable, 19 March 1991, stn JKL/PNG-260.

Diagnosis. Length 2.6 mm. Head elongate, anteroventral margin deeply recessed, eye round, situated close to anterior margin of ocular lobes; mandible palp three-articulate, articles in the basi-distal ratios 1:4:3, article 3 slender parallel-sided with a distal cluster of long setae and with about 3 long setae on the posterior margin; maxilla 1 inner plate asetiferous, palp with 5 distal spines; maxilliped palp with slender distal spine; antennae about half body length, weakly setiferous; antenna 1 a little shorter than antenna 2, peduncular article 1 short, half length of article 2, article 3 elongate only a little shorter than article 2, flagellum shorter than peduncular articles 2 and 3 combined, with 5 articles, the terminal article rudimentary, accessory flagellum missing; antenna 2 peduncular article 5 longer than 4, flagellum subequal with peduncular article 5, with 5 articles; gnathopod 1 coxa small, subtriangular, basis flask-shaped, distally broad, carpus a little longer than subovoid propodus, palm evenly convex, continuous with posterior margin, with three spines; male gnathopod 2 coxa enormously expanded, shield-like, longer than deep, almost covering coxa 1 and strongly overlapping coxa 3, basis flask-shaped with anterior flange, anterior margin straight, carpus short, cup-shaped, propodus more than twice length of carpus, parallel-sided, palm excavated forming triangular shaped depression, palm delimited by two spines, with a further spine on the posterior margin, dactylus moderately stout, evenly convex, fitting palm; female coxa 2 enlarged, but much smaller than that of male, propodus about one and one half times length of carpus, palm evenly convex, continuous with posterior margin, with three spines, dactylus fitting palm; pereopods 3–4 coxae large, shield like, but smaller than coxa 2, basis stout, anterior margin convex, carpus shortened, slightly telescoped into merus, dactylus elongate, much longer than carpus and propodus combined; pereopods 5–7 in the length ratios 14:19:22; epimera 1–3 rounded; uropod 1 peduncle elongate almost twice length of rami with 5 long, evenly spaced setae on the outer margin, rami subequal, inner ramus lacking marginal spines or setae and with a single terminal spine, outer ramus with a terminal cluster of spines and two further spines on the outer margin; uropod 2 similar to uropod 1 but peduncle somewhat less elongate, with only two long outer marginal setae, rami subequal, each with a terminal spine; uropod 3 peduncle expanded a little over twice as long as wide, with three long setae on the outer margin, rami expanded, outer ramus lacking spines or setae, with two strong recurved hooks, inner ramus without hooks and with a single terminal seta; telson short and broad, weak distolateral prominences with numerous short setae.

Etymology. From the latin scutatus = shield bearing, referring to the enlarged coxae.

Habitat. Among a mat of sand tubes at base of reef in 27 m.

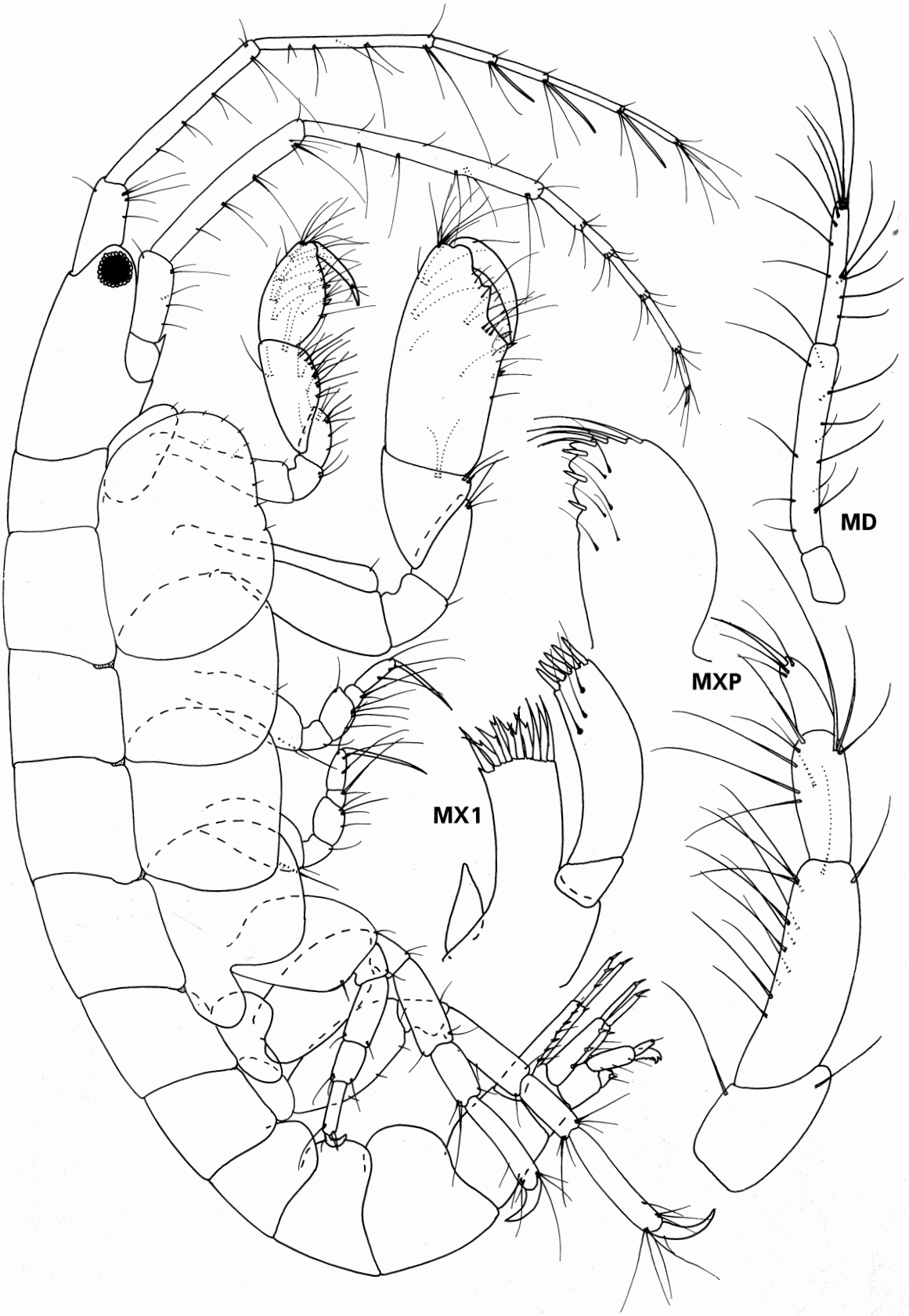

Fig. 48. *Scutischyrocerus scutatus* n.sp., Awan Biziwan, Madang Lagoon, Papua New Guinea, JKL/PNG-260.

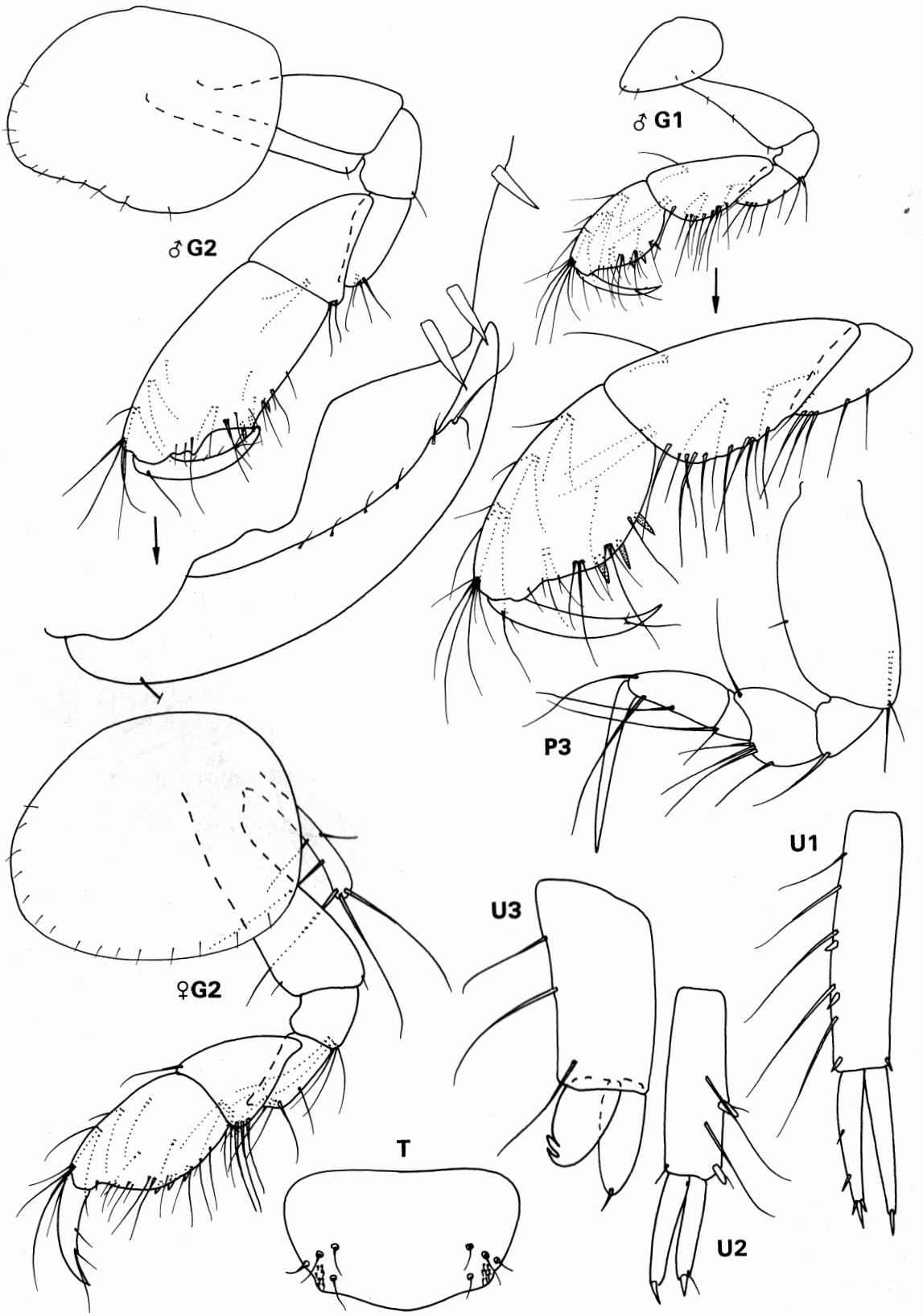

Fig. 49. *Scutischyrocerus scutatus* n.sp., Awan Biziwan, Madang Lagoon, Papua New Guinea, JKL/PNG-260.

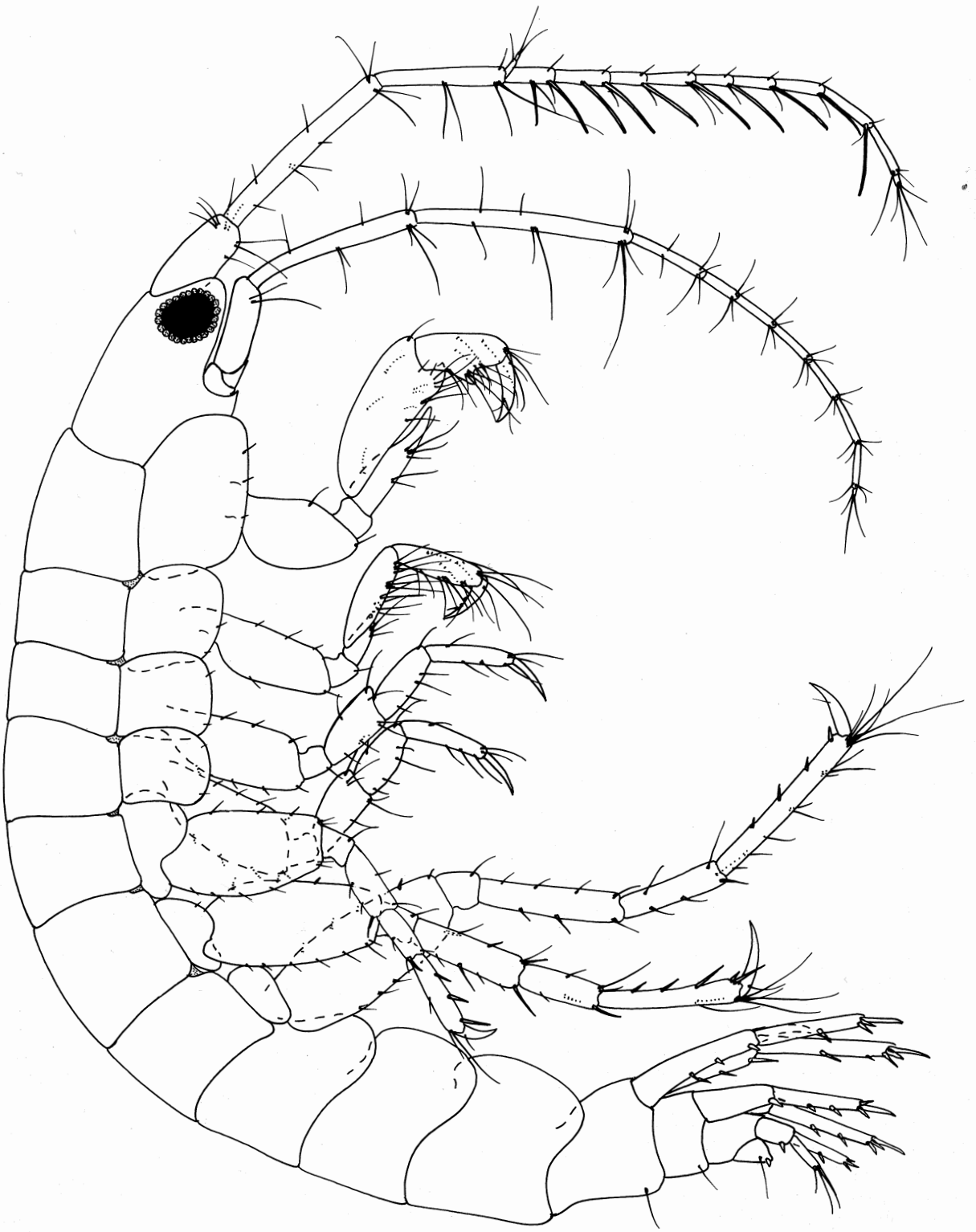

Fig. 50. *Riwomegamphopus bamus* n.sp., eastern face of Wongad Natun reef, Madang Lagoon, Papua New Guinea, JDT/PNG-28.

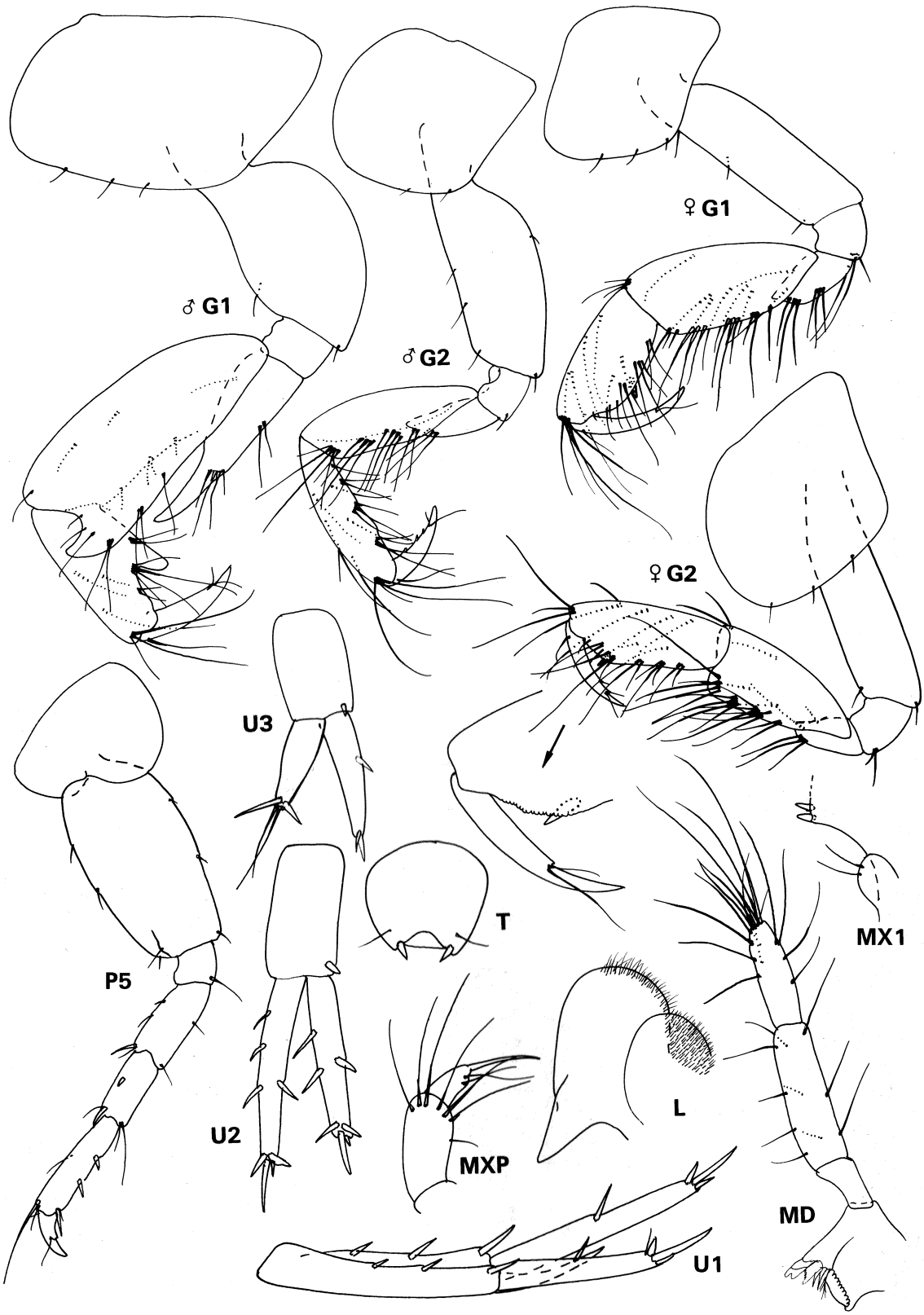

Fig. 51. *Riwomegamphopus bamus* n.sp., eastern face of Wongad Natun reef, Madang Lagoon, Papua New Guinea, JDT/PNG-28.

Neomegamphopidae

Diagnosis. Head ventral margin deeply recessed above insertion of antenna 2; antennae 1 and 2 slender, subequal, about half body length, weakly setiferous; antenna 1 accessory flagellum. variable in length, but always composed of two articles, the terminal article reduced; mandible palp article 2 longer than 3, palp article 3 clavate to ovoid, never falcate; coxa 1 the largest; male gnathopod 1 larger than 2; gnathopod 2 slender; uropod 1 with inter-ramal tooth; uropod 2 lacking inter-ramal tooth; uropod 3 peduncle shorter than rami, inner ramus longer than outer, with 1–2 terminal spines and one or more marginal spines, but never with setae, outer ramus with marginal and distal spines and one or more distal setae.

Remarks. Barnard and Thomas (1987a) discuss the relationships of *Neomegamphopus* Shoemaker, 1942 and of the Neomegamphopidae as a whole. They include *Amphideutopus* Barnard, 1959 in the family Neomegamphopidae by reason of the structure of the male gnathopods, but in doing so take no cognisance of other rather large differences between *Amphideutopus* and all Neomegamphopidae. *Amphideutopus* differs from neomegamphopids in its unique head structure, very elongate unequal antennae, enlarged coxa 2 and quite different uropod 3 with long setae on both inner and outer ramus (the form of the head and uropods is remarkably similar in all neomegamphopids). These authors also include the acuminodeutopine genera *Acuminodeutopus* Barnard, 1959 and *Rudilemboides* in the Neomegamphopidae. The aorid head shape (notwithstanding the acute eye lobes) and the form of the antenna, all point more to aorid relationships than to neomegamphopid relationships. Classifying corophioids on the basis of the structure of the male gnathopods only, is unlikely to result in an effective phylogenetic classification.

Riwomegamphopus n.gen.

Description. Like *Neomegamphopus*, but male gnathopod 1 with long meral, tooth.

Type species. *Riwomegamphopus bamus* n.sp.

Species composition. *Riwomegamphopus* n.gen. is monotypic.

Remarks. This genus shows convergent evolution with *Aora* Krøyer in the Aoridae.

Riwomegamphopus bamus n.sp.

Figs 50, 51

Type material. HOLOTYPE male, AM P42425, PARATYPE female, AM P42426; eastern face of Wongad Natun reef (5°08.31'S 145°49.36'E), sediment sample (24–27 m) and piece of submerged wood (15 m), small sample of wood contained *Tropichelura* and limnoriids, J.D.Thomas, 30 January 1990, stn JDT/PNG-28.

Other material. AM P42427; JDT/PNG-56 (1 male, 6 females).

Diagnosis. Head ocular lobes rounded, eye large; antennae subequal, a little over half body length; antenna 1 peduncular articles basi-distal length ratios 4:7:5, flagellum subequal in length with peduncle, with 10 articles, the terminal article reduced; accessory flagellum with one long and one short article; antenna two peduncular article 5 longer than 4, flagellum longer than peduncular articles 4 and 5 combined; mandible palp articles in the basi-distal ratios 2:5:3, article 3 weakly ovoid; maxilla 1 inner plate with two setae; maxilliped palp dactylus with long seta; labium outer plate mandibular processes short, acute; male gnathopod 1 coxa the largest, longer than deep, anteriorly rounded, basis swollen, anterior and posterior margins convex, merus anterior margin drawn out into an inwardly curved acute tooth, carpus elongate the posterodistal angle produced into a short, stout, recurved tooth, propodus slender, about two thirds length of carpus, with a strong, obtuse, posterodistal tooth delimiting a deep triangular palmar excavation, dactylus stout strongly overlapping palm; female gnathopod 1 slender, carpus and propodus subequal in length, but carpus a little broader, palm oblique, crenulate, defined by a spine, dactylus strongly overlapping palm; gnathopod 2 coxa and basis equal in size to coxae and bases of pereopods 3–4, carpus and propodus subequal, elongate and slender, palm of propodus almost obsolete, dactylus stout about half length of propodus; pereopods 3–7 normal, bases of pereopods 5–7 only moderately expanded; epimera 1–3 rounded; uropod 1 elongate, peduncle with strong, acute, distal inter-ramal tooth, about half length of peduncle, inner ramus subequal with peduncle, outer ramus shorter than inner; uropod 2 lacking an inter-ramal tooth, inner ramus longer than peduncle, outer ramus shorter than inner; uropod 3 peduncle relatively short, inner ramus a little longer than peduncle with one marginal spine and two distal spines, but no setae, outer ramus shorter than inner, lacking marginal spines and with two distal spines and two long distal setae; telson dorsolateral crests each bearing a stout spine.

Etymology. From the Riwo language, bamus = swollen, referring to the gnathopod 1 basis.

Remarks. This species differs from all other described species in the family by the *Aora*-like extension of the merus on the male gnathopod 1.

Habitat. In fine sediments in 6–27 m.

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The Amphipoda (Crustacea) of Madang Lagoon: Lysianassidae, Opisidae, Uristidae, Wandinidae and Stegocephalidae *

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ABSTRACT. This is the first comprehensive study of lysianassoid and stegocephaloid amphipods from the north coast of Papua New Guinea. The study reports 19 species in 11 genera in five families living in several discrete habitats in the Madang Lagoon and Astrolabe Bay. In the Lysianassidae one new genus and eight new species (*Paralysianopsis mazamoz* n.sp., *P. padoz* n.sp., *Rhinolabia elliotti* n.sp., *R. jebbi* n.sp., *R. paeowai* n.sp., *Riwo mizeui* n.gen., n.sp., *Tryphosella astrolabensis* n.sp. and *T. wongada* n.sp.) are described. These are the first records of *Paralysianopsis* and *Rhinolabia* from the Indo-Pacific. In the Opisidae n.fam. one new species (*Podoprionella dagadugaban* n.sp.) is described. This is the first record of *Podoprionella* from the Indo-Pacific. In the Uristidae the new genus *Nagada* and three new species (*Nagada garagassi* n.sp., *N. papua* n.sp. and *N. uwedoae* n.sp.) are described. Two new species of Stegocephalidae (*Andaniotes bagabag* n.sp. and *A. karkar* n.sp.) are described. Species diversity was greatest among scavenging lysianassoids. Five lysianassoid genera (*Ichnopus, Nagada, Paralysianopsis, Rhinolabia* and *Tryphosella*) represented by eleven species (*Ichnopus malpatun* Lowry & Stoddart, 1992, *Nagada garagassi, N. papua, N. uwedoae, Paralysianopsis mazamoz, Rhinolabia elliotti, R. paeowai, R. jebbi, Riwo mizeui, Tryphosella astrolabensis* and *T. wongada*) and both *Andaniotes* species were only collected in baited traps and are considered to be at least opportunistic scavengers. *Podoprionella dagadugaban* was also collected in a trap, but it is suspected of being an epiparasite of fish. Three species (*Paralysianopsis padoz, Riwo mizeui* and *Tryphosella wongada*) were taken among living coral inside and outside the lagoon. Five species (*Nagada garagassi, N. papua, N. uwedoae, Rhinolabia jebbi* and *Tryphosella astrolabensis*) were found in deep water outside the lagoon, probably on sand and mud bottoms. Three free-living species (*Paralysianopsis padoz, Parawaldeckia lowryi* Myers, 1985 and *Pseudambasia acuticaudata* (Ledoyer, 1984)) and two suspected commensal species (*Pseudocyphocaris gosema* Lowry & Stoddart, 1990 and *P. lobata* Lowry & Stoddart, 1990) occurred among coral rubble. No lysianassoid species was found in seagrass beds or living among sponges, but *P. gosema* and *P. lobata* are suspected of living with the tunicate *Didemnum molle*. Little is known of the biogeographic affinities of this fauna because so little is known from other parts of the Indo-Pacific. However, *I. malpatun* also occurs in New Caledonia, *Pseudambasia acuticaudata* also occurs in New Caledonia and the Austral Isles, and *Parawaldeckia lowryi* also occurs in Fiji and Tonga.

* Christensen Research Institute Contribution No. 102.

LOWRY, J.K. & H.E. STODDART, 1995. The Amphipoda (Crustacea) of Madang Lagoon: Lysianassidae, Opisidae, Uristidae, Wandinidae and Stegocephalidae. **In** J.K. Lowry (ed.). The Amphipoda (Crustacea) of Madang Lagoon, Papua New Guinea, Part 1. *Records of the Australian Museum, Supplement* 22: 97–174.

Contents

Introduction

During February and March of 1991 and 1992 one of us (JKL) participated in an international project to study the amphipods of the Madang Lagoon and adjacent areas. An account of the natural history (geological history and the physical and biological oceanography) of the lagoon is given in the first paper of this volume (Jebb & Lowry, 1995). As part of a study on the scavenging crustaceans in the lagoon, about 160 traps were set in the most obvious habitats inside and outside the lagoon. This method of sampling was very productive. As well as cirolanid isopods and cypridinid ostracodes, 12 species of lysianassoid and two species of stegocephalid amphipods were collected in the traps. Five more lysianassoid species were found free-living or as commensals within the lagoon. This paper presents the first comprehensive taxonomic account of lysianassoid amphipods from an area of Papua New Guinea. To put this faunule into perspective a resumé of the taxonomic status of tropical, shallow-water, Indo-West Pacific lysianassoids is presented.

Ecology

Lysianassoids appear to play subtle roles in the ecology of the Madang Lagoon area. They are uncommon in most habitats. Only five non-scavenging species (*Paralysianopsis padoz* n.sp., *Pseudambasia acuticaudata* (Ledoyer), *Parawaldeckia lowryi* Myers, *Pseudocyphocaris gosema* Lowry & Stoddart and *P. lobata* Lowry & Stoddart) occur among the coral rubble and none of these is common.

Lysianassoid scavengers are more diverse. Eleven species occur inside the lagoon or on the outer barrier reef face. However, in traps they are often found with cirolanid isopods which are more numerous and often larger. Whether they compete directly for food resources is unknown.

Four of the five scavengers which occur in the lagoon (*Nagada uwedoae* n.sp., *Rhinolabia elliotti* n.sp., *Riwo mizeui* n.sp. and *Tryphosella wongada* n.sp.) also occur at similar depths on the outer face of the barrier reef. *Rhinolabia elliotti* occurs inside the lagoon on sandy mud bottoms below 27 m depth and on the outer face of the barrier reef on sandy bottoms at similar depths. *Riwo mizeui* is most abundant on the tops and sides of reefs among living coral in the lagoon. It occurs in low numbers among coral outcrops on sandy mud and coarse sand bottoms from 17 to 50 m inside the lagoon and on the face of the outer barrier. *Tryphosella wongada* occurs abundantly on hard and soft coral bottoms, often near sand patches, in the outer lagoon and on the face of the outer barrier between 2 and 17 m depth. *Paralysianopsis mazamoz* n.sp. was found once on the back slope of the outer barrier on unconsolidated rubble at 15 m.

Six other scavengers (*Rhinolabia jebbi* n.sp., *R. paeowai* n.sp., *Tryphosella astrolabensis* n.sp., *Nagada garagassi* n.sp., *N. papua* n.sp. and *N. uwedoae*) occur outside the lagoon in deep water on the barrier face and onto the sea floor of Astrolabe Bay.

Nagada papua and *N. uwedoae* occur on the face of the outer barrier below 40 m depth on coarse sand bottoms. *Rhinolabia paeowai* occurs on the outer face of the barrier reef in depths exceeding 300 m. A larger species of *Tryphosella* Bonnier, 1893, *T. astrolabensis*, occurs in deep water on the outer face of the barrier reef and on the ooze off the reef in depths of 500 m. *Nagada garagassi* and *Rhinolabia jebbi* occur on the sea floor of Astrolabe Bay in depths of 500 m.

Podoprionella dagadugaban n.sp. was taken in a baited trap on a hard coral bottom at Padoz Natun reef. The mouthparts and gnathopods indicate that this species is not a scavenger. It is possible that *P.*

dagadugaban, like its close relatives in the genera *Normanion* Bonnier, 1893 and *Opisa* Boeck, 1876 is an ectoparasite of fish.

Biogeography of Madang Lagoon Lysianassoids

There is not yet sufficient knowledge about lysianassoid distributions in the Indo-West Pacific to enable realistic assessments of biogeography. One genus, *Riwo* n.gen., is currently considered endemic; it is the sister taxon of *Socarnella* Walker, 1904 currently known only from Sri Lanka. The other new genus, *Nagada*, also occurs in eastern Australian waters (unpublished data).

The distribution of *Ichnopus* Costa, 1853 was recently discussed by Lowry & Stoddart (1992). It is a true Indo-West Pacific genus which has relict species in the Mediterranean Sea and the eastern North Atlantic Ocean. The only species known from the Madang area, *Ichnopus malpatun* Lowry & Stoddart, is also known from New Caledonia.

Species of *Podoprionella* Sars, 1895 are extremely rare. The currently known distribution (eastern North Atlantic Ocean, Mediterranean Sea and Bismarck Sea) is based on so few records that no generalisations can be made.

Parawaldeckia Stebbing, 1910 occurs in southern South America, throughout the Subantarctic, Australia, Papua New Guinea, Fiji and Tonga. It has not been reported from the northern or western Indian Ocean. The only species known from the Madang area, *Parawaldeckia lowryi*, is also known from Fiji and Tonga.

Paralysianopsis Schellenberg, 1931 has a similar distribution to that of *Parawaldeckia*, but it has also been reported from Madagascar on the African plate and is not known from the islands east of Papua New Guinea. At the moment it appears to have a disjunct distribution, but we have good evidence that *Paralysianopsis* is widespread in Australian waters. *Paralysianopsis padoz* is not reported outside northern Papua New Guinea.

Pseudambasia Stephensen, 1927 appears to be widespread (at least five tectonic plates) in the Indo-West Pacific area, and is also known from the Subantarctic and southern South America. The only species known from the Madang area, *Pseudambasia acuticaudata*, is also known from New Caledonia and the Austral Isles.

Until now *Rhinolabia* Ruffo, 1972 was known only from the Mediterranean Sea. The new species described here are not known from outside northern Papua New Guinea.

Tryphosella is a widespread genus with many species, but the species described here have peculiar morphological characters in the first gnathopods which also occur in at least one species from New Caledonia (Lowry & Stoddart, 1994). *Tryphosella astrolabensis* and *T. wongada* are not known from outside northern Papua New Guinea.

Status of Tropical Indo-West Pacific Lysianassoids

The tropical Indo-West Pacific is a huge area (extending over about 12 tectonic plates) generally considered to be the most diverse marine environment on earth. Invertebrate groups such as hard corals, echinoderms, decapod crustaceans and the larger molluscs, are relatively well known for the area. Many other groups are poorly known. Through the efforts of workers such as Pirlot (1933, 1936), Schellenberg (1938), Birstein & Vinogradov (1958, 1960, 1963, 1964), J.L. Barnard (1965, 1970), Ledoyer (1972, 1973, 1978a,b, 1979a,b, 1984, 1986), Myers (1985, 1986, 1989, 1990, 1995) and Lowry & Stoddart (1990, 1992, 1993, 1994), a good foundation for the study of tropical Indo-West Pacific Amphipoda is in place. There are currently more than 1000 amphipod species known from this area. It would be extremely difficult to estimate how many amphipod species may be present, but in this project at least 166 species have been collected from the Madang Lagoon alone.

Collecting Lysianassoids. Although scientific collections have been made in the Indo-West Pacific since the middle of last century, the efforts have been sporadic and non-systematic. Many collecting expeditions have been geographically wide-ranging but habitat-specific, for example the *Challenger, Valdivia, Galathea*, several Russian *Vityaz* expeditions and the French MUSORSTOM expeditions sampled the deep sea; the ORSTOM collections reported by Repelin (1978) and the *Ob* and *Vityaz* collections reported by Birstein & Vinogradov (1964) sampled the oceanic pelagics. Others have been geographically limited but attempted to sample more than one habitat, for example the John Murray Expedition in Arabian waters, the *Siboga* Expedition in Indonesia, and Ledoyer's reports from Madagascar. Many reports of Indo-West Pacific lysianassoids result from limited sampling in limited geographical areas, for example the reports of J.L. Barnard and A.A. Myers from Pacific islands and the ORSTOM sampling in the Philippines, Indonesia and New Caledonia.

Lysianassoid amphipods occur in almost all possible habitats. Tropical lysianassoids are often small (Steele, 1983) and may be overlooked or not caught in sampling programs designed to collect large invertebrates. The full range of species present has probably never been collected from any one area.

Conventional dredges, trawls and grabs are good collectors of lysianassoid amphipods. However, scavenging lysianassoids are not often taken by dredges or grabs, presumably because they are motile enough to avoid them. They are collected most efficiently with baited traps. Species associated with living coral or coral rubble, such as *Parawaldeckia* spp., are most efficiently collected by scuba divers. Pelagic predators, such as species of *Cyphocaris* Boeck, 1871 and some species of *Ichnopus* can only be taken with plankton nets. The

same is true for abyssopelagic members of the cebocarid group. It takes a combination of all these methods to collect adequately the lysianassoids of any area.

We know of no tropical collection resulting from the use of all of these collecting methods. The collection from the Madang area of Papua New Guinea, reported here, does not contain a pelagic component or a deep sea component. The collections studied by Ledoyer from the Malagasy area appear to lack only the scavenging component. In order to make comparisons or gain an understanding of the diversity or ecological role of Indo-West Pacific lysianassoids, complete collections are needed from at least several areas on each plate within the Indo-West Pacific area.

Table 1 documents records of tropical Indo-West Pacific lysianassoids. There are currently 174 lysianassoid species known from the tropical Indo-West Pacific area, about 21% of the known world species. Tectonic plates are used for listing the distribution of taxa in Tables 1 and 2, although the text may refer to geographic areas on a plate. We have delimited "tropical" by 25°N and 25°S.

Diversity. Lysianassoids have never been considered to be diverse components of tropical amphipod faunas (J.L. Barnard, 1969; Barnard & Karaman, 1991). However, even with the collection limitations outlined above, the data currently available indicate that tropical lysianassoids are more diverse than the literature implies. Using the table compiled by Ledoyer (1986) for shallow- and deep-water Indian Ocean gammaridean amphipods, only corophioids (22%) and gammaroids (14.5%) are more diverse at the species level than are lysianassoids (12.6%). At the generic level corophioids and lysianassoids are equally diverse and gammaroids are less diverse. In a shallow water, high tropical area such as the well-sampled Madang Lagoon, corophioids comprise 32% of the genera and 30% of the species; gammaroids comprise 10% and 14% respectively and lysianassoids make up 10% and 9% of the genera and species. Consequently it must be considered that lysianassoids are a more important part of the tropical fauna than was previously thought.

Generic Status. There are currently about 69 genera known from the tropical Indo-West Pacific (Table 2), about 40% of the known world genera. Of the 35 shallow-water (less than 500 m) genera, seven can be considered cosmopolitan; eight are known from the North Atlantic Ocean, the Mediterranean Sea and the Indo-West Pacific Ocean, and may be post-Tethyan; fourteen appear to have southern origins and may be post-Gondwanan; and six are currently considered to be endemic to the tropical Indo-West Pacific area. These genera are listed in Table 3.

Conclusions. Lysianassoid amphipods are more diverse in tropical Indo-West Pacific marine environments than the literature implies. Based on current evidence they appear to be the third most diverse group of gammaridean amphipods after the Corophioidea and the Gammaroidea. Collecting for lysianassoids in the Indo-West Pacific has been sporadic and inefficient. A combination of trapping, habitat collections by divers, dredging and plankton samples are essential to collect the majority of lysianassoid amphipods in an area. To date trapping for lysianassoid amphipods has been largely ignored in the Indo-West Pacific.

Methods

In recent regional studies (Lowry & Stoddart, 1993, 1994) species have been reported in the superfamily Lysianassoidea with no attempt at family classification. In this paper we present species in their known family groups and establish a new family group, Opisidae. Family groups are treated in alphabetical order.

Descriptions have been generated from the taxonomic database program DELTA (Dallwitz *et al.*, 1993).

Coded setal types on the mandibular palp follow the scheme presented by Lowry & Stoddart (1993).

Lowry & Stoddart (1995) changed the terminology they had previously used to describe setae and spines. This change was based primarily on arguments about the homology of setae and spines presented by Oshel & Steele (1988) and Watling (1989). The terminology mainly follows Watling (1989) with a few modifications. What were previously referred to as setae are now referred to as slender setae and what were previously referred to as spines are now called robust setae. What were previously referred to mainly as teeth (non-articulating extrusions of the cuticle), are now referred to as spines.

Lowry & Stoddart (1992) explained the 7/4 setal-tooth arrangement on the outer plate of maxilla 1 of hirondelleid and scopelocheirid taxa and the 7/4 crown setal-tooth arrangement of the Uristidae. Lowry & Stoddart (1993) explained the 6/5 setal-tooth arrangement of the Lysianassidae. An explanation of the 8/3 crown setal-tooth arrangement found among species of Opisidae occurs under the description of the family.

All material is lodged in the Australian Museum, Sydney (**AM**), the British Museum (Natural History), London (**BMNH**) and the United States National Museum of Natural History, Washington, D.C. (**USNM**). A set of types is held in trust at the Australian Museum for the National Museum of Papua New Guinea, Port Morseby.

Complete station data is published in this volume (Jebb & Lowry, 1995, pp. 1–24).

The following abbreviations are used in the figures: **A**, antenna; **C**, coxa; **E**, epistome and upper lip; **EP**, epimeron; **G**, gnathopod; **H**, head; **MD**, mandible; **MDP**, mandibular palp; **MP**, maxilliped; **MPIP**, maxilliped inner plate; **MPOP**, maxilliped outer plate; **MPP**, maxilliped palp; **MX**, maxilla; **MX1IP**, maxilla 1 inner plate; **MX1OP**, maxilla 1 outer pate; **MX1P**, maxilla 1 palp; **P**, peraeopod; **ST**, setal-tooth; **T**, telson; **U**, uropod; **UR**, urosome; **l**, left; **r**, right; **lat**, lateral.

Systematics

Lysianassoidea

Lysianassidae

Paralysianopsis Schellenberg

Paralysianopsis Schellenberg, 1931: 7.–K.H. Barnard, 1932: 38.–Lowry & Stoddart, 1984: 103.–Barnard & Karaman, 1991: 513.
Austronisimus K.H. Barnard, 1931: 425.

Diagnosis. Callynophore present in female and male. Antenna 2 not elongate in male. Mandible: left lacinia mobilis a robust seta or cuspidate peg; molar with reduced column, sparsely or not setose, triturating surface well developed to vestigial distal patch. Maxilla 1: outer plate ST7 contiguous with or slightly displaced from ST6, STA–STD bicuspidate or apically bifurcate; palp with small apical conate setae, with or without serrate apical margin. Maxilliped: outer plate small, medial robust setae vestigial. Gnathopod 1 weakly subchelate. Gills present from gnathopod 2 to peraeopod 6, not pleated. Uropod 2: inner ramus not constricted to strongly constricted. Uropod 3: outer ramus usually 2-articulate, article 2 long. Telson entire, occasionally incised.

Species composition. *Paralysianopsis* contains 5 species: *Paralysianopsis incerta* (Ledoyer, 1986); *P. mauritiensis* Ledoyer, 1978a; *P. mazamoz* n.sp.; *P. odhneri* Schellenberg, 1931; and *P. padoz* n.sp.

Remarks. *Paralysianopsis* may be a widespread southern genus. It is related to scavenging genera such as *Aruga* Holmes, 1908, *Rhinolabia, Socarnopsis* Chevreux, 1911 and *Waldeckia* Chevreux, 1906, but it has rarely been taken from traps and is probably only an occasional scavenger. *Paralysianopsis* appears most closely related to *Rhinolabia* and differs from it in the molar which is a triturating button and the palp of maxilla 1 which has reduced apical conate setae and a partially serrate margin.

Key to Species of *Paralysianopsis*

1. Upper lip strongly produced in a sharp point 2
—— Upper lip slightly produced, bluntly rounded 3
2. Uropod 2, inner ramus weakly constricted; uropod 3, outer ramus 2-articulate ..... *P. odhneri*
—— Uropod 2, inner ramus not constricted; uropod 3, outer ramus 1-articulate ..... *P. mauritiensis*
3. Gnathopod 1, palm acute; uropod 2, inner ramus weakly constricted; telson longer than broad, entire 4
—— Gnathopod 1, palm transverse; uropod 2, inner ramus strongly constricted; telson about as long as broad, incised ..... *P. incerta*
4. Maxilla 1, outer plate STB–STC 2-cuspidate; maxilla 1, palp apical conate setae vestigial; gnathopod 1 palm without spine; uropod 3, article 2 of outer ramus about 2 × article 1 ..... *P. mazamoz*
—— Maxilla 1, outer plate STB–STD apically bifurcate; maxilla 1, palp apical conate setae small but well-developed; gnathopod 1 palm with large acute spine; uropod 3, article 2 of outer ramus about 1.3 × article 1 ..... *P. padoz*

Paralysianopsis mazamoz n.sp.

Figs 1, 2

Type material. HOLOTYPE, female, 2.8 mm, non-ovigerous, AM P41755; 2 PARATYPES, AM P41756; back slope of outer barrier directly north of Wongad, Madang Lagoon, Papua New Guinea, 5°07.98'S 145°49.51'E, baited trap on unconsolidated rubble with *Padina* and some living *Halimeda* on *Halimeda* flake sediment, 15 m, J.K. Lowry & S.J. Keable, 12–13 March 1991, stn JKL/PNG-205.

Diagnosis. Upper lip slightly produced, rounded. Mandible: molar sparsely setose with weak triturating surface. Maxilla 1: outer plate STB and STC bifurcate, STD apically bicuspidate; palp serrate with vestigial apical spines. Gnathopod 1: palm acute, smooth, without spine. Uropod 2: inner ramus weakly constricted. Uropod

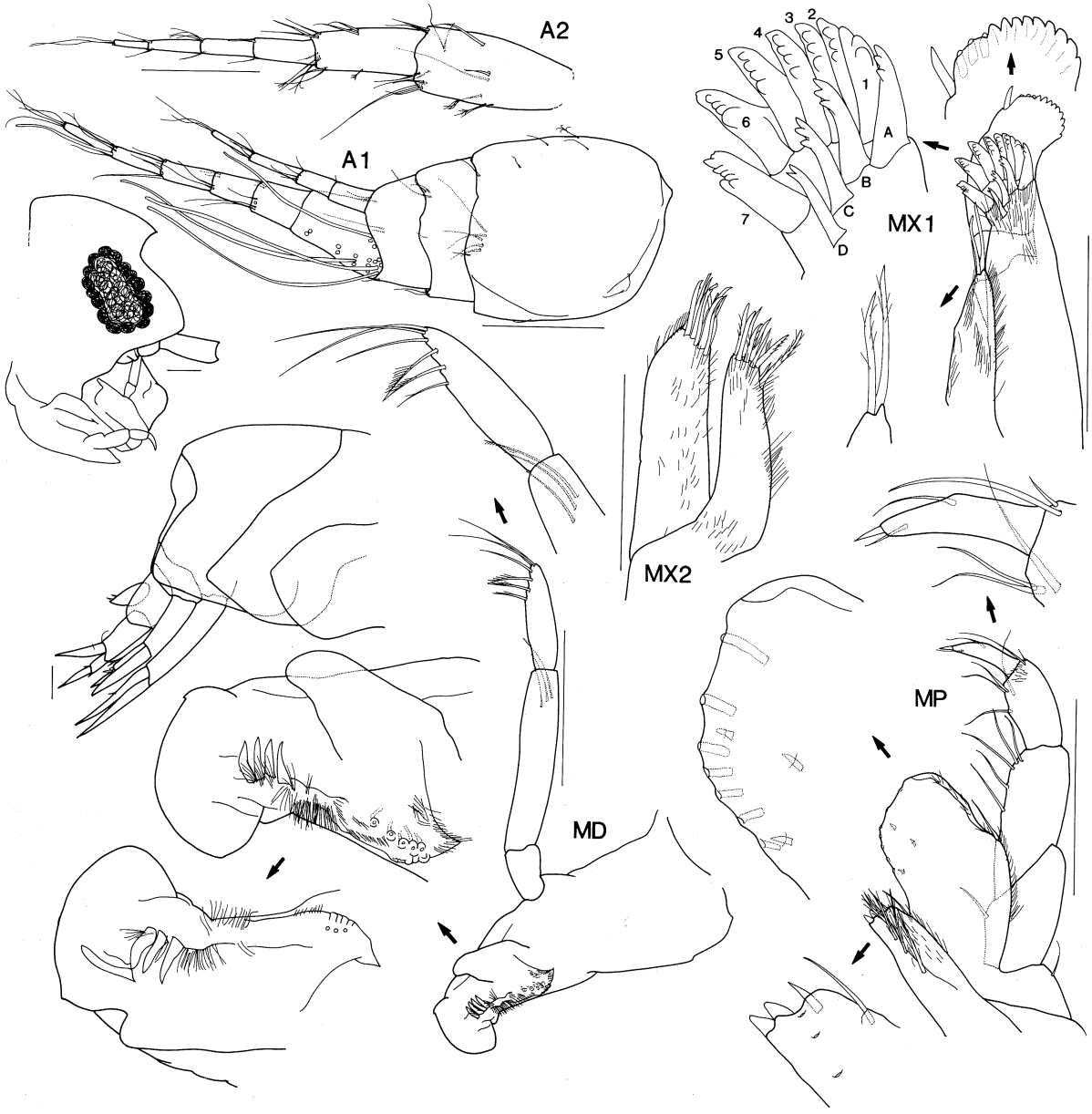

Fig. 1. *Paralysianopsis mazamoz* n.sp., holotype female, 2.8 mm, AM P41755, back slope of outer barrier near Wongad, Madang Lagoon, Papua New Guinea. Scales represent 0.1 mm.

3: outer ramus 2-articulate, article 2, 1.9 times article 1. Telson entire, slightly emarginate.

Description. Holotype female, 2.8 mm; male not known. *Head and body*: without setae; colour not known. *Head*: deeper than long; lateral cephalic lobe large, narrowly rounded; rostrum absent; eyes oval. *Antenna 1*: medium length, 0.2 × body; peduncular article 1 short, length 1.1 × breadth; peduncular article 2 short, 0.29 × article 1; peduncular article 3 long, 0.25 × article 1; accessory flagellum long, 0.5 × primary flagellum, 4-articulate, article 1 short, 1 × article 2, not forming cap; flagellum 6-articulate, callynophore weak 2-field in female, without posterodistal slender or robust setae, without flagellar robust setae, calceoli absent. *Antenna 2*: subequal in length to antenna 1; peduncle without brush setae in female, peduncular article 1 not greatly enlarged, peduncular articles 4 and 5 not enlarged in female; flagellum 6-articulate, calceoli absent.

Mouthpart bundle: subquadrate. *Epistome* and *upper lip*: fused, with central bulge. *Mandible*: incisors symmetrical, small, with slightly convex margins; left lacinia mobilis present, a long slender peg; accessory setal row without distal setal tuft, left row with 3, right

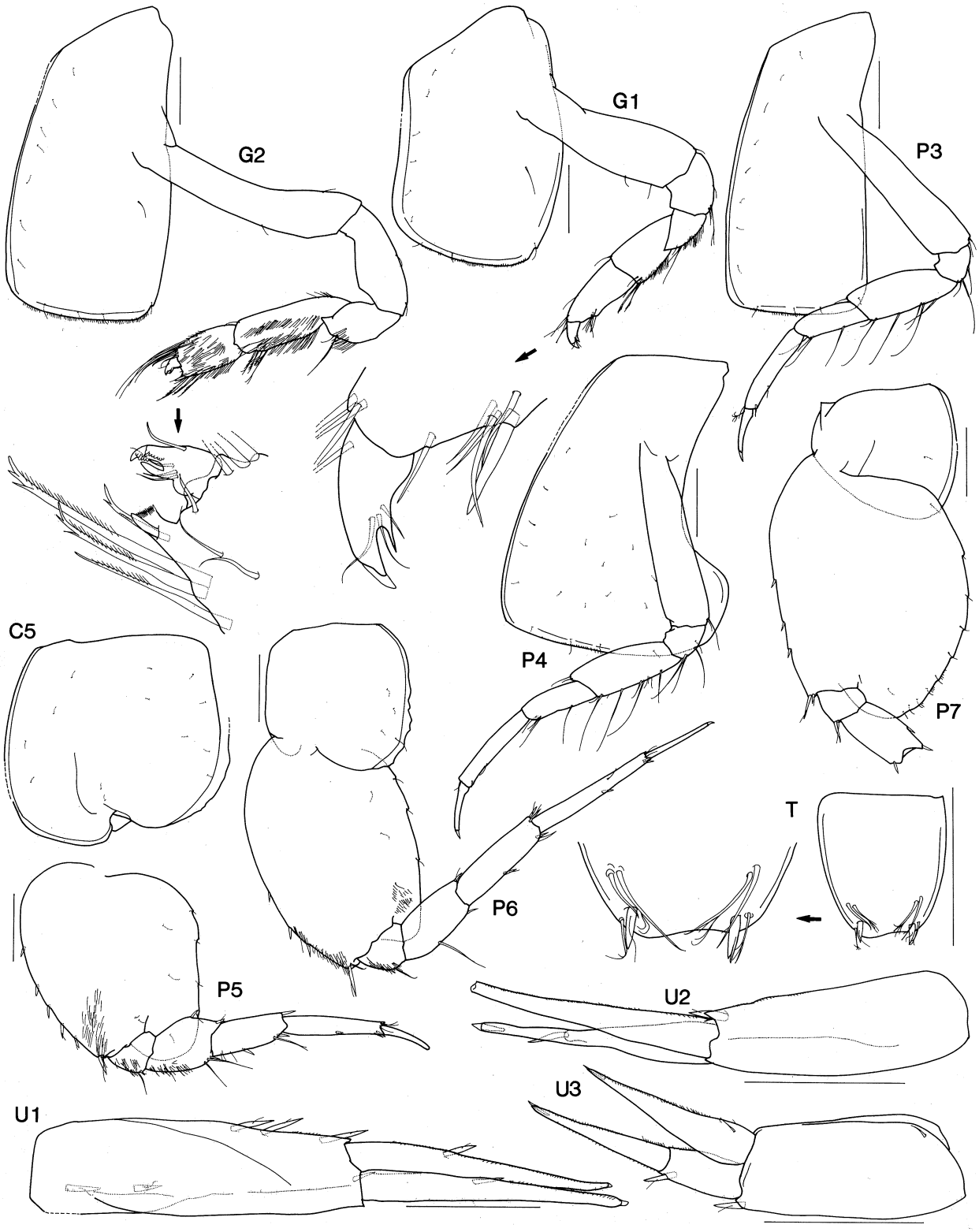

Fig. 2. *Paralysianopsis mazamoz* n.sp., holotype female, 2.8 mm, AM P41755, back slope of outer barrier near Wongad, Madang Lagoon, Papua New Guinea. Scales represent 0.1 mm.

with 4 short, slender, simple setae, intermediate setae present, probably simple; molar with reduced column, sparsely setose with weak triturating surface; mandibular palp attached midway; article 1 short, length 1.5 × breadth; article 2 elongate, slender, length 4.9 × breadth, 1.7 × article 3, with 3 posterodistal A2-setae, without D2-setae; article 3 slender, blade-like, short, length 3.8 × breadth, without A3- or B3-setae, with 4 distal D3-setae and 2 apical E3-setae. *Maxilla 1*: inner plate narrow with 2 pappose apical setae; outer plate with 11 setal-teeth; outer row with ST1–ST3 large, stout, weakly to multicuspidate, ST4 and ST5 large, stout, 4-cuspidate, ST6 large, broad, 4-cuspidate distally, ST7 symmetrical, slightly displaced from ST6, large, broad, 5-cuspidate distally; inner row with STA large, slightly displaced from STB–STD, 2-cuspidate, STB large, broad, 2-cuspidate, STC long, slender, 2-cuspidate, STD long, slender, apically bifurcate; palp large, 2-articulate, with 3 short terminal conate setae, without subterminal setae, flag seta present on distolateral corner, distomedial margin serrate. *Maxilla 2*: inner plate narrow, outer plate broad, subequal in length. *Maxilliped*: inner plate large, subrectangular, with 2 apical nodular setae, oblique setal row reduced with 4 pappose setae; outer plate small, subovate, with many apical simple setae, without apical robust setae, medial robust setae vestigial, submarginal setae short, simple; palp large, 4-articulate, article 2 broad, length 2.5 × breadth, 1.6 × article 3, article 3 short, slender, length 1.9 × breadth, dactylus well developed, with 2 subterminal setae, unguis present.

Coxae: 1 to 4 with setal fringe along ventral margin. *Gnathopod 1*: subchelate; coxa large, as long as coxa 2, anterior margin straight, posterior margin slightly convex; basis long, slender, length 3.1 × breadth, anterior margin smooth, with simple setae; ischium short, length 1.3 × breadth; merus, posterior margin with patch of short setae; carpus subrectangular, short, length 1.9 × breadth, subequal in length to propodus, with patch of very fine setae near posterior margin; propodus large, subrectangular, length 2.1 × breadth, margins subparallel, posterior margin smooth, straight, without robust or slender setae, palm acute, margin straight, smooth, posterodistal corner with 1 robust seta; dactylus simple, with subterminal spine. *Gnathopod 2*: minutely subchelate; coxa large, subequal in size to coxa 3; ischium long, length 2.6 × breadth; carpus long, length 3.2 × breadth, posterior margin straight; propodus subrectangular, short, length 1.7 × breadth, palm transverse, with straight margin with serrate pad, posterodistal corner with 1 medial robust seta; dactylus reaching corner of palm, posterior margin serrate.

Peraeopod 3: coxa large; merus not expanded anteriorly, female merus-carpus without plumose setae, not known for male; propodus with 1 slender seta and 1 distal locking seta along posterior margin; dactylus long, slender. *Peraeopod 4*: coxa deeper than wide, with large posteroventral lobe, anterior margin slightly rounded, posterior margin slightly sloping anteriorly; merus not expanded anteriorly, female merus-carpus without plumose setae, not known for male; propodus with 1 slender seta and 1 distal locking seta along posterior margin; dactylus long, slender. *Peraeopod 5*: coxa equilobate; basis expanded with posterior margin smooth; merus slightly expanded posteriorly; propodus with 1 robust seta and 2 distal locking setae along anterior margin; dactylus long, slender. *Peraeopod 6*: coxa small, slightly lobate posteriorly; basis expanded posteriorly with smooth posterior margin, without anteroventral lobe; merus not expanded posteriorly; propodus with 1 robust seta and 2 distal locking setae along anterior margin; dactylus long, slender. *Peraeopod 7*: basis expanded posteriorly, posterior margin slightly rounded, minutely crenate, posteroventral corner rounded, posteroventral margin rounded; merus not expanded posteriorly with 2 robust setae; propodus and dactylus not known.

Oostegites from gnathopod 2 to peraeopod 5. *Gills* from gnathopod 2 to peraeopod 6, not pleated.

Pleonites 1 to 3 dorsally smooth. *Epimeron 1*: anteroventral corner rounded. *Epimeron 3*: posteroventral corner narrowly rounded. *Urosomites*: 1 to 3 dorsally smooth; urosomite 3 without small dorsolateral robust seta. *Uropod 1*: without fine setae; peduncle with 2 dorsolateral, 1 apicolateral, 2 dorsomedial and 1 apicomedial robust setae; outer ramus slightly longer than inner ramus; outer and inner ramus each with 1 dorsal robust seta. *Uropod 2*: without fine setae; peduncle with 1 apicolateral and 1 apicomedial robust setae; outer ramus slightly longer than inner ramus; outer ramus with 1 dorsal robust seta; inner ramus with 1 dorsal robust seta, with weak constriction. *Uropod 3*: peduncle long, length 2.2 × breadth, without dorsolateral flange, without dorsal or midlateral robust or slender setae, with 1 distoventral robust seta, without plumose setae; rami lanceolate, inner ramus reduced, about 0.83 × outer ramus; outer ramus 2-articulate, article 2 long, 1.9 × article 1, article 1 with 1 lateral robust seta; inner ramus without medial or lateral robust setae; plumose setae absent in female. *Telson*: length 1.1 × breadth, entire, without dorsal robust or slender setae, distally emarginate, with 2 marginal penicillate setae, without simple marginal setae, with 2 marginal robust setae.

Etymology. Named for Mazamoz reef in Madang Lagoon.

Remarks. *Paralysianopsis mazamoz* could be considered as the female of *P. padoz*, but the weakly triturating molar, the patch of setae between the accessory setal row and the molar, the vestigial apical conate setae on the palp of maxilla 1 outer plate, the lack of a spine on the palm of gnathopod 1, the slightly different cuspidation of the inner row of setal-teeth on maxilla 1, the differently shaped epimeron 3, the longer article 2 of the outer ramus of uropod 3 and the slightly emarginate telson indicate that this is a distinct, but closely related, species.

Distribution. Madang Lagoon, Papua New Guinea, in 15 m depth.

Paralysianopsis padoz n.sp.

Figs 3, 4

Type material. HOLOTYPE, male, 2.3 mm, AM P41570; PARATYPE, male, AM P41571; Padoz Tinan reef, Madang Lagoon, Papua New Guinea, 5°09.53'S 145°48.88'E, formalin wash of clean rubble and one piece of circular, flat-topped coral with numerous sponges and ascidians on underside, 2 m, J.D. Thomas, 9 January 1989, stn JDT/PNG-3.

Diagnosis. Upper lip slightly produced, rounded. Mandible: molar with reduced column and convex triturating surface. Maxilla 1: outer plate STB to STD apically bifurcate; palp without serrations, with small well-developed apical conate setae. Gnathopod 1: palm acute, with large spine. Uropod 2: inner ramus weakly constricted. Uropod 3: outer ramus 2-articulate, article 2, 1.3 × article 1. Telson entire, distally rounded.

Description. Holotype male, 2.3 mm; female not known. *Head and body*: without setae; colour not known. *Head*: deeper than long; lateral cephalic lobe large, broad, distally truncated; rostrum absent; eyes long, oval. *Antenna 1*: medium length, 0.26 × body, peduncular article 1 short, length 0.9 × breadth; peduncular article 2 short, 0.44 × article 1; peduncular article 3 long, 0.25 × article 1; accessory flagellum long, 0.6 × primary flagellum, 4-articulate, article 1 long, 2.7 × article 2, not forming cap; flagellum 6-articulate, callynophore strong 2-field in male, without posterodistal slender or robust setae, without flagellar robust setae or aesthetascs, calceoli absent. *Antenna 2*: subequal in length to antenna 1, weakly geniculate between peduncular articles 3 and 4, article 3 short, 0.39 × article 4; peduncle with strong brush setae in male; peduncular article 1 not greatly enlarged; flagellum 6-articulate, calceoli absent.

Mouthpart bundle: subquadrate. *Epistome* and *upper lip*: separate, epistome straight, upper lip produced, hemispherical. *Mandible*: incisors symmetrical, small, with slightly convex margins; left lacinia mobilis present, a short smooth robust seta; accessory setal row without distal setal tuft, left row with 3, right with 4 short, slender, simple robust setae, with simple intermediate setae; molar with reduced column and convex triturating surface; mandibular palp attached midway, article 1 short, length 1.5 × breadth; article 2 elongate, slender, length 4.25 × breadth, 1.7 × article 3, with 3 distomedial A2-setae, without D2-setae; article 3 slender, blade-like, short, length 3.4 × breadth, without A3- or B3-setae, with 3 distal D3-setae on posterior margin and 2 apical E3-setae. *Maxilla 1*: inner plate narrow with 2 pappose apical setae; outer plate with 11 setal-teeth; outer row with ST1–ST3 large, stout, weakly to multicuspidate, ST4 large, stout, 4-cuspidate, ST5 large, stout, 5-cuspidate, ST6 large, broad, 4-cuspidate distally, ST7 symmetrical, contiguous with ST6, large, broad, 5-cuspidate distally; inner row with STA large, broad, 2-cuspidate, STB–STD long, slender, apically bifurcate; palp large, 2-articulate, with 3 short terminal conate setae, without subterminal setae, flag seta present on distolateral corner, distomedial margin smooth. *Maxilla 2*: inner plate narrow, outer plate broad, subequal in length *Maxilliped*: inner plate large, subrectangular, with 2 apical nodular setae, oblique setal row reduced with 3 pappose setae; outer plate small, subovate, without apical setae, with 2 vestigial apical robust setae, medial robust setae vestigial, submarginal setae vestigial; palp large, 4-articulate, article 2 broad, length 2.3 × breadth, 1.4 × article 3, article 3 long, broad, length 2.4 × breadth, dactylus well developed, with 1 subterminal seta, unguis present.

Coxae: 1 to 4 without setal fringe along ventral margin. *Gnathopod 1*: subchelate; coxa large, as long as coxa 2, anterior margin straight, posterior margin straight; basis long, slender, length 3.1 × breadth, anterior margin smooth, without setae; ischium short, length 1.2 × breadth; merus, posterior margin with patch of short setae; carpus subrectangular, short, length 1.6 × breadth, subequal in length to propodus, with patch of very fine setae near posterior margin; propodus large, subrectangular, length 2.2 × breadth, margins slightly converging distally, posterior margin smooth, straight, without setae, palm extremely acute, margin straight, with long acute spine, posterodistal corner with 1 large medial robust seta; dactylus simple, with subterminal spine. *Gnathopod 2*: minutely subchelate; coxa large, subequal in size to coxa 3; ischium long, length 2.9 × breadth; carpus long, length 3.7 × breadth, posterior margin straight; propodus subrectangular, short, length 1.6 × breadth, palm transverse, with straight margin with serrate pad, posterodistal corner without robust setae; dactylus reaching corner of palm, posterior margin serrate.

Peraeopod 3: coxa large; merus weakly expanded anteriorly, male merus-carpus without plumose setae, not known for female; propodus with 1 seta and 1 distal locking seta along posterior margin; dactylus long, slender. *Peraeopod 4*: coxa deeper than wide with large posteroventral lobe, anterior margin slightly rounded, posterior margin slightly sloping anteriorly; merus weakly expanded anteriorly, male merus-carpus without plumose setae; propodus with 1 slender seta and 1 distal locking seta along posterior margin; dactylus long, slender. *Peraeopod 5*: coxa equilobate; basis expanded with posterior margin minutely crenate; merus slightly expanded posteriorly; propodus and dactylus not known. *Peraeopod 6*: coxa small, not lobate posteriorly; basis expanded posteriorly with minutely crenate posterior margin; merus not expanded posteriorly; propodus and dactylus not known. *Peraeopod 7*: basis expanded posteriorly, posterior margin slightly rounded, minutely crenate, posteroventral corner rounded, posteroventral margin straight; merus not expanded posteriorly with 2 robust setae; propodus and dactylus not known.

Oostegites not known. *Gills* from gnathopod 2 to peraeopod 6, not pleated.

Pleonites 1 to 3 dorsally smooth. *Epimeron 1*: anteroventral corner rounded. *Epimeron 3*: posteroventral corner produced, narrowly rounded. *Urosomites*: 1 to 3

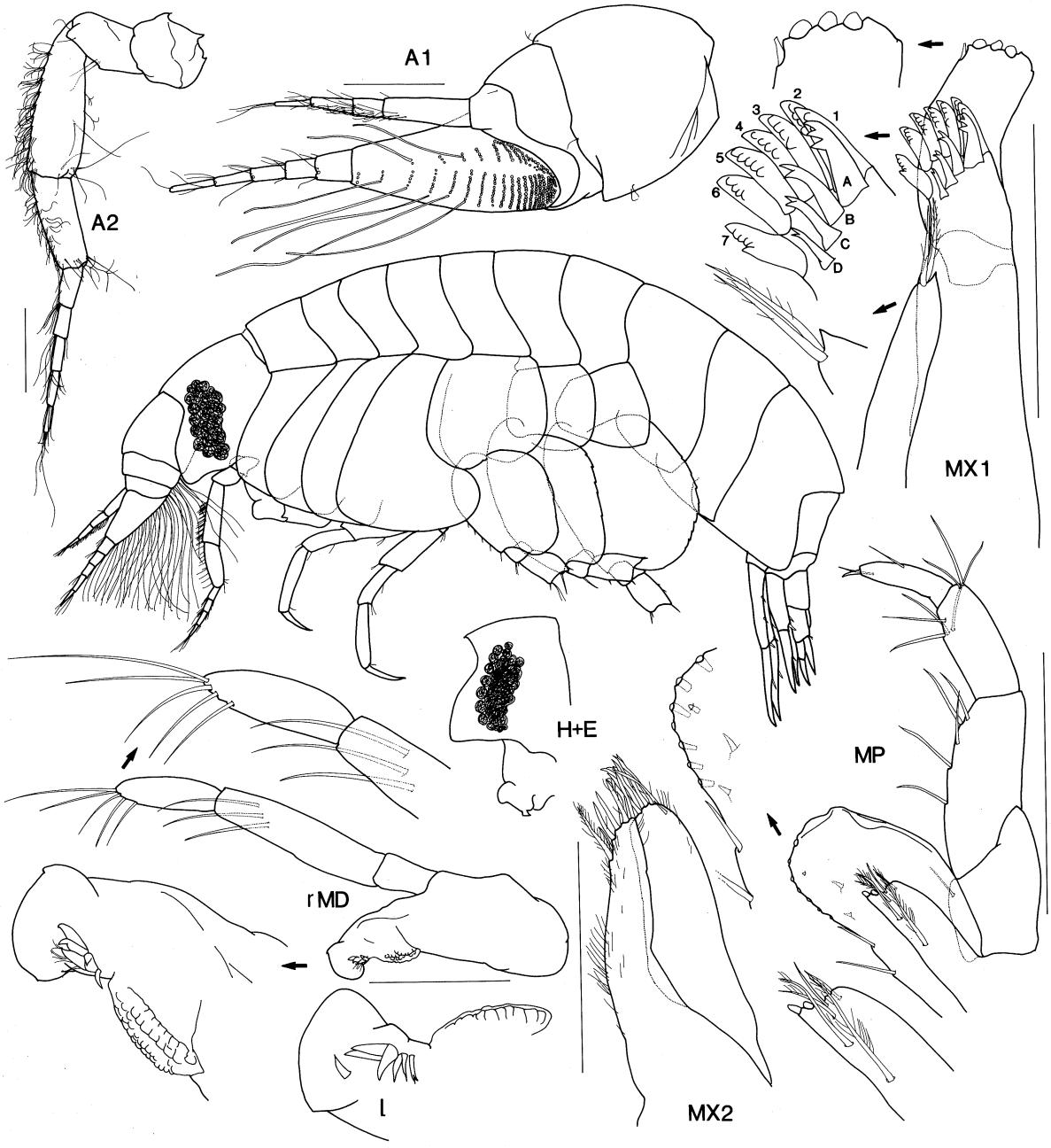

Fig. 3. *Paralysianopsis padoz* n.sp., holotype male, 2.3 mm, AM P41570, Padoz Natun reef, Madang Lagoon, Papua New Guinea. Scales represent 0.1 mm.

dorsally smooth; urosomite 3 without small dorsolateral robust seta. *Uropod 1*: without fine setae; peduncle with 2 dorsolateral, 1 apicolateral, 2 dorsomedial and 1 apicomedial robust setae, without robust setae along distal margin; rami subequal in length; outer ramus with 1 lateral robust seta; inner ramus with 1 robust seta. *Uropod 2*: without fine setae; peduncle with 1 apicolateral and 1 apicomedial robust setae, without robust setae along distal margin; outer ramus slightly longer than inner ramus; outer ramus with 1 dorsal robust seta; inner ramus with 1 dorsal robust seta, with slight constriction. *Uropod 3*: peduncle long, length 2.3 × breadth, without dorsolateral flange, with 1 apicolateral and 2 apicomedial robust setae; rami lanceolate, subequal in length; outer ramus 2-articulate, article 2 long, 1.3 × article 1, article 1 with 1 lateral robust seta; inner ramus without robust setae; plumose setae absent in male, not known for female. *Telson*: length 1.3 × breadth, entire, with 2

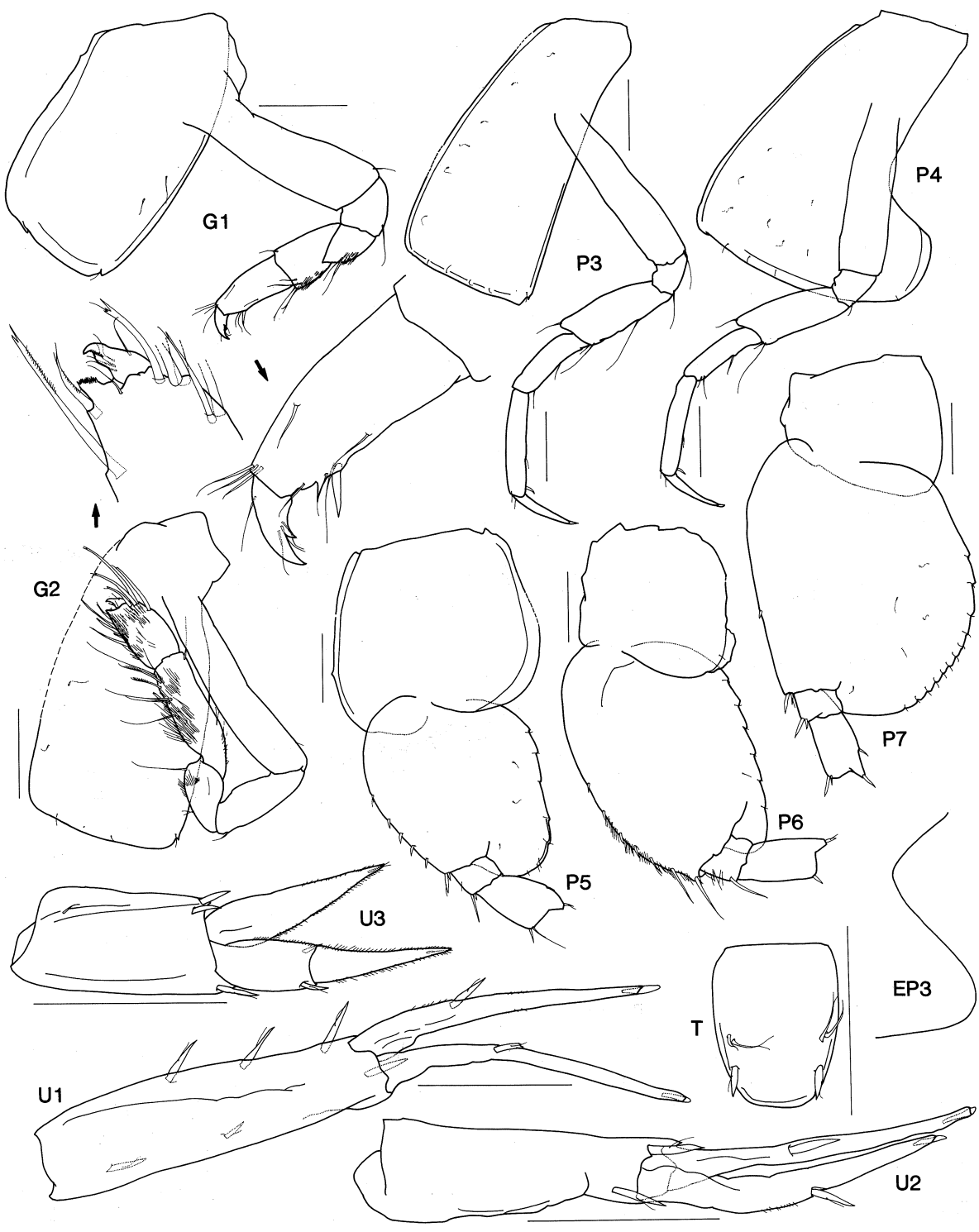

Fig. 4. *Paralysianopsis padoz* n.sp., holotype male, 2.3 mm, AM P41570, Padoz Natun reef, Madang Lagoon, Papua New Guinea. Scales represent 0.1 mm.

dorsal robust setae, distal margin rounded, without marginal simple or robust setae.

Etymology. Named for Padoz reef in Madang Lagoon.

Remarks. *Paralysianopsis padoz* differs from *P. mazamoz* as indicated under that species. It differs from other species of *Paralysianopsis* as follows: *Paralysianopsis incerta* has a transverse palm on gnathopod 1, a stronger constriction on the inner ramus of uropod 2, subequal rami on uropod 3 and a notched telson; *P. mauritiensis* has a sharply pointed upper lip, an unconstricted inner ramus on uropod 2 and a 1-articulate outer ramus on uropod 3; *P. odhneri* has a strongly produced, acute upper lip and a distally tapering, truncated telson.

Paralysianopsis padoz is known only from coral rubble, sponges and ascidians.

Distribution. Madang Lagoon, northern Papua New Guinea in 2 m depth.

Parawaldeckia Stebbing

Parawaldeckia Stebbing, 1910: 571.–Lowry & Stoddart, 1983: 327.–Barnard & Karaman, 1991: 515.

Remarks. The diagnosis of *Parawaldeckia* proposed in the revision of Lowry & Stoddart (1983) is expanded to include the rugose molar with setose margins found in *P. lowryi*, in addition to the smooth flap with setose margins found in all other species.

Parawaldeckia lowryi Myers

Figs 5–7

Parawaldeckia lowryi Myers, 1985: 97, figs 77, 78.
Parawaldeckia mua Myers, 1986: 272, figs 2, 3.

Type material examined. *Parawaldeckia lowryi*: HOLOTYPE, female, 4.2 mm, AM P35203; 10 PARATYPES, AM P35204; Momi Bay, Viti Levu, Fiji, coral debris, mainly *Acropora* fragments at reef edge, A.A. Myers, 7 September 1979, stn 40. *Parawaldeckia mua*: HOLOTYPE, female, 4.0 mm, AM P36954, Pangaimotu Island, Tonga, among *Amphiroa* sp. on inner reef, A.A. Myers, 23 September 1979.

Additional material examined. AM P41620 to P41625, P41783 from stations: AAM/PNG-17 (3), JDT/PNG-3 (5), JDT/PNG-20 (16), JDT/PNG-21 (1 male), JDT/PNG-22 (32), JDT/PNG-24 (19), JKL/PNG-26 (37), JKL/PNG-240 (4).

Material described. Female (ovigerous, 7 eggs), 3.5 mm; male, 4.0 mm, AM P41572; Padoz Tinan reef, Madang Lagoon, Papua New Guinea, 5°09.53'S 145°48.88'E, formalin wash of clean rubble and one piece of circular, flat-topped coral with numerous sponges and ascidians on underside, 2 m, J.D. Thomas, 9 January 1989, stn JDT/PNG-3.

Description. *Head and body*: without setae; colour white. *Head*: exposed, deeper than long; lateral cephalic lobe large, narrow, subacute; rostrum absent; eyes oval, black, enlarged in reproductive male. *Antenna 1*: short, 0.1 × body, peduncular article 1 short, length 1 × breadth; peduncular article 2 short, 0.1–0.3 × article 1; peduncular article 3 short, 0.05–0.3 × article 1; accessory flagellum long, 0.7 × primary flagellum, 3-articulate, article 1 long, 1.5 × article 2, not forming cap; flagellum 6-articulate (male 8), callynophore absent in female (strong 2-field in male), without posterodistal slender or robust setae, without flagellar robust setae, calceoli absent in female (present in reproductive male). *Antenna 2*: subequal in length to antenna 1 (1.3 × body length in male); peduncle without brush setae (strong in male), peduncular article 1 not greatly enlarged, female weakly geniculate between peduncular articles 3–4, article 3 short, 0.5 × article 4 (male weakly geniculate between peduncular articles 3–4, article 3 short, 1 × article 4), peduncular article 4 short, broad, article 5 elongate in male, length 1.6 breadth; flagellum 5-articulate (male 75), calceoli absent in female (present on most articles in reproductive male).

Mouthpart bundle: subquadrate. *Epistome* and *upper lip*: fused, with slight distal sinus. *Mandible*: incisors symmetrical, large, with slightly convex margins; laciniae mobilis absent; accessory setal row without distal setal tuft, left and right rows each 6 short, slender, serrate setae, without intermediate setae; molar a reduced rugose flap without setose margins; mandibular palp attached proximally, article 1 long, length 2.4 × breadth; article 2 elongate, slender, length 4.6 × breadth, 1 × article 3, without A2-, B2- or C2-setae, without (male 2) D2-setae on distal third of posterior margin; article 3 falcate, long, length 5 × breadth, without A3- or B3-setae, without (male 5–6) D3-setae along most of posterior margin, without E3-setae. *Maxilla 1*: inner plate narrow without apical setae; outer plate broad with 11 setal-teeth in 6/5 arrangement; outer row with ST1–ST3 large, stout, weakly cuspidate, ST4 large, stout, 2-cuspidate, ST5 large, stout, 4-cuspidate, ST6 large, stout, 8-cuspidate, ST7 symmetrical, contiguous with ST6, large, broad, multicuspidate medially; inner row with STA large, slightly displaced from STB–STD, 2-cuspidate, STB–STC short, broad, 2-cuspidate, STD broad, smaller than STC, 2-cuspidate; palp large, 2-articulate, with smooth apical margin, without subterminal setae or flag seta, distomedial margin with 2 large serrations. *Maxilla 2*: inner and outer plates narrow, subequal in length. *Maxilliped*: inner plate large, subrectangular, with 3 apical nodular setae, oblique setal row reduced with 2 simple setae; outer plate medium size, subovate, without subapical notch, without apical setae, apical robust setae, medial robust setae or submarginal setae; palp large, 4-articulate, article 2 slender, length 2.2 × breadth, 1.5 × article 3, article 3 long, slender, length 2 × breadth, dactylus reduced with serrate inner margin, with 2 subterminal setae, unguis absent.

Gnathopod 1: simple; coxa large, as long as coxa 2, anterior margin concave, anteroventral corner produced,

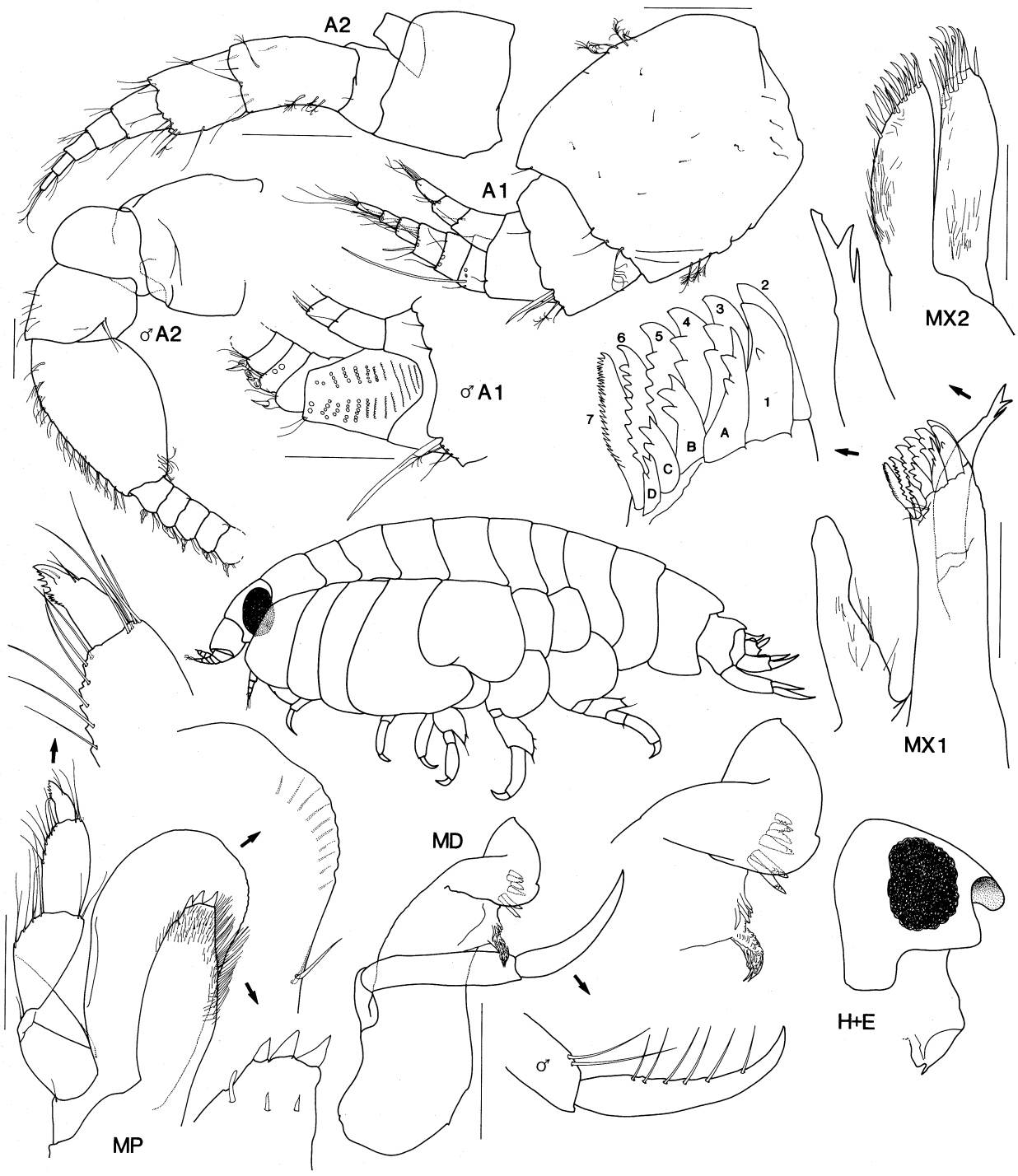

Fig. 5. *Parawaldeckia lowryi* Myers, 1985, female, 3.5 mm, AM P41572, male, 4.0 mm, AM P41572, Padoz Natun reef, Madang Lagoon, Papua New Guinea. Scales represent 0.1 mm.

rounded, posterior margin straight; basis long, slender, length 2.9 × breadth, anterior margin smooth, without setae; ischium short, length 1.4 × breadth; merus, posterior margin with group of long simple setae; carpus subrectangular, short, length 1.4 × breadth, subequal in length to propodus; propodus small, subtriangular, length 1.7 × breadth, tapering distally, posterior margin rugose with weak indentations, each with several setae, palm absent; dactylus simple, with subterminal spine. *Gnathopod 2*: minutely subchelate; coxa large, subequal in size to coxa 3; ischium long, length 3.5 × breadth; carpus very long, length 4.3 × breadth, posterior margin straight; propodus subrectangular, long, length 2 × breadth, palm slightly obtuse, with convex, serrate

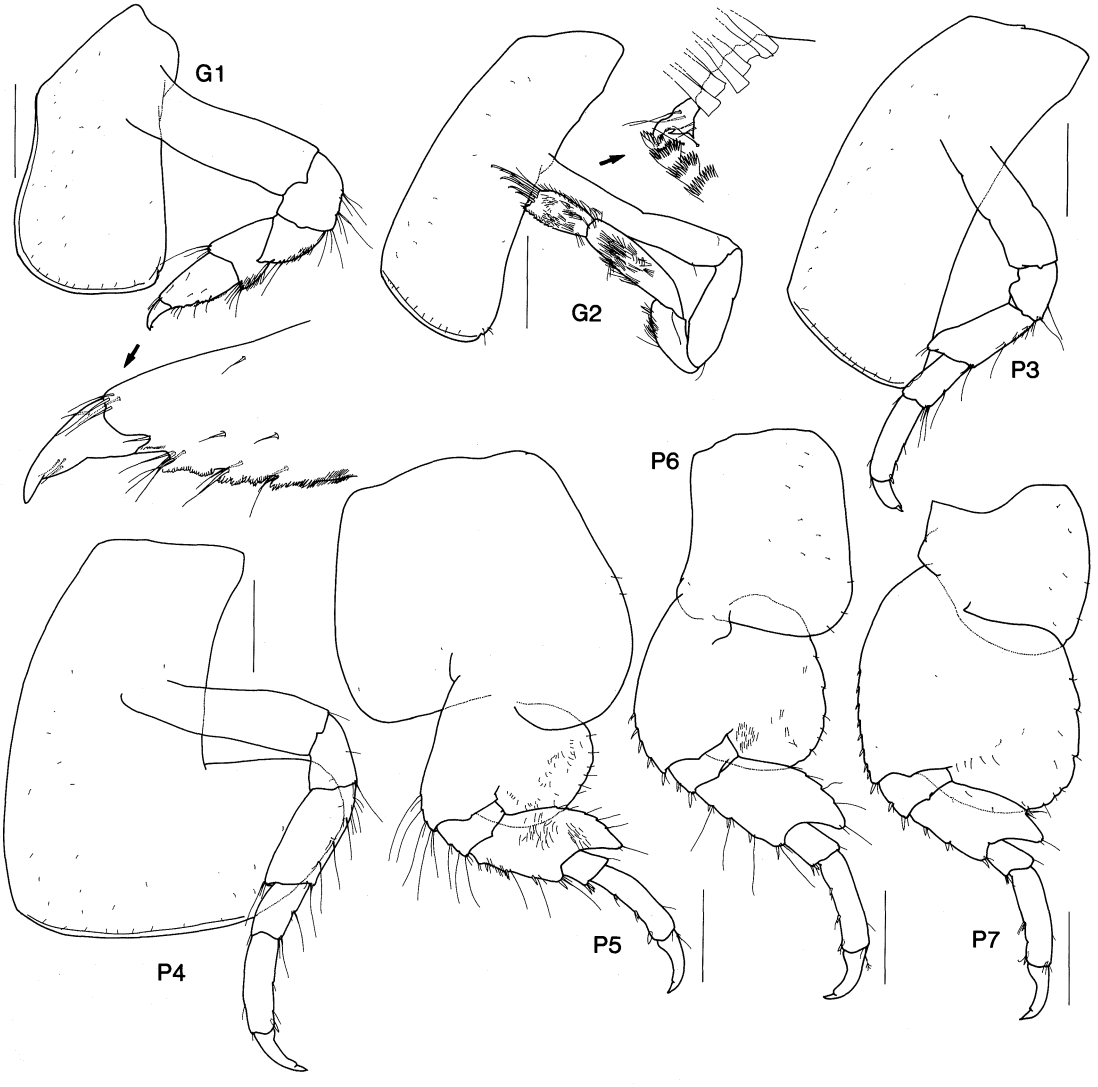

Fig. 6. *Parawaldeckia lowryi* Myers, 1985, female, 3.5 mm, AM P41572, Padoz Natun reef, Madang Lagoon, Papua New Guinea. Scales represent 0.1 mm.

margin, posterodistal corner without robust setae; dactylus reaching corner of palm, posterior margin serrate.

Peraeopod 3: coxa large; male and female merus-carpus without plumose setae; propodus with 2 slender setae and 1 distal locking seta along posterior margin; dactylus short, slender. *Peraeopod 4*: coxa with very large posteroventral lobe, anterior margin rounded, posterior margin sloping anteriorly; male and female merus-carpus without plumose setae; propodus with 2 setae and 1 distal locking seta along posterior margin; dactylus short, slender. *Peraeopod 5*: coxa bilobate, posterior lobe slightly produced ventrally; basis expanded with posterior margin minutely crenate; merus expanded with rounded posterior margin; propodus with 2 robust setae and 1 distal locking seta along anterior margin; dactylus short, slender. *Peraeopod 6*: coxa small, not lobate posteriorly; basis expanded posteriorly with minutely crenate posterior margin; merus expanded with rounded posterior margin; propodus with 2 robust setae and 1 distal locking seta along anterior margin; dactylus short, slender. *Peraeopod 7*: basis expanded posteriorly, posterior margin almost straight, minutely crenate, posteroventral corner subquadrate, posteroventral margin rounded; merus distally expanded, margin sloping proximally, straight distally with 3 setae; propodus with 2 robust setae, 1 distal slender seta and 1 distal locking seta along anterior margin and 5 slender setae along posterior margin; dactylus short, slender.

Oostegites from gnathopod 2 to peraeopod 5. *Gills* from gnathopod 2 to peraeopod 7, not pleated.

Pleonites 1 to 3 dorsally smooth. *Epimeron 1*: anteroventral corner rounded. *Epimeron 3*: posteroventral

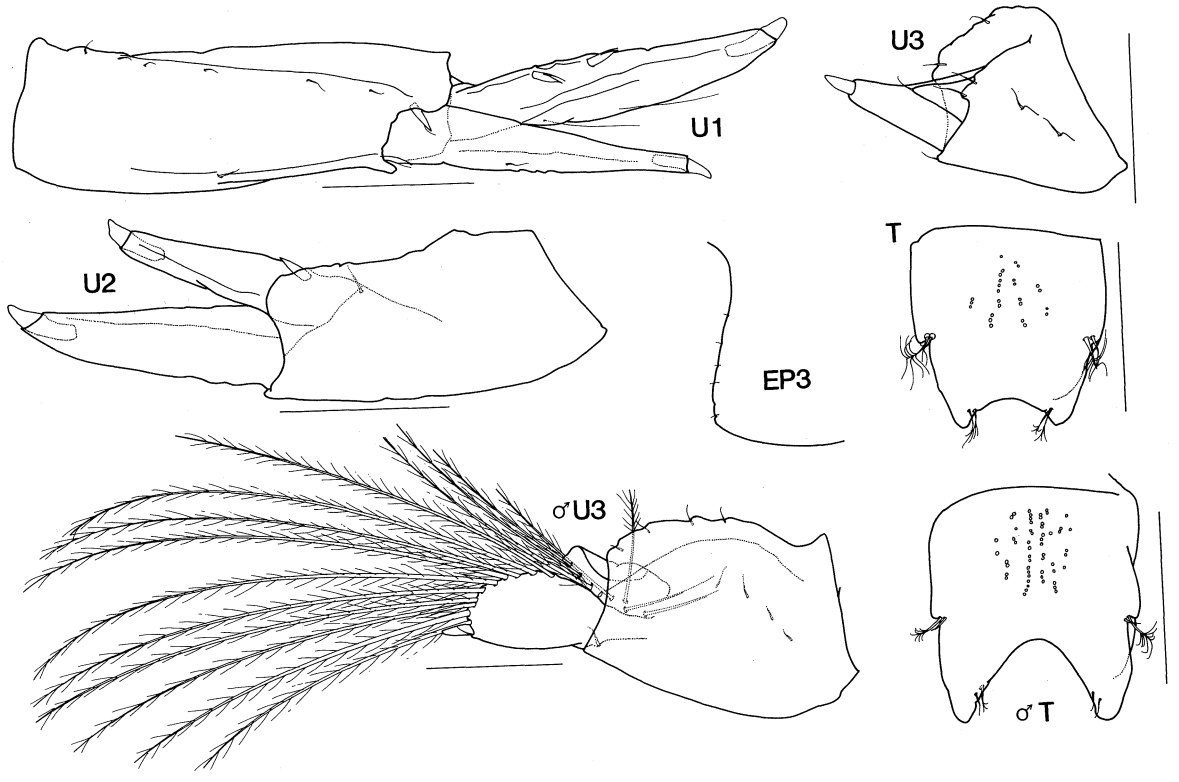

Fig. 7. *Parawaldeckia lowryi* Myers, 1985, female, 3.5 mm, AM P41572, male, 4.0 mm, AM P41572, Padoz Natun reef, Madang Lagoon, Papua New Guinea. Scales represent 0.1 mm.

corner subquadrate. *Urosomites*: dorsally smooth; urosomite 3 without small dorsolateral robust seta. *Uropod 1*: with long fine setae; peduncle with 1 apicolateral and 1 apicomedial robust setae (male with 2 dorsomedial robust setae), without robust setae along distal margin; outer ramus slightly longer than inner ramus; outer ramus with 2 lateral robust setae; inner ramus without robust setae. *Uropod 2*: without fine setae (present in male); peduncle with 1 dorsolateral robust seta, without robust setae along distal margin; outer ramus slightly longer than inner ramus; rami without robust setae; inner ramus without constriction. *Uropod 3*: peduncle short, length 0.9 × breadth, with dorsolateral flange, without dorsal robust setae, with 2 midlateral setae, without distoventral robust setae, with plumose setae in male; rami lanceolate, inner ramus reduced, about 0.4 × outer ramus; outer ramus 2-articulate, article 2 short; rami without robust setae, plumose setae present in male only. *Telson*: sexually dimorphic, as long as broad, emarginate or notched (36%), without dorsal robust setae, with 4 marginal penicillate setae, without marginal slender or robust setae.

Remarks. We have examined the type material of *P. lowryi*. The paratype collection, AM P35203, reported by Myers (1985) as 10 females, actually contains 4 females (1 ovigerous), 1 immature male and 5 juveniles. The immature male has a second antenna as in Myers' fig. 78, "female A2". The females have short second antennae, of about 5 articles. The un-attributed "MD" of Myers' fig. 78 is probably also from an immature male. The original female from the type collection has no setae on the mandibular palp article 3. The mature male holotype has 3 D2-setae and 4 D3-setae on the mandibular palp. There is slight variation in the shape of the peraeopod 7 merus, the shape of epimeron 3 and the relative lengths of the inner and outer rami of uropod 3, in both the Madang population and the type collection. We have also examined the holotype female of *P. mua* and can find no differences to separate it from *P. lowryi*.

Parawaldeckia lowryi differs from all known species in the genus by its rugose mandibular molar. It is most similar to *P. dabita* Lowry & Stoddart, 1983. However, *P. dabita* has E3-setae on the mandibular palp, a rounded dorsal boss on urosomite 3 and a non-emarginate telson. In the Madang Lagoon *P. lowryi* is found among coral rubble on the tops of reefs such as Yazi, Padoz and Guzem Natun in 2 to 3 m depth.

Distribution. Fiji, Tonga and northern Papua New Guinea in less than 10 m depth.

Pseudambasia Stephensen

Pseudambasia Stephensen, 1927: 305 (type species: *Pseudambasia bipartita* Stephensen, 1927 [= *Pseudambasia rossi* (Stephensen, 1927)] by monotypy).

Lowry & Stoddart (1983) discussed the *Parambasia* Walker & Scott, 1903 problem. They retained the name *Parambasia*, but much of their diagnosis was based on *P. rossi* (Stephensen, 1927). The original material of the type species of *Parambasia, P. forbesi* Walker & Scott, 1903, is lost and no new material has ever been reported. It is not possible to diagnosis the genus based on the original type species mainly because of lack of information about mouthparts. Stephensen (1927) described the female *Parambasia rossi*, but described the male, *Pseudambasia bipartita*, in a different genus and species (Lowry & Stoddart, 1983). We believe that *Parambasia* and *Pseudambasia* are congeneric, but we cannot diagnose *Parambasia* based on the type species. We therefore consider it to be a dubious genus and place all species previously considered as *Parambasia*, except *Parambasia forbesi*, in the genus *Pseudambasia*.

Diagnosis. Antenna 2 strongly geniculate between peduncular articles 3 and 4. Mandibular molar vestigial, represented by one or more serrate robust setae; palp article 3 with a weak to strong distal wrinkle. Gnathopod 1 sexually dimorphic, weakly to strongly subchelate in male. Uropod 3: outer ramus 1-articulate. Telson entire.

Species composition. *Pseudambasia* contains four species: *P. acuticaudata* (Ledoyer, 1984); *P. indentata* (Ledoyer, 1986); *P. nui* (Myers, 1985); and *P. rossi* (Stephensen, 1927).

Remarks. *Azotostoma* J.L. Barnard, 1965, *Kakanui* Lowry & Stoddart, 1983, *Pronannonyx* Schellenberg, 1953 and *Pseudambasia* all have antenna 2 strongly geniculate between articles 3 and 4 and all have entire telsons (the telson of *P. indentata* may be cleft according to Ledoyer, 1986). *Azotostoma* and *Pseudambasia* both have an apically smooth margin on the maxilla 1 palp and a 1-articulate outer ramus on uropod 3, but *Azotostoma* has a highly derived maxilla 2, maxilliped and gnathopod 1 which sets it apart from all of these taxa *Kakanui* and *Pronannonyx* both have terminal conate setae on the palp of maxilla 1 and non-dimorphic gnathopods and *Kakanui* has a 2-articulate outer ramus on uropod 3, all characters which distinguish these genera from *Pseudambasia*.

Distribution. *Pseudambasia* is known from the western Indian Ocean, south-east Asia, New Caledonia, Austral Isles, Australia, New Zealand, Auckland Islands and Campbell Island, from the intertidal to 400 m depth.

Pseudambasia acuticaudata (Ledoyer)

Figs 8, 9

Parambasia acuticaudata Ledoyer, 1984: 84, fig. 41.–Lowry & Stoddart, 1994: 282.

Material examined. AM P41626 to P41637, P41730, P41731 from stations: AAM/PNG-12 (2), AAM/PNG-16 (1), JDT/PNG-3 (5), JDT/PNG-10 (1), JDT/PNG-20 (8), JDT/PNG-22 (9), JDT/PNG-24 (19), JDT/PNG-26 (12), JDT/PNG-57 (1), JKL/PNG-212 (2), JKL/PNG-213 (1), JKL/PNG-240 (4), JKL/PNG-259 (7), JKL/PNG-266 (1).

Material described. Female, 2.5 mm; male, 2.3 mm, AM P41632; Yazi Natun reef, Madang Lagoon, Papua New Guinea, 5°09.23'S 145°48.98'E, formalin wash of rubble from hard, elevated substrate, not in connection with bottom sediments, J.D. Thomas, 26 January 1990, stn JDT/PNG-22.

Diagnosis. Gnathopod 2 with acute palm. Epimeron 3 with a small posteroventral notch. Uropod 2 with inner ramus weakly incised. Telson strongly tapering distally.

Description. *Head and body*: colour translucent with mottled brown head, body and upper coxae; without setae. *Head*: exposed, deeper than long; lateral cephalic lobe large, broadly rounded; rostrum small; eyes oval, dark brown, slightly enlarged in reproductive male. *Antenna 1*: peduncular article 1 short, length 1.4 × breadth; peduncular article 2 long, 0.5 × article 1; peduncular article 3 long, 0.4 × article 1; accessory flagellum short, 0.3 × primary flagellum, 2-articulate, article 1 long, 1 × article 2 (male, long, 1.6 × article 2), not forming cap; flagellum 7-articulate (male 10), callynophore absent in female (weak 1-field in male), without posterodistal slender or robust setae, without flagellar robust setae, calceoli absent. *Antenna 2*: subequal in length to antenna 1 (same in male); peduncle without brush setae in female or male, in female and male strongly geniculate between peduncular articles 3–4, article 3 long, 1 × article 4, articles 4 and 5 not enlarged in female or male; flagellum 6-articulate, calceoli absent.

Mouthpart bundle: subquadrate. *Epistome* and *upper lip*: fused, straight. *Mandible*: incisors symmetrical, small, with slightly convex margins; laciniae mobilis absent; accessory setal row without distal setal tuft, left and right rows each with 3 short, slender, simple robust setae, without intermediate setae; molar absent, represented by large serrate robust seta; mandibular palp attached extremely proximally, article 1 long, length 2.2 × breadth; article 2 elongate, slender, length 3.9 × breadth, 1.1 × article 3, with 1 distal A2-seta; article 3 falcate, long, length 2.8 × breadth, without setae. *Maxilla 1*: inner plate narrow without apical setae; outer plate broad with 11 setal-teeth in 6/5 arrangement; outer row with ST1–ST3 large, stout, weakly cuspidate, ST4–ST6 large, stout, 1-cuspidate, ST7 symmetrical, slightly displaced from ST6, small, shorter than ST6, broad, 2-

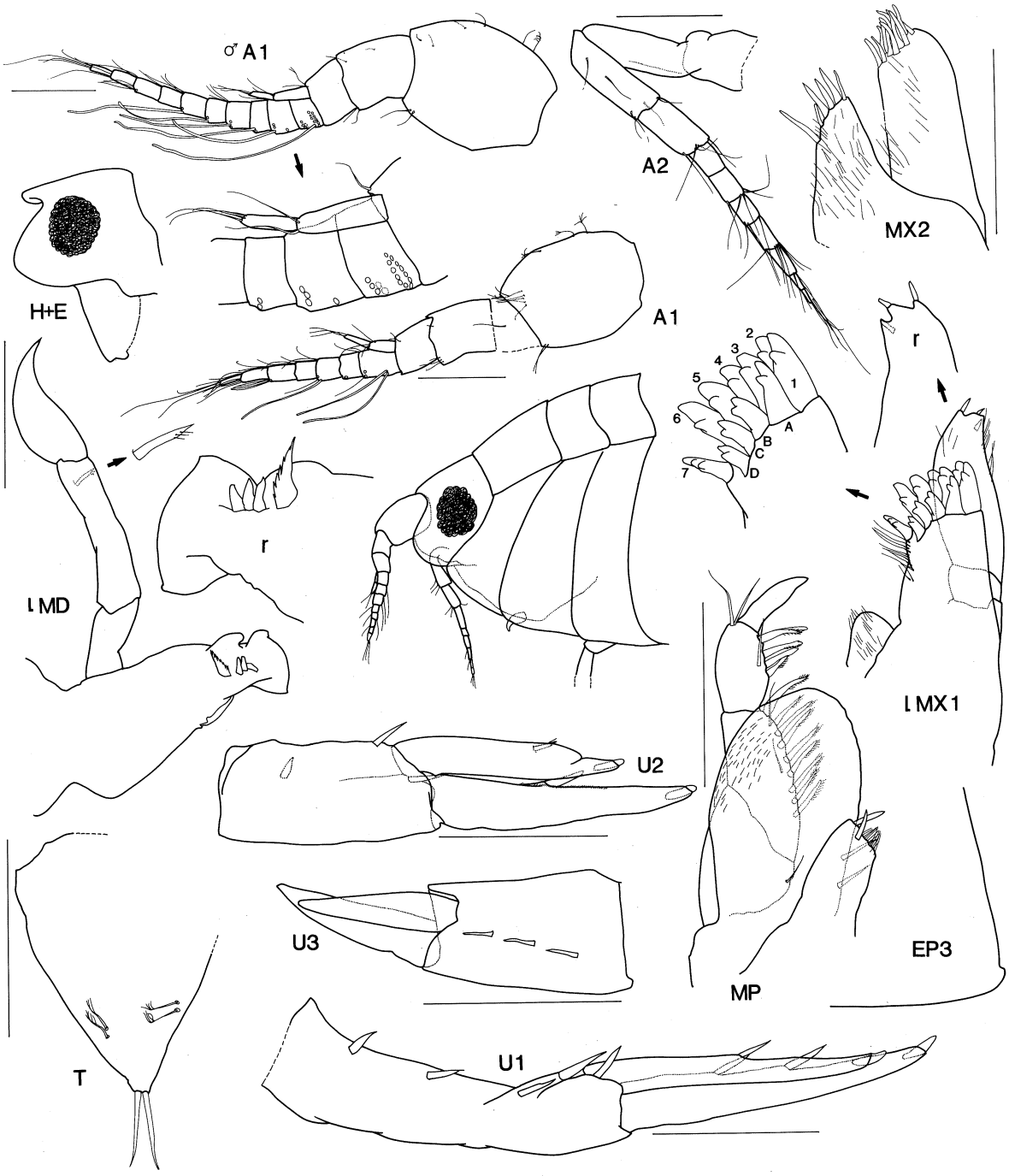

Fig. 8. *Pseudambasia acuticaudata* Ledoyer, 1984, female, 2.5 mm, AM P41632, Yazi Natun reef, Madang Lagoon, Papua New Guinea. Scales represent 0.1 mm.

cuspidate; inner row with STA large, slightly displaced from STB–STD, 1-cuspidate, STB–STD short, broad, apically bifurcate; palp large, 2-articulate, with 3 short terminal conate setae and serrate apical margin, without subterminal setae, flag seta absent, distomedial margin smooth. *Maxilla 2*: inner and outer plates broad, inner plate 0.6 × length outer plate. *Maxilliped*: inner plate large, subrectangular, without nodular setae, with one long, slender apicolateral robust seta, oblique setal row absent; outer plate medium size, subovate, without subapical notch, without apical slender or robust setae, medial robust setae or submarginal slender setae; palp large, 4-articulate, article 2 slender, length 2.3 × breadth, 1.7 × article 3, article 3 short, broad, length 1.8 × breadth, dactylus well developed, without terminal setae, unguis absent.

Gnathopod 1: not sexually dimorphic, subchelate; coxa large, as long as coxa 2, anterior margin concave, anteroventral corner produced, rounded, posterior margin straight; basis long, slender, length 2.7 × breadth, anterior margin smooth, with simple setae; ischium long, length 1.6 × breadth; merus, posterior margin with patch of short setae and a few long slender setae; carpus subtriangular, short, length 1.4 × breadth, shorter than (0.9 ×) propodus, without denticulate patch near posterodistal margin; propodus large, subtriangular, length 1.7 × breadth, tapering distally, posterior margin smooth, straight, without robust or slender setae, without denticulate patch near posterior margin, palm extremely acute, margin straight, rugose, with 3 robust setae along margin; dactylus simple, with subterminal spine. *Gnathopod 2*: minutely subchelate; coxa large, subequal in size to coxa 3; ischium very long, length 4.2 × breadth; carpus long, length 3.3 × breadth, posterior margin straight; propodus subquadrate, short, length 1.6 × breadth, palm obscured; dactylus reaching corner of palm, posterior margin serrate.

Peraeopod 3: coxa large; merus not expanded anteriorly, male and female merus-carpus without plumose setae; propodus without robust setae along posterior margin, with 1 distal locking seta; dactylus short, slender. *Peraeopod 4*: coxa with large posteroventral lobe, anterior margin slightly rounded, posterior margin slightly sloping anteriorly; merus not expanded anteriorly, male and female merus-carpus without plumose setae; propodus with 2 slender setae and 1 distal locking seta along posterior margin; dactylus short, slender. *Peraeopod 5*: coxa equilobate; basis expanded with posterior margin minutely crenate; merus expanded with rounded posterior margin; propodus with 2 slender setae and 1 distal locking seta along anterior margin; dactylus short, slender. *Peraeopod 6*: coxa large, not lobate posteriorly; basis expanded posteriorly with minutely crenate posterior margin; merus slightly expanded and rounded posteroproximally, straight posterodistally with 2 setae; propodus with 1 slender seta and 1 distal locking seta along anterior margin; dactylus short, slender. *Peraeopod 7*: basis expanded posteriorly, posterior margin almost straight, minutely crenate, posteroventral corner rounded, posteroventral margin rounded; merus slightly expanded, convex posterior margin with 1 seta; propodus with 2 slender setae and 1 distal locking seta along anterior margin, with 3 slender setae and 2 distal setae along posterior margin; dactylus short, slender.

Oostegites on peraeopod 5. *Gills* from gnathopod 2 to peraeopod 6, not pleated.

Pleonites 1 to 3 dorsally smooth. *Epimeron 1*: anteroventral corner broadly rounded. *Epimeron 3*: posteroventral corner weakly notched. *Urosomites*: 2 and 3 fused; urosomites dorsally smooth. *Uropod 1*: peduncle with 3 dorsolateral, 1 apicolateral and 1 apicomedial robust setae; outer ramus slightly longer than inner ramus; outer ramus with 2 dorsal robust setae; inner ramus with 1 dorsal robust seta. *Uropod 2*: peduncle with 1 dorsolateral, 1 apicolateral and 1 apicomedial robust setae; outer ramus slightly longer than inner ramus; outer ramus with 1 dorsal robust seta; inner ramus with 1 dorsal robust seta and weak constriction. *Uropod 3*: peduncle short, length 1.7 × breadth, without dorsal robust setae, with 3 midlateral robust setae, without distoventral robust setae, without plumose setae; rami lanceolate, outer ramus reduced, about 0.9 × outer ramus; outer ramus 1-articulate; rami without robust setae, plumose setae absent in male and female. *Telson*: length 1.2 × breadth, entire, without dorsal robust setae, distal margin truncated, without marginal penicillate setae, without slender marginal setae, with 2 marginal robust setae.

Remarks. The population of *P. acuticaudata* living in the Madang Lagoon differs from *P. acuticaudata* in New Caledonia as follows: in the New Caledonia population the carpus of gnathopod 2 is 4 times as long as broad; the posterior margin of peraeopod 7 is more rounded; the peduncle of uropod 1 has only two robust setae; the peduncle of uropod 3 has no robust setae and the rami are subequal. With such small sample sizes it is not possible to evaluate the significance of these differences.

Pseudambasia nui is a very distinctive species which differs from *P. acuticaudata* in the strongly sexually dimorphic gnathopod 1, and the extremely long slender ischium and carpus of gnathopod 2.

The species from the Moluccas which Ledoyer (1979a) called *Lysianassa* sp. is probably a male of an undescribed species of *Pseudambasia*. It has a narrowly rounded lateral cephalic lobe, a much longer peduncular article 1 on antenna 1, a much longer, more slender mandibular palp article 3, a more strongly subchelate gnathopod 1, and differently shaped basis on peraeopods 5 to 7.

Pseudambasia acuticaudata differs from *P. rossi* as follows: molar represented by one large robust seta; mandibular palp article 3 much larger, falcate and without wrinkle; maxilla 1, ST7 smaller and slightly displaced from ST6; maxilla 1 palp with apical conate setae; maxillipedal palp, article 3 short, broad; urosomites 1 to 3 essentially fused, slight suture between urosomite 1 and 2 can still be detected; telson much longer than wide.

According to Ledoyer (1984) *P. acuticaudata* from Noumea, New Caledonia, occurs in seagrass beds (mainly *Halodule* and *Cymodocea*). In the Madang area *P. acuticaudata* is found inside the lagoon and at Planet Rock, Astrolabe Bay, living on dead coral rubble, often among algal turf, encrusting tunicates and sponges. *Halodule* beds occur in the Madang Lagoon but *P. acuticaudata* was never found there.

Distribution. The Austral Isles, New Caledonia and northern Papua New Guinea from the intertidal to 10 m depth.

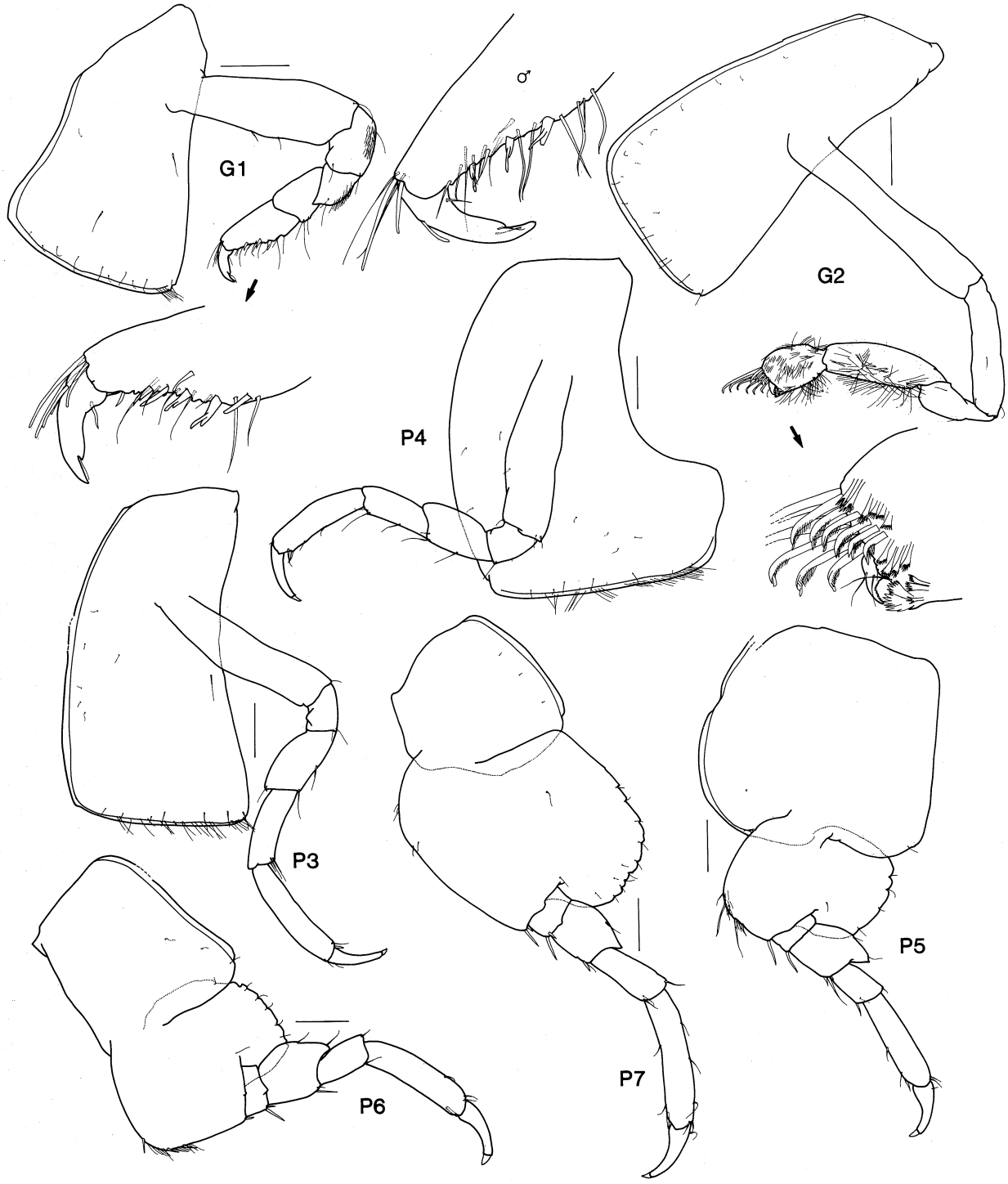

Fig. 9. *Pseudambasia acuticaudata* Ledoyer, 1984, female, 2.5 mm, AM P41632, Yazi Natun reef, Madang Lagoon, Papua New Guinea. Scales represent 0.1 mm.

Rhinolabia Ruffo

Rhinolabia Ruffo, 1972: 103.–Barnard & Karaman, 1991: 525.

Diagnosis. Callynophore present in female and male. Antenna 2 not elongate in male. Mandible: left lacinia mobilis a robust seta or cuspidate peg; molar without a column, strongly to weakly setose, with vestigial distal triturating patch. Maxilla 1: outer plate ST7 slightly or strongly displaced from ST6, STA–STD 2- to 4-cuspidate or apically bifurcate; palp without apical conate setae, with serrate apical margin.

Maxilliped: outer plate small, medial robust setae vestigial or absent. Gnathopod 1 weakly to strongly subchelate. Gills present from gnathopod 2 to peraeopod 6, not pleated. Uropod 2: inner ramus weakly to moderately constricted. Uropod 3: outer ramus 2-articulate, article 2 long. Telson entire.

Species composition. *Rhinolabia* contains four species: *R. elliotti* n.sp., *R. jebbi* n.sp., *R. paeowai* n.sp. and *R. parthenopeia* Ruffo, 1972.

Remarks. This is a fringe genus between the tryphosine group which has a triturating molar and a well developed subchelate gnathopod 1 and the socarnine group in which the setose molar has a vestigial distal triturating patch and the first gnathopod is simple. In *Rhinolabia* the molar is of the socarnine type, but gnathopod 1 is functionally simple to weakly subchelate. It appears to be most closely related to the tryphosine genus *Paralysianopsis*. *Paralysianopsis* differs in having a better developed molar, terminal conate setae on the palp of maxilla 1 and medial robust setae on the outer plate of the maxilliped.

Species of *Rhinolabia* go into baited traps and are therefore scavengers. However, they are small and have only minimal impact on the bait which suggests that they are not competing strongly with other scavengers in the Madang area, such as species of the cirolanid isopod genera *Natatolana* and *Booralana*.

Distribution. Mediterranean Sea and northern Papua New Guinea in 27 to 500 m depth.

Key to Species of *Rhinolabia*

1. Upper lip strongly produced in a narrowly rounded or subacute point 2

—— Upper lip slightly produced, broadly rounded 3

2. Gnathopod 1, palm acute; uropod 3, rami subequal in length ..... *R. paeowai*

—— Gnathopod 1, palm extremely acute; uropod 3 inner ramus about 0.8 × outer ramus ..... *R. parthenopeia*

3. Gnathopod 1, palm transverse; uropod 3 inner ramus about 0.8 × outer ramus ..... *R. elliotti*

—— Gnathopod 1, palm extremely acute; uropod 3, rami subequal in length ..... *R. jebbi*

Rhinolabia elliotti n.sp.

Figs 10–12

Type material. HOLOTYPE, female, 3.1 mm, non-setose oostegites, AM P41573; 24 PARATYPES, AM P41574; Wongad Natun reef, Madang Lagoon, Papua New Guinea, 5°08.31'S 145°49.36'E, baited trap on sandy mud bottom with some *Halimeda* and some blue-green algae, 27 m, J.K. Lowry & J.K. Elliott, 30–31 January 1990, stn JKL/PNG-111. 7 PARATYPES, AM P41575, same locality, baited trap on sandy mud bottom and some blue-green algal cover, 29 m, stn JKL/PNG-112. 15 PARATYPES, AM P41700, back slope of outer barrier, directly east of Wongad, Madang Lagoon, Papua New Guinea, 5°08.98'S 145°49.51'E; *Halimeda* flake sediment at bottom of slope, very large sponges, baited trap, 27 m, J.K. Lowry & S.J. Keable, 12–13 March 1991, stn JKL/PNG-208.

Additional material examined. AM P41576, P41697 to P41703 from stns JKL/PNG-117 (4), JKL/PNG-168 (1), JKL/PNG-206 (1), JKL/PNG-207 (9), JKL/PNG-209 (18), JKL/PNG-210 (3), JKL/PNG-252 (3).

Diagnosis. Lateral cephalic lobe large, broadly rounded. Upper lip slightly produced, rounded. Gnathopod 1: palm transverse. Telson without marginal robust setae.

Description. Holotype female, 3.1 mm; paratype male, 1.9 mm, AM P41700. *Head and body*: without setae. *Head*: exposed, deeper than long; lateral cephalic lobe large, broadly rounded; rostrum absent; eyes reniform, brown, slightly enlarged in adult male. *Antenna 1*: medium length, 0.2 × body; peduncular article 1 short, length 1.1 × breadth; peduncular article 2 short, 0.3 × article 1; peduncular article 3 short 0.26 × article 1; accessory flagellum long, 0.5 × primary flagellum, 4-articulate (male 3), article 1 short, 1.2 × article 2, not forming cap; flagellum 8-articulate (male 6), callynophore weak 2-field in female, without posterodistal slender or robust setae, without flagellar robust setae, calceoli absent in female and male. *Antenna 2*: subequal in length to antenna 1 (same in male); peduncle with weak brush setae in female and male, peduncular article 1 not greatly enlarged, female weakly geniculate between peduncular articles 3–4, article 3 short, 0.65 × article 4, peduncular articles 4 and 5 not enlarged in female or male; flagellum 6-articulate (male 5), calceoli absent in female and male.

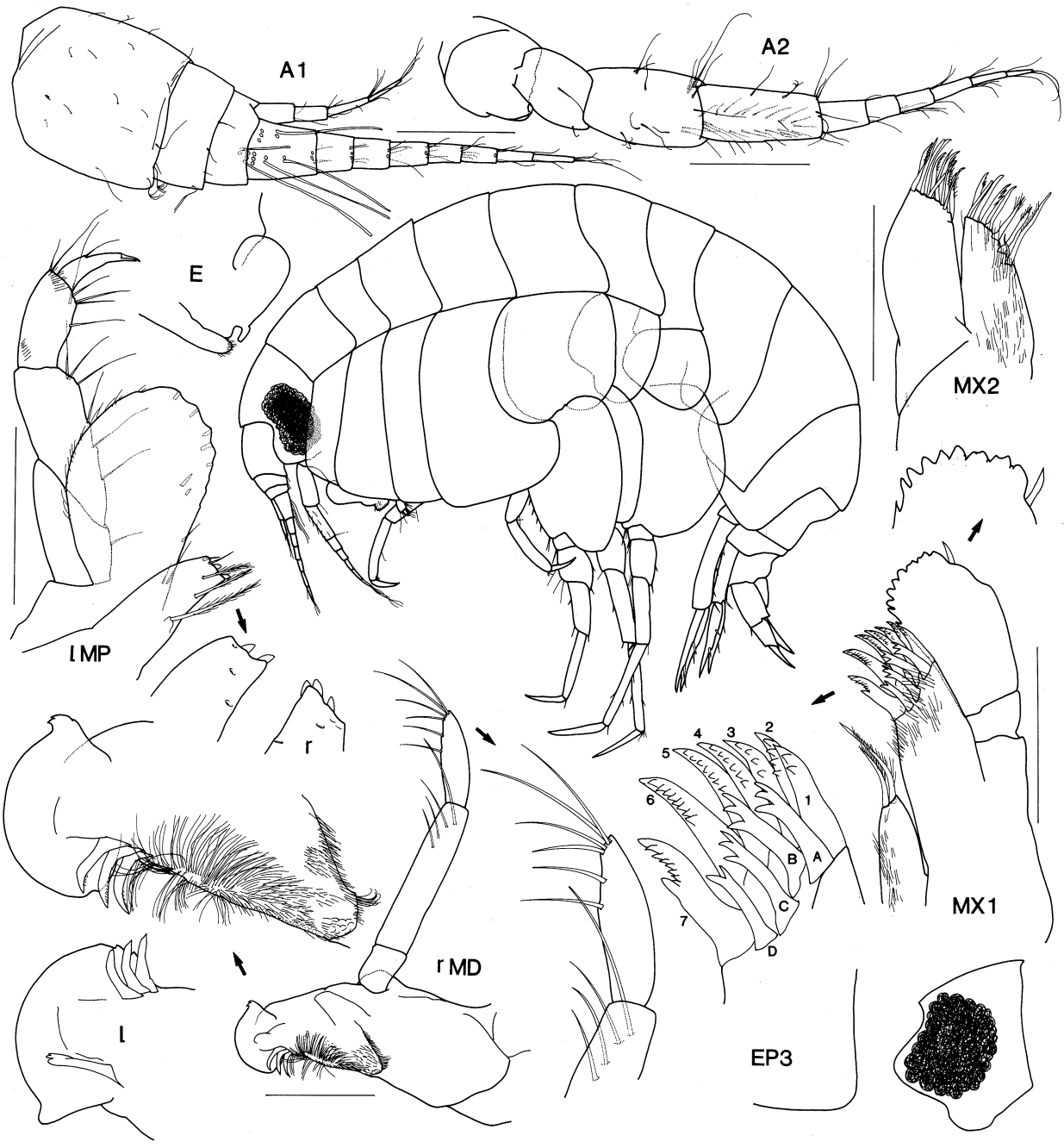

Fig. 10. *Rhinolabia elliotti* n.sp., holotype female, 3.1 mm, AM P41573; whole animal, paratype female, 2.8 mm, AM P41574, Wongad Natun reef, Madang Lagoon, Papua New Guinea. Scales represent 0.1 mm.

Mouthpart bundle: subquadrate. *Epistome* and *upper lip*: separate, epistome concave, upper lip slightly produced, rounded. *Mandible*: incisors symmetrical, large, with slightly convex margins; left lacinia mobilis present, a cuspidate peg; accessory setal row without distal setal tuft, left and right rows each with 3 short, slender, simple robust setae, without intermediate setae; molar setose with vestigial distal triturating patch; mandibular palp attached midway; article 1 short, length 1.25 × breadth; article 2 elongate, slender, length 4.5 × breadth, 1.6 × article 3, with 4 (male 3) posterodistal A2-setae, without B2- or D2-setae; article 3 slender, blade-like, long, length 3.1 × breadth, without A3- or B3-setae, with 4 (male 3) distal D3-setae and 2 apical E3-setae. *Maxilla 1*: inner plate narrow with 2 pappose apical setae; outer plate with 11 setal-teeth in a 6/5 arrangement; outer row with ST1 to ST3 large, stout, weakly to multicuspidate, ST4 large, stout, 6-cuspidate,

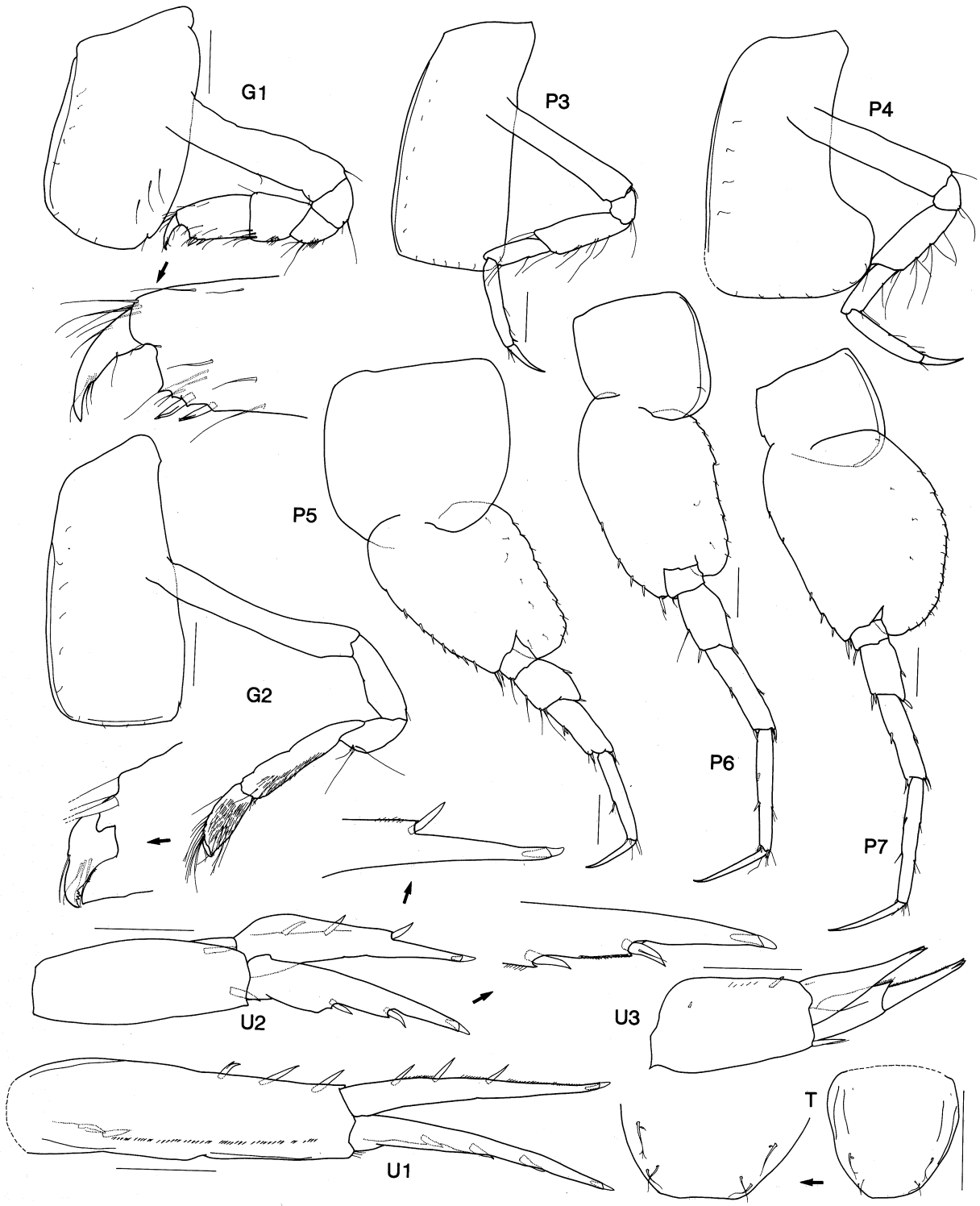

Fig. 11. *Rhinolabia elliotti* n.sp., holotype female, 3.1 mm, AM P41573, Wongad Natun reef, Madang Lagoon, Papua New Guinea. Scales represent 0.1 mm.

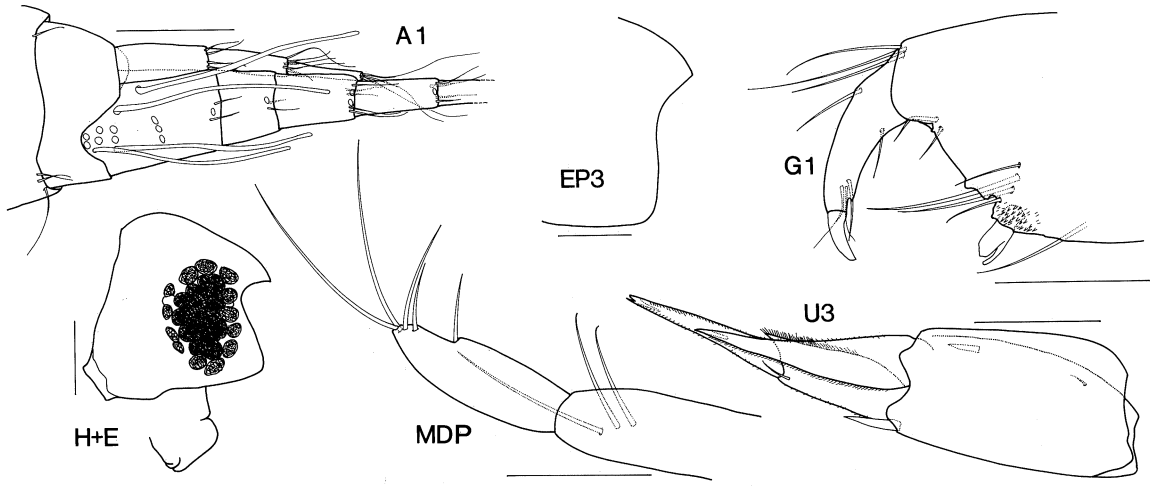

Fig. 12. *Rhinolabia elliotti* n.sp., paratype male, 1.9 mm, AM P41700, back slope of outer barrier, directly east of Wongad, Madang Lagoon, Papua New Guinea. Scales for H & E, EP3 represent 0.1 mm, remainder represent 0.05 mm.

ST5 large, stout, 7-cuspidate, ST6 large, broad, 8-cuspidate distally, ST7 slightly displaced from ST6, large, broad, multicuspidate distally; inner row with STA large, slightly displaced from STB–STD, 2-cuspidate, STB–STC long, slender, 2-cuspidate, STD long, slender, apically bifurcate; palp large, 2-articulate, with serrate apical margin, without subterminal setae, flag seta present on distolateral corner, distomedial margin serrate. *Maxilla 2*: inner plate narrow, outer plate broad, subequal in length. *Maxilliped*: inner plate large, subrectangular, with 2–3 apical nodular setae, oblique setal row reduced with 3 pappose setae; outer plate small, subovate, without apical slender or robust setae, medial robust setae or submarginal setae; palp large, 4-articulate, article 2 broad, length 2.7 × breadth, 1.4 × article 3, article 3 short, slender, length 2.5 × breadth, dactylus well developed, with 1 subterminal seta, unguis present.

Gnathopod 1: subchelate; coxa large, as long as coxa 2, anterior margin slightly concave, anteroventral corner rounded, posterior margin straight; basis long, slender, length 3.6 × breadth, anterior margin smooth, with 1 simple seta; ischium short, length 1.4 × breadth; merus, posterior margin with patch of short setae; carpus subrectangular, short, length 1.25 × breadth, shorter than (0.75 ×) propodus, with patch of very fine setae near posterior margin; propodus large, subrectangular, length 1.8 × breadth, margins subparallel, posterior margin smooth, straight, without robust or slender setae, without denticulate patch near posterior margin, palm transverse, margin straight, with short acute spine, posterodistal corner with 2 medial robust setae (male posterodistal corner with 1 stout robust seta); dactylus simple, without subterminal spines or robust setae. *Gnathopod 2*: minutely subchelate; coxa large, subequal in size to coxa 3; ischium long, length 3 × breadth; carpus very long, length 5.5 × breadth, posterior margin straight; propodus subrectangular, long, length 2.5 × breadth, posterior margin without strong distal robust setae, palm slightly obtuse, with convex, smooth margin, posterodistal corner without robust setae; dactylus reaching corner of palm, posterior margin serrate.

Peraeopod 3: coxa large; merus not expanded anteriorly, male and female merus-carpus without plumose setae; propodus with 2 slender setae and 1 distal locking seta along posterior margin; dactylus long, slender. *Peraeopod 4*: coxa deeper than wide, with large posteroventral lobe, anterior and posterior margins subparallel; merus not expanded anteriorly, male and female merus-carpus without plumose setae; propodus with 2 slender setae and 1 distal locking seta along posterior margin; dactylus long, slender. *Peraeopod 5*: coxa equilobate; basis expanded with posterior margin minutely crenate; merus slightly expanded posteriorly; propodus with 1 robust seta and 2 distal locking setae along anterior margin; dactylus long, slender. *Peraeopod 6*: coxa small, slightly lobate posteriorly; basis expanded posteriorly with minutely crenate posterior margin, with anteroventral lobe; merus not expanded posteriorly; propodus with 3 robust setae and 2 distal locking setae along anterior margin; dactylus long, slender. *Peraeopod 7*: basis expanded posteriorly, posterior margin slightly rounded, minutely crenate, posteroventral corner rounded, posteroventral margin rounded; merus not expanded posteriorly with 2 robust setae; propodus with 2 slender setae and 1 distal locking seta along anterior margin, with 5 slender setae along posterior margin and 1 distal robust seta; dactylus long, slender.

Oostegites from gnathopod 2 to peraeopod 5. *Gills* from gnathopod 2 to peraeopod 6, not pleated.

Epimeron 1: anteroventral corner rounded. *Epimeron 3*: posteroventral corner narrowly rounded. *Urosomites*:

1 to 3 dorsally smooth; urosomite 3 without small dorsolateral robust seta. *Uropod 1*: peduncle with 2 dorsolateral, 1 apicolateral and 2 dorsomedial robust setae; rami subequal in length; outer ramus with 3 dorsal robust setae; inner ramus with 3 dorsal robust setae. *Uropod 2*: peduncle with 1 apicolateral and 1 apicomedial robust setae; rami subequal in length; outer ramus with 2 dorsal robust setae; inner ramus with 3 dorsal robust setae, with weak constriction. *Uropod 3*: peduncle short, length 1.7 × breadth, without dorsolateral flange, with 1 apicomedial robust seta, without midlateral robust or slender setae, with 1 distoventral robust seta; rami lanceolate, inner ramus reduced, about 0.8 × outer ramus; outer ramus 2-articulate, article 2 long; rami without robust setae, plumose setae absent in female and male. *Telson*: as long as broad, entire, without dorsal robust setae, distal margin truncated, without marginal penicillate setae, with 4 simple slender submarginal setae, without marginal robust setae.

Etymology. Named for Joel Elliott, who gave up time from his own studies to assist as a diving partner on this project.

Remarks. *Rhinolabia elliotti* is most easily distinguished by its large, broadly rounded lateral cephalic lobe and its slightly produced and rounded upper lip. This is the only species of *Rhinolabia* with a transverse palm on gnathopod 1 and a telson without marginal robust setae. *Rhinolabia elliotti* is a scavenger which appears to be confined to shallow waters.

Distribution. Madang Lagoon, northern Papua New Guinea in 20 to 32 m depth.

Rhinolabia jebbi n.sp.

Figs 13, 14

Type material. HOLOTYPE, female, 5.2 mm, non-setose oostegites, AM P41577; 10 PARATYPES, AM P41578; 0.75 km east of Planet Rock, Astrolabe Bay, Papua New Guinea, 5°15.48'S 145°49.14'E, baited trap on silty mud bottom, about 500 m, J.K. Lowry, S.J. Keable, M.H.P. Jebb & A.A. Myers, 15–16 March 1991, stn JKL/PNG-231.

Diagnosis. Lateral cephalic lobe large, narrow, subacute. Upper lip produced, hemispherical. Gnathopod 1: palm extremely acute. Telson with 2 marginal robust setae.

Description. Holotype female, 5.2 mm; male not known. *Head and body*: without setae. *Head*: exposed, deeper than long; lateral cephalic lobe large, broad, subacute; rostrum absent; eyes oval. *Antenna 1*: short, 0.18 × body; peduncular article 1 short, length 1.3 × breadth; peduncular article 2 short, about 0.2 × article 1; peduncular article 3 short, about 0.2 × article 1; accessory flagellum long, 0.7 × primary flagellum, 6-articulate, article 1 long, 1.7 × article 2, not forming cap; flagellum 9-articulate, callynophore weak 2-field in female, without posterodistal slender or robust setae, calceoli absent in female. *Antenna 2*: subequal in length to antenna 1; peduncle with weak brush setae in female, female weakly geniculate between peduncular articles 3 and 4, article 3 short, about 0.6 × article 4, peduncular articles 4 and 5 not enlarged in female; flagellum 6+-articulate, calceoli absent in female.

Mouthpart bundle: subquadrate. *Epistome* and *upper lip*: separate, epistome straight, upper lip produced, hemispherical. *Mandible*: incisors symmetrical, large, with slightly convex margins; left lacinia mobilis present, a cuspidate peg; accessory setal row without distal setal tuft, left and right rows with 3 short, slender, simple setae, without intermediate setae; molar setose with vestigial distal triturating patch; mandibular palp attached midway, article 1 short, length 1.7 × breadth; article 2 elongate, slender, length 6.25 × breadth, 1.7 × article 3, with 4 posterodistal A2-setae, without B2- or D2-setae; article 3 slender, blade-like, long, length 5.3 × breadth, without A3-setae or B3-setae, with 7 distal D3-setae and 2 apical E3-setae. *Maxilla 1*: inner plate narrow with 2 pappose apical setae; outer plate with 11 setal-teeth in 6/5 arrangement; outer row with ST1 to ST3 large, stout, weakly to multicuspidate, ST4 large, stout, 6-cuspidate, ST5 large, stout, 5-cuspidate, ST6 large, broad, 5-cuspidate distally, ST7 slightly displaced from ST6, large, broad, 6- to 7-cuspidate distally; inner row with STA large, slightly displaced from STB–STD, 2- to 3-cuspidate, STB large, broad, 3- to 4-cuspidate, STC large, broad, 2-cuspidate, STD broad, smaller than STC, apically bifurcate; palp large, 2-articulate, with serrate apical margin, without subterminal setae, flag seta present on distolateral corner, distomedial margin serrate. *Maxilla 2*: inner plate narrow, outer plate broad, subequal in length. *Maxilliped*: inner plate large, subrectangular, with 2 apical nodular setae, oblique setal row strong with 6 pappose setae; outer plate small, subovate, without apical slender or robust setae, medial robust setae vestigial, submarginal setae short, simple; palp large, 4-articulate, dactylus well developed, with 2 subterminal setae, unguis present.

Gnathopod 1: subchelate; coxa large, as long as coxa 2, anterior margin straight, posterior margin straight; basis long, slender, length 4.7 × breadth, anterior margin smooth, with simple setae; ischium short, length 1.2 × breadth; merus, posterior margin with group of long simple setae; carpus subrectangular, short, length 1.9 × breadth, subequal in length to propodus; propodus large, subrectangular, length 2.3 × breadth, tapering distally, posterior margin smooth, straight, with few slender setae, palm extremely acute, margin concave, smooth, posterodistal corner with 1 medial robust seta; dactylus simple, with subterminal spine. *Gnathopod 2*: minutely subchelate; coxa large, subequal in size to coxa 3; ischium long, length 3.7 × breadth; carpus very long, length 4 × breadth, posterior margin straight; propodus subrectangular, long, length 2.9 × breadth, palm slightly obtuse, with straight, serrate margin, posterodistal corner

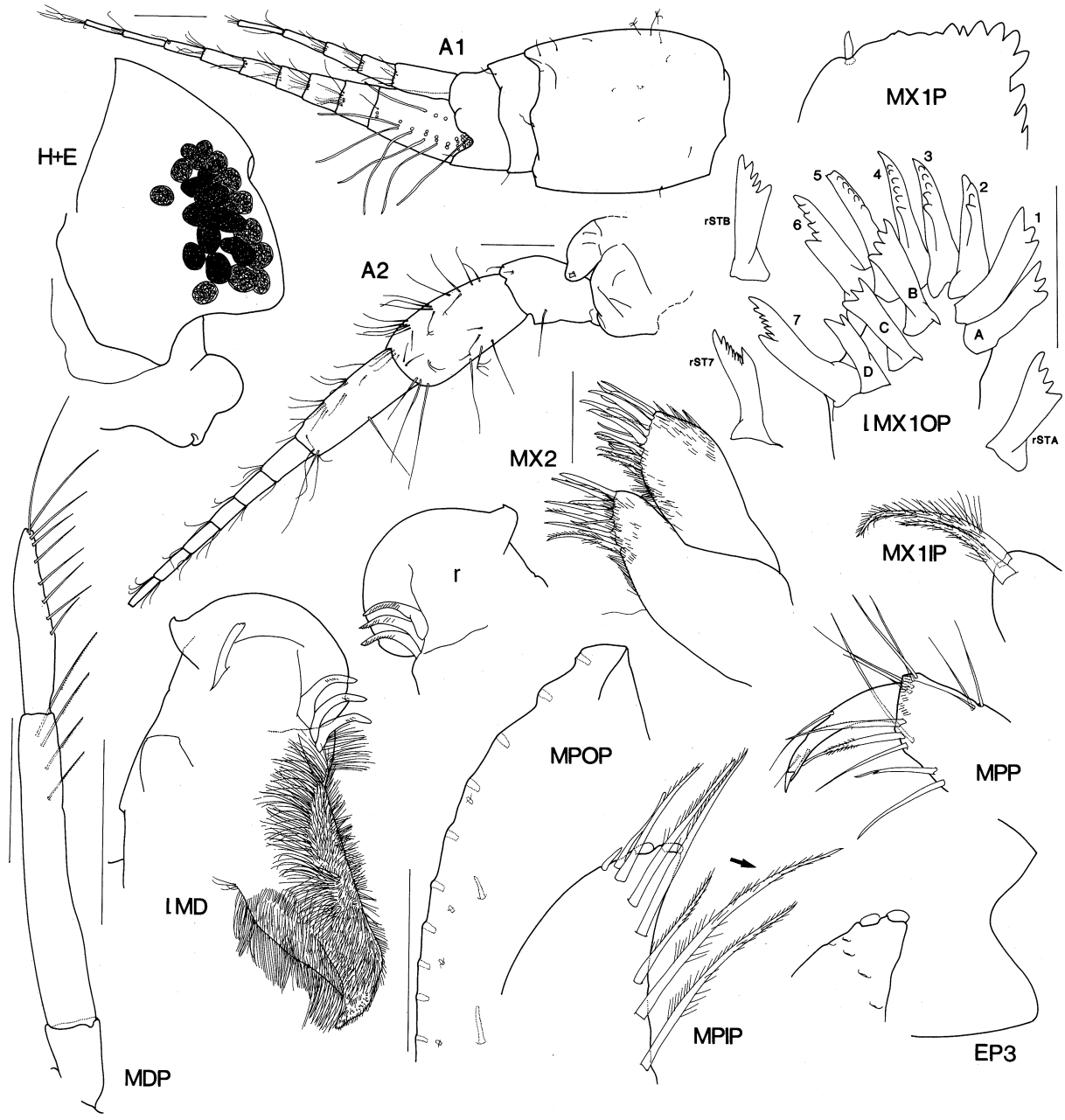

Fig. 13. *Rhinolabia jebbi* n.sp., holotype female, 5.2 mm, AM P41577, east of Planet Rock, Astrolabe Bay, Papua New Guinea. Scales represent 0.1 mm.

with 2 medial robust setae; dactylus reaching corner of palm, posterior margin serrate.

Peraeopod 4: coxa deeper than wide, with large posteroventral lobe, anterior margin slightly rounded, posterior margin slightly sloping anteriorly; female merus-carpus without plumose setae; propodus with 2 setae and 1 distal locking seta along posterior margin; dactylus short, slender. *Peraeopod 5*: coxa equilobate; basis expanded with posterior margin minutely crenate; merus slightly expanded posteriorly; propodus with 2 robust setae and 1 distal locking seta along anterior margin; dactylus long, slender. *Peraeopod 6*: coxa small, slightly lobate posteriorly; basis expanded posteriorly with minutely crenate posterior margin; merus not expanded posteriorly; propodus with 3 robust setae along anterior margin, distal locking setae obscured; dactylus long, slender. *Peraeopod 7*: basis expanded posteriorly, posterior margin almost straight, minutely crenate, posteroventral corner rounded, posteroventral margin rounded; merus not expanded posteriorly with 2 robust

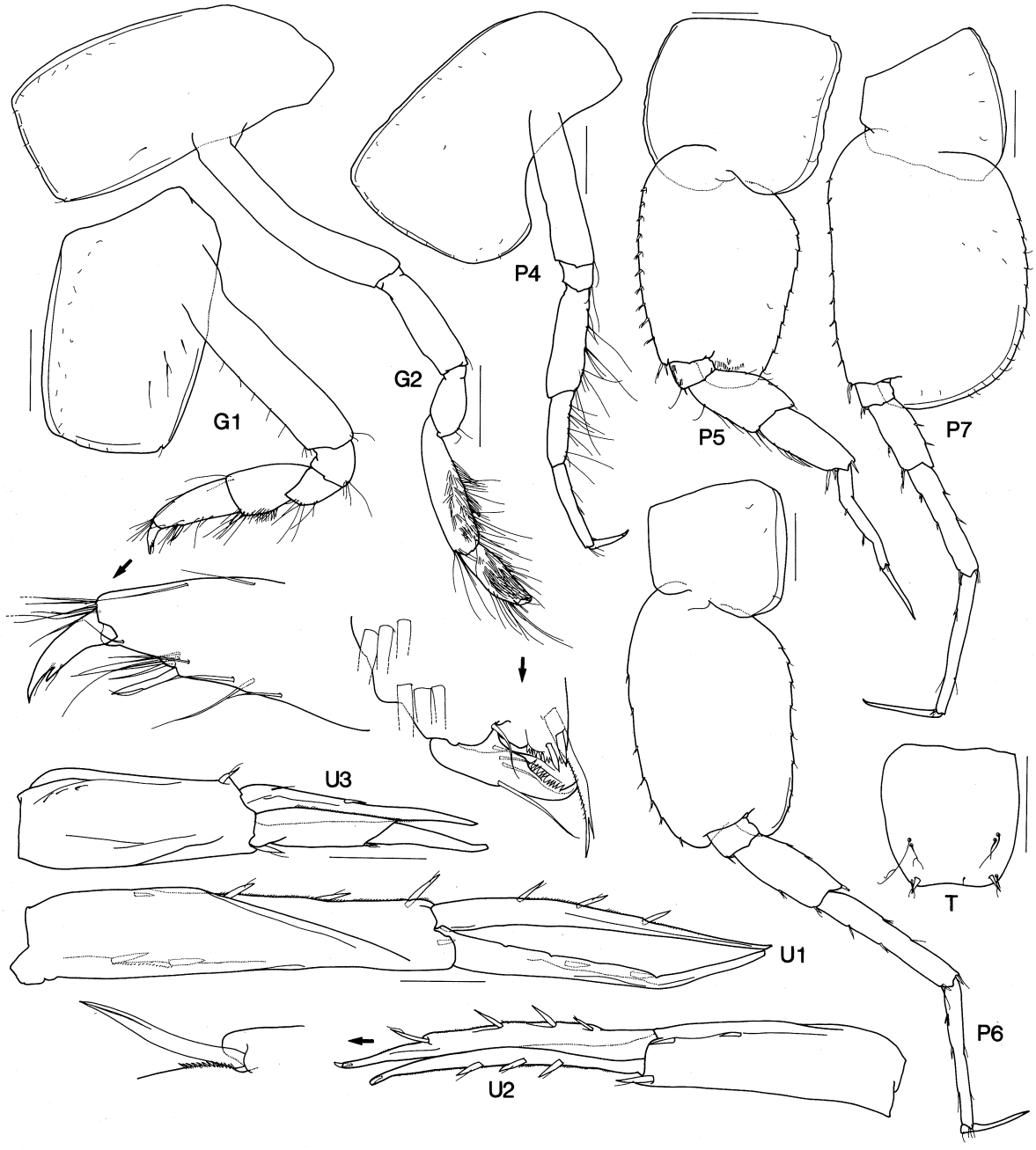

Fig. 14. *Rhinolabia jebbi* n.sp., holotype female, 5.2 mm, AM P41577, east of Planet Rock, Astrolabe Bay, Papua New Guinea. Scales for U1-3, T represent 0.1 mm, remainder represent 0.2 mm.

setae; propodus with 2 robust setae, 1 slender seta and 2 distal locking setae along anterior margin, with 1 slender seta on posterior margin; dactylus long, slender.

Oostegites from gnathopod 2 to peraeopod 5. *Gills* from gnathopod 2 to peraeopod 6, not pleated.

Epimeron 1: anteroventral corner rounded. *Epimeron 3*: posteroventral corner produced, narrowly rounded. *Urosomites*: 1 to 3 dorsally smooth; urosomite 3 without small dorsolateral robust seta. *Uropod 1*: without fine setae; peduncle with 3 dorsolateral, 1 apicolateral, 2 dorsomedial and 1 apicomedial robust setae; rami subequal in length; outer ramus with 3 lateral robust setae; inner ramus with 2 lateral robust setae. *Uropod 2*: without fine setae; peduncle with 1 apicolateral, 1

dorsomedial and 1 apicomedial robust setae; rami subequal in length; outer ramus with 3 dorsal robust setae; inner ramus with 4 dorsal robust setae, with moderate constriction. *Uropod 3*: peduncle long, length 2.5 × breadth, without dorsolateral flange, with 1 apicomedial robust seta, without midlateral robust or slender setae, with 1 distoventral robust seta, without plumose setae in female; rami lanceolate, subequal in length; outer ramus 2-articulate, article 2 long, article 1 with 1 lateral robust seta; inner ramus with 1 medial robust seta; plumose setae absent in female. *Telson*: as long as broad, entire, without dorsal robust setae, distal margin truncated, without marginal penicillate setae, with 2 simple slender marginal setae and 2 marginal robust setae.

Etymology. After Matthew Jebb who enthusiastically supported this project and made it possible to set the deep-water traps.

Remarks. *Rhinolabia jebbi* is easily distinguished from other species by its hemispherical upper lip and extremely acute palm on gnathopod 1. *Rhinolabia jebbi* is a deep-water scavenger.

Distribution. Astrolabe Bay, northern Papua New Guinea, in about 500 m depth.

Rhinolabia paeowai n.sp.

Figs 15, 16

Type material. HOLOTYPE, female, 3.0 mm, non-setose oostegites, AM P41579; paratype, male, 2.1 mm, AM P41580, face of outer barrier between Dam Awan (Rasch Passage) and Wongad, Astrolabe Bay, Papua New Guinea, 5°08.59'S 145°49.65'E, baited trap, 340 m, J.K. Lowry & J. Mizeu, 26–27 January, 1990, stn JKL/PNG-83; PARATYPE, female, 3.1 mm, AM P41581, same locality, 390 m, stn JKL/PNG-84.

Diagnosis. Lateral cephalic lobe large, narrow, subacute. Upper lip produced, subacute. Gnathopod 1: palm acute. Telson with 2 marginal robust setae.

Description. Holotype female, 3.0 mm; paratype male, 2.1 mm. *Head and body*: without setae; colour light lemon-yellow. *Head*: exposed, deeper than long; lateral cephalic lobe large, narrow, subacute; rostrum absent; eyes oval, brown (fading to yellow in alcohol), not enlarged in reproductive male. *Antenna 1*: medium length, 0.23 × body, peduncular article 1 short, length 1.1 (male 0.9) × breadth; peduncular article 2 short, 0.3 × article 1; peduncular article 3 short, 0.26 × article 1 (male short, 0.06 × article 1), accessory flagellum long, 0.7 × primary flagellum, 5-articulate, article 1 long, 2.1 × article 2, not forming cap; flagellum 6-articulate (male 6), callynophore weak 2-field in female (strong 2-field in male), without posterodistal slender or robust setae, calceoli absent. *Antenna 2*: subequal in length to antenna 1 (same in male); peduncle with brush setae in female and male, female weakly geniculate between peduncular articles 3–4, article 3 short, 0.4 × article 4, peduncular articles 4 and 5 not enlarged in male or female; flagellum 6-articulate (male 5), calceoli absent.

Mouthpart bundle: subquadrate. *Epistome* and *upper lip*: separate, epistome straight, upper lip produced, subacute. *Mandible*: incisors symmetrical, large, with slightly convex margins; left lacinia mobilis present, a cuspidate peg; accessory setal row without distal setal tuft, left row with 3, right with 4 short, slender, simple setae, without intermediate setae; molar setose with vestigigal distal triturating patch; mandibular palp attached midway, article 1 short, length 1.2 × breadth; article 2 elongate, slender, length 4.9 × breadth, 1.7 × article 3, with 3 (male 3) A2-setae on lateral surface; article 3 slender, blade-like, long, length 4 × breadth, without A3- or B3-setae, with 4 (male 5-6) distal D3-setae on posterior margin, and 2 apical E3-setae. *Maxilla 1*: inner plate narrow with 2 pappose apical setae; outer plate with 11 setal-teeth in 6/5 arrangement; outer row with ST1–ST3 large, stout, weakly cuspidate, ST4 large, stout, 2-cuspidate, ST5 large, stout, 3-cuspidate, ST6 large, broad (badly worn), ST7 symmetrical, slightly displaced from ST6, large, broad, ?1-cuspidate; inner row with STA large, slightly displaced from STB–STD, apically bifurcate, STB large, broad, apically bifurcate (tip broken), STC large, broad, apically bifurcate, STD long, slender, apically bifurcate; palp large, 2-articulate, with serrate apical margin, flag seta absent, distomedial margin serrate. *Maxilla 2*: inner plate narrow, outer plate broad, subequal in length. *Maxilliped*: inner plate large, subrectangular, with 2 apical nodular setae, oblique setal row reduced with 3 pappose setae; outer plate small, subovate, without subapical notch, without apical slender or robust setae, without medial robust setae, submarginal setae absent; palp large, 4-articulate, article 2 broad, length 2.5 × breadth, 1.6 × article 3, article 3 short, slender, length 1.9 × breadth, dactylus well developed, with 2 subterminal setae, unguis present.

Gnathopod 1: subchelate; coxa large, as long as coxa 2, anterior margin straight, posterior margin straight; basis long, slender, length 4.3 × breadth, anterior margin smooth, with simple setae; ischium short, length 1.2 × breadth; merus, posterior margin with patch of short setae; carpus subrectangular, short, length 1.8 × breadth, subequal in length to propodus, with patch of very fine setae near posterior margin; propodus large, subrectangular, length 2.1 × breadth, margins subparallel, posterior margin smooth, straight, without robust or slender setae, palm acute, margin convex, posterodistal corner with 2 medial robust setae; dactylus simple, with subterminal spine. *Gnathopod 2*: minutely subchelate; coxa large, subequal in size to coxa 3; ischium long, length 3 × breadth; carpus very long, length 4.4 × breadth, posterior margin straight; propodus subrectangular, long, length 2.2 × breadth, palm slightly obtuse, with straight,

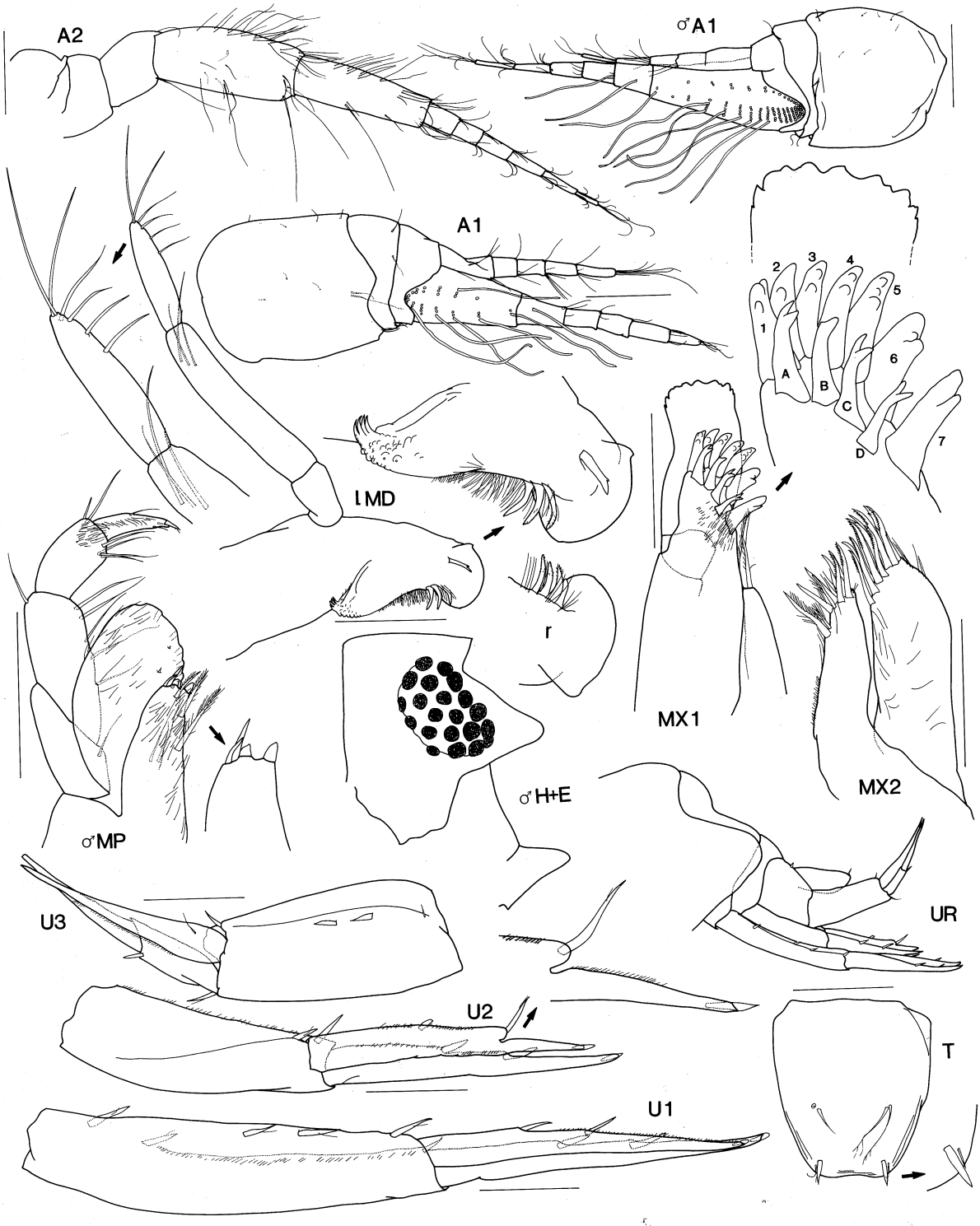

Fig. 15. *Rhinolabia paeowai* n.sp., holotype female, 3.0 mm, AM P41579; male head, A1, MP, paratype male, 2.1 mm, AM P41580, outer barrier between Dam Awan (Rasch Passage) and Wongad, Astrolabe Bay, Papua New Guinea. Scales represent 0.1 mm.

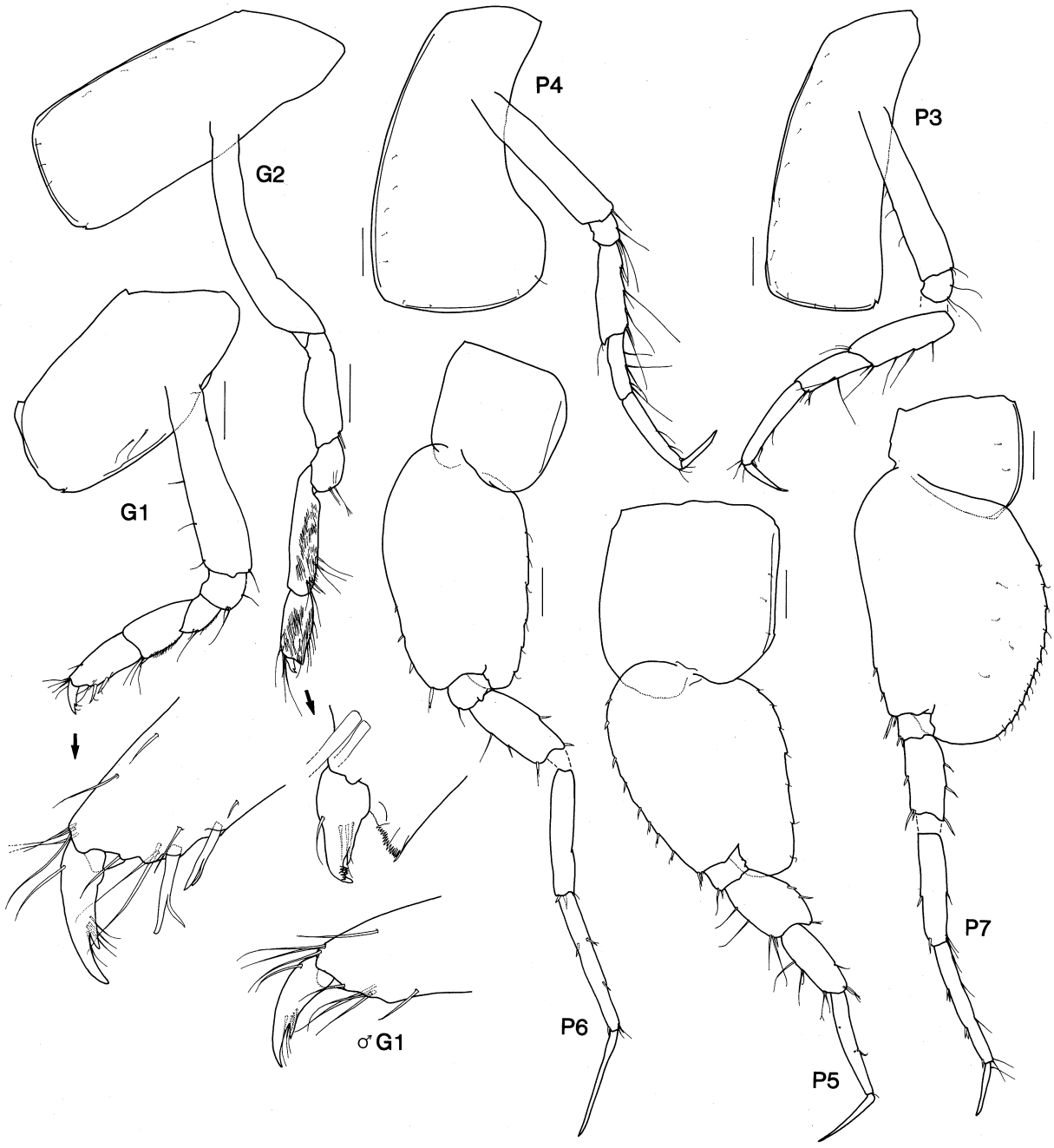

Fig. 16. *Rhinolabia paeowai* n.sp., holotype female, 3.0 mm, AM P41579; paratype male, 2.1 mm, AM P41580; UR: paratype female, 3.1 mm, AM P41581, outer barrier between Dam Awan (Rasch Passage) and Wongad, Astrolabe Bay, Papua New Guinea. Scales represent 0.1 mm.

serrate margin, posterodistal corner without robust setae; dactylus reaching corner of palm, posterior margin serrate.

Peraeopod 3: coxa large; male and female merus-carpus without plumose setae; propodus with 2 setae and 1 distal locking seta along posterior margin; dactylus long, slender. *Peraeopod 4*: coxa deeper than wide, with large posteroventral lobe, anterior and posterior margins subparallel; male and female merus-carpus without plumose setae; propodus with 2 setae and 1 distal locking seta along posterior margin; dactylus long, slender. *Peraeopod 5*: coxa bilobate, anterior lobe slightly produced ventrally; basis expanded with posterior margin minutely crenate; merus slightly expanded

posteriorly; propodus with 1 robust seta and 1 distal locking seta along anterior margin and 1 robust seta along posterior margin; dactylus long, slender. *Peraeopod 6*: coxa small, not lobate posteriorly; basis expanded posteriorly with minutely crenate posterior margin; merus not expanded posteriorly; propodus with 1 robust seta and 1 distal locking seta along anterior margin and 2 robust setae and 1 distal seta along posterior margin; dactylus long, slender. *Peraeopod 7*: basis expanded posteriorly, posterior margin slightly rounded, minutely crenate, posteroventral corner rounded, posteroventral margin rounded; merus not expanded posteriorly with 3 robust setae; propodus with 4 robust setae and 1 distal locking seta along anterior margin and 2 slender setae and 2 distal slender setae along posterior margin; dactylus long, slender.

Oostegites from gnathopod 2 to peraeopod 5. *Gills* from gnathopod 2 to peraeopod 6, not pleated.

Pleonites 1 to 3 dorsally smooth. *Epimeron 1*: anteroventral corner rounded. *Epimeron 3*: posteroventral corner produced, narrowly rounded. *Urosomites*: dorsally smooth; urosomite 3 with small dorsolateral robust seta. *Uropod 1*: without fine setae; peduncle with 3 dorsolateral, 1 apicolateral, 1 dorsomedial and 1 apicomedial robust setae, without robust setae along distal margin; rami subequal in length; outer ramus with 2 robust setae; inner ramus with 2 robust setae. *Uropod 2*: without fine setae; peduncle with 1 apicolateral and 1 apicomedial robust setae, without robust setae along distal margin; rami subequal in length; outer ramus with 2 dorsal robust setae; inner ramus with 2 dorsal robust setae, with moderate constriction. *Uropod 3*: peduncle long, length 2.1 × breadth, without dorsolateral flange, with 2 dorsolateral and 1 apicolateral robust setae, without midlateral robust or slender setae, with 1 distoventral robust seta, without plumose setae; rami lanceolate, subequal in length; outer ramus 2-articulate, article 2 long, article 1 with 1 lateral robust seta; inner ramus without robust setae; plumose setae absent in male and female. *Telson*: length 1.1 × breadth, entire, without dorsal robust setae, distal margin truncated, without marginal penicillate setae, with 2 simple slender marginal and 2 robust marginal setae.

Etymology. Named for one of the islands of the outer barrier reef of Madang Lagoon.

Remarks. *Rhinolabia paeowai* is distinguished from other *Rhinolabia* species in the Madang area by its large, narrow, subacute lateral cephalic lobe and strongly produced upper lip. It is a scavenger which appears to be most common on the deep slopes of the outer barrier reef.

Distribution. Astrolabe Bay, northern Papua New Guinea in 340 to 390 m depth.

Riwo n.gen.

Diagnosis. Antenna 1: callynophore weak in female and male; calceoli present in male. Antenna 2: flagellum short in female and male; calceoli present in male. Epistome and upper lip separate. Mouthpart bundle subquadrate. Mandible: lacinia mobilis absent; molar a setose flap; palp article 3 with D3-setae strongly gaped along the posterior margin. Maxilla 1: inner plate with 1 simple apical seta; outer plate with 10 setal-teeth, ST7 symmetrical, slightly displaced from ST6. Gnathopod 1 simple. Uropod 2: inner ramus not incised. Uropod 3: inner ramus shorter than outer; outer ramus 2-articulate. Telson short, notched.

Type species. *Riwo mizeui* n.sp.

Etymology. Named for Riwo, Madang Lagoon.

Remarks. Few lysianassid taxa have the combination of a setose molar, a simple first gnathopod and a notched telson *Phoxostoma* K.H. Barnard, 1925 and some conicostomatins do, but they all have subconical mouthpart bundles. *Concarnes* Barnard & Karaman, 1991 and *Socarnoides* Stebbing, 1888, do, but *Concarnes* has a long second antenna in the male, no apical conate setae on maxilla 1 palp, a well developed constriction on the outer ramus of uropod 2 and plumose setae on the male uropod 3 rami. *Socarnoides* has a subconical mouthpart bundle, a conicostomatin maxilliped and peduncular flange on uropod 3. Species of *Parawaldeckia* often have a strongly notched telson in the male, but these males also develop the full array of secondary sexual characters.

Riwo appears to be closely related to the poorly known genus *Socarnella* Walker, 1904. The mouthparts, uropods and telson are similar. However, in *Socarnella* the mandibular palp article 3 is more falcate; the outer plate of maxilla 1 has 11 setal-teeth, STA to STD are longer and more slender and the palp has no terminal conate setae; the maxilliped outer plate has no medial robust setae; the posterior margin of the propodus on gnathopod 1 is serrate; and the outer ramus of uropod 3 is 1-articulate. Both taxa have the same apically notched telson, an unusual synapomorphy.

Distribution. *Riwo* is known only from the north coast of Papua New Guinea in 3 to 17 m depth.

Riwo mizeui n.sp.

Figs 17–19

Type material. HOLOTYPE, female, 3.3 mm, AM P41582; PARATYPE, male, 2.4 mm, AM P41583; 50 PARATYPES, AM P41584; 10 PARATYPES, AM P41585; 10 PARATYPES, BMNH 1995.625-634; 10 PARATYPES, USNM 274113; Wongad Natun reef, Madang Lagoon, Papua New Guinea, 5°08.31'S

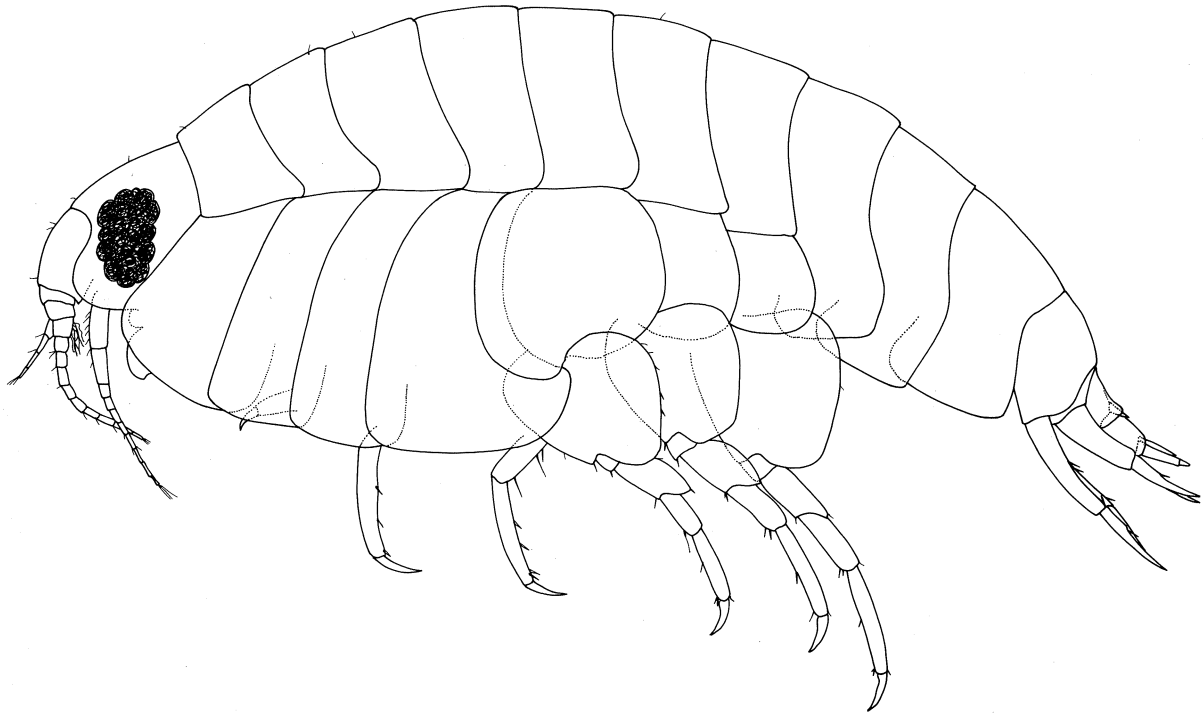

Fig. 17. *Riwo mizeui* n.sp., holotype female, 3.3 mm, AM P41582, Wongad Natun reef, Madang Lagoon, Papua New Guinea.

145°49.36'E, baited trap on bottom of *Acropora*, branching soft corals and *Porites*, 4 m, J.K. Lowry & J.K. Elliott, 30–31 January 1990, stn JKL/PNG-105.

Additional material examined. AM P41638 to P41645, P41729 from stations: JKL/PNG-86 (1), JKL/PNG-106 (3), JKL/PNG-107 (2), JKL/PNG-110 (1), JKL/PNG-114 (1 juvenile), JKL/PNG-115 (1) juvenile, JKL/PNG-119 (1 juvenile), JKL/PNG-120 (1 juvenile), JKL/PNG-161 (1).

Description. Holotype female, 3.3 mm; paratype male, 2.4 mm. *Head and body*: colour whitish with small black chromatophores covering peraeon, coxae and epimera, but concentrated anteriorly on peraeon segments to give a striped effect; without setae. *Head*: deeper than long; lateral cephalic lobe large, broadly rounded; rostrum small; eyes oval, black, enlarged in reproductive male. *Antenna 1*: medium length, about 0.3 × body; peduncular article 1 short, length 1.3 × breadth; peduncular article 2 short, 0.25 × article 1; peduncular article 3 short, 0.18 × article 1; accessory flagellum long, 0.5 × primary flagellum, 4-articulate, article 1 long, 1.5 × article 2 (same in male), not forming cap; flagellum 9-articulate (male 8), callynophore weak 1-field in female (weak 2-field in male), without posterodistal slender or robust setae, without flagellar robust setae, calceoli absent in female (present in adult male). *Antenna 2*: subequal in length to antenna 1 (same in male); peduncle with brush setae in female and male, female strongly geniculate between peduncular articles 3–4, article 3 long, 0.6 × article 4, peduncular articles 4 and 5 not enlarged in male or female; flagellum 9-articulate (male 7), calceoli absent in female (present in reproductive male).

Mouthpart bundle: subquadrate. *Epistome* and *upper lip*: separate, epistome concave, upper lip produced, rounded. *Mandible*: incisors symmetrical, large, with slightly convex margins; laciniae mobilis absent; accessory setal row without distal setal tuft, left and right rows each with 3 long, slender, multiserrate robust setae, without intermediate setae; molar a small, smooth setose flap; mandibular palp attached proximally, article 1 short, length 1.5 × breadth; article 2 elongate, slender, length 5 × breadth, 1.8 × article 3, with 3 posterodistal A2-setae; article 3 slender, blade-like, long, length 3.6 × breadth, without A3- or B3-setae, with 1 proximal and 2 distal D3-setae on posterior margin, and 2 apical E3-setae. *Maxilla 1*: inner plate narrow with 1 simple apical seta; outer plate with 10 setal-teeth in modified 6/5 arrangement; outer row with ST1–ST3 large, stout, weakly cuspidate, ST4 large, stout, 3-cuspidate, ST5 absent, ST6 large, broad, 8-cuspidate distally, ST7 symmetrical, slightly displaced from ST6, large, broad, 9-cuspidate distally; inner row with STA large, slightly displaced from STB–STD, 2-cuspidate, STB–STD large, broad, 2-cuspidate; palp large, 2-articulate, with 3 short terminal conate setae and serrate apical margin, without subterminal setae, flag seta present on distolateral corner, distomedial margin serrate. *Maxilla 2*: inner and outer plates broad, subequal in length. *Maxilliped*: inner

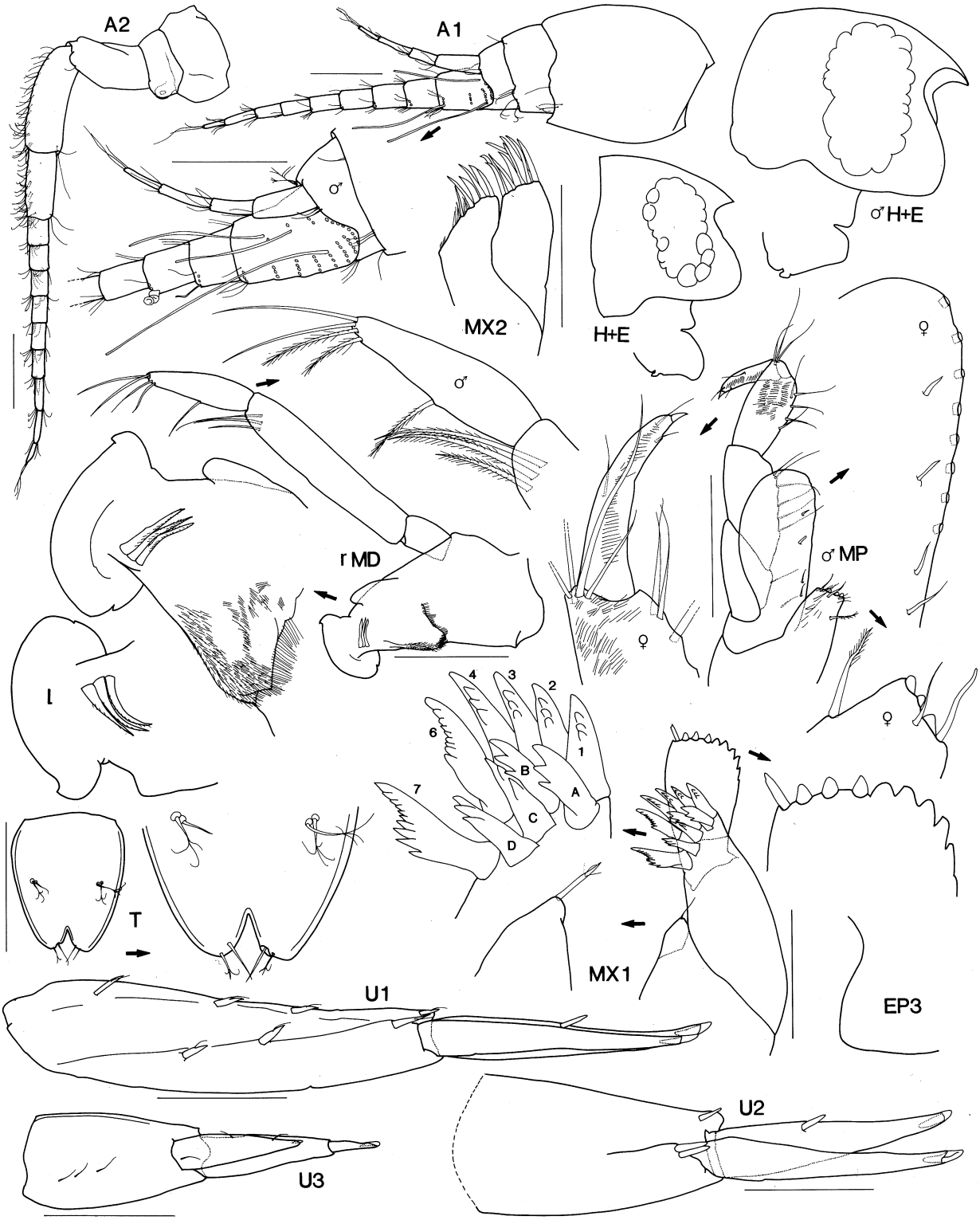

Fig. 18. *Riwo mizeui* n.sp., holotype female, 3.3 mm, AM P41582; paratype male, 2.4 mm, AM P41583, Wongad Natun reef, Madang Lagoon, Papua New Guinea.

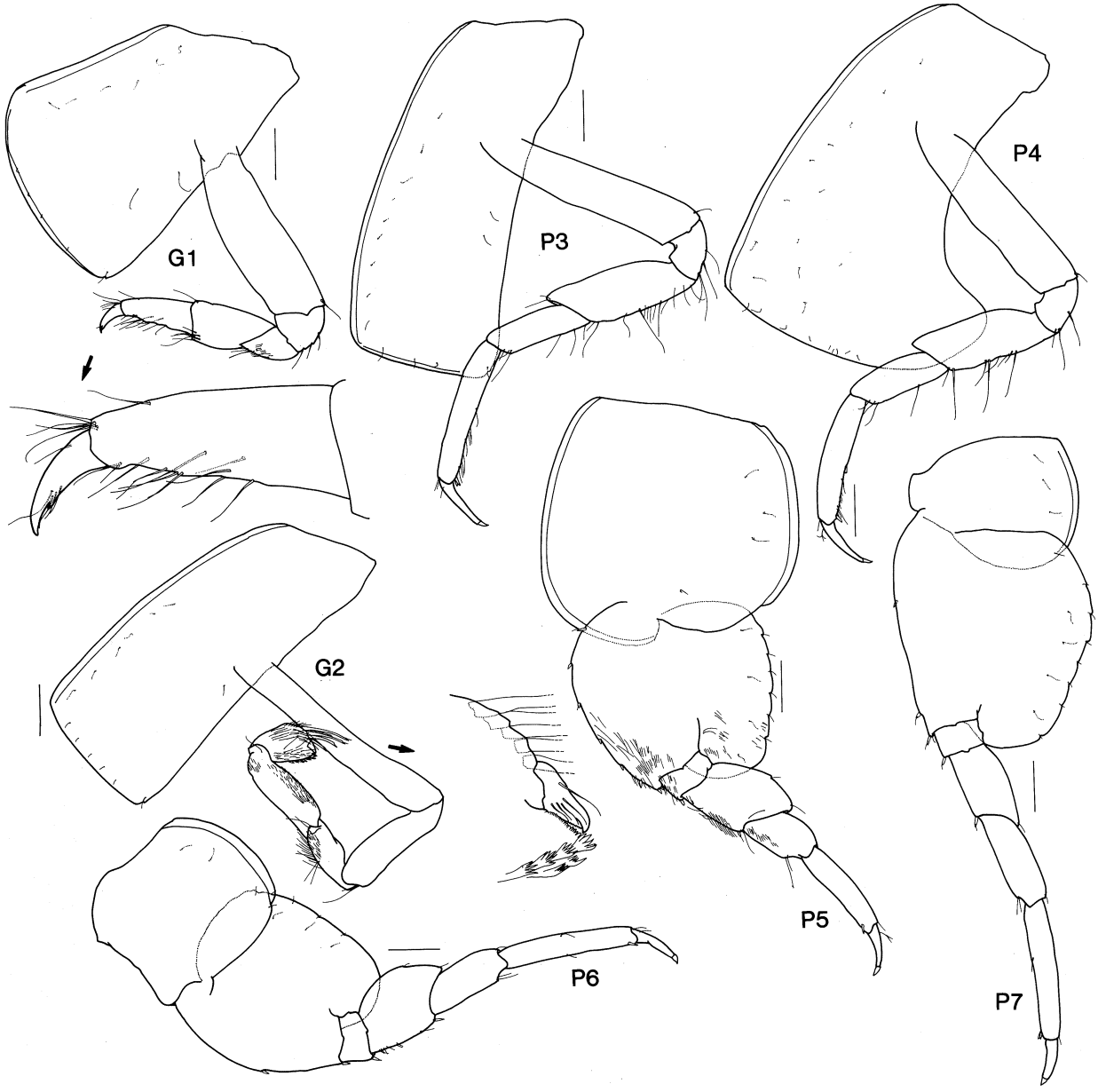

Fig. 19. *Riwo mizeui* n.sp., holotype female, 3.3 mm, AM P41582, Wongad Natun reef, Madang Lagoon, Papua New Guinea. Scales represent 0.1 mm.

plate large, subrectangular, with 3 apical nodular setae, oblique setal row reduced with 1 pappose seta; outer plate small, subovate, without apical slender or robust setae, medial robust setae vestigial, submarginal setae short, simple; palp large, 4-articulate, article 2 broad, length 2.2 × breadth, 1.2 × article 3, article 3 long, slender, length 2.1 × breadth, dactylus well developed, with 2 subterminal setae, unguis present.

Gnathopod 1: simple; coxa large, as long as coxa 2, anterior margin slightly concave, anteroventral corner rounded, posterior margin straight; basis long, slender, length 3.3 × breadth, anterior margin smooth, without setae; ischium short, length 1.1 × breadth; merus, posterior margin with patch of short setae and a few simple slender setae; carpus subrectangular, short, length 1.9 × breadth, subequal in length to propodus, without denticulate patch near posterodistal margin; propodus small, subrectangular, length 2.2 × breadth, tapering distally, posterior margin smooth, straight, with few slender setae, without denticulate patch near posterior margin, palm absent; dactylus simple, with subterminal spine. *Gnathopod 2*: minutely subchelate; coxa large, subequal in size to coxa 3; ischium long, length 3.5 × breadth; carpus long, length 3.5 × breadth, posterior

margin straight; propodus subrectangular, short, length 1.6 × breadth, palm slightly obtuse, with straight, serrate margin, posterodistal corner without robust setae; dactylus reaching corner of palm, posterior margin serrate.

Peraeopod 3: coxa large; merus weakly expanded anteriorly, male and female merus-carpus without plumose setae; propodus with 9 slender setae and 2 distal locking setae along posterior margin; dactylus long, slender. *Peraeopod 4*: coxa deeper than wide, with large posteroventral lobe, anterior margin rounded, posterior margin sloping anteriorly; merus weakly expanded anteriorly, male and female merus-carpus without plumose setae; propodus with 8 slender setae and 1 distal locking seta along posterior margin; dactylus long, slender. *Peraeopod 5*: coxa equilobate; basis expanded with posterior margin minutely crenate; merus distally expanded, margin sloping proximally, straight distally with 2 setae; propodus with 1 slender seta and 2 distal locking setae along anterior margin; dactylus long, slender. *Peraeopod 6*: coxa small, not lobate posteriorly; basis expanded posteriorly with minutely crenate posterior margin, without anteroventral lobe; merus expanded posteriorly with rounded posterior margin; propodus with 1 slender seta and 2 distal locking setae along anterior margin; dactylus short, slender. *Peraeopod 7*: basis expanded posteriorly, posterior margin slightly rounded, minutely crenate, posteroventral corner rounded, posteroventral margin rounded; merus not expanded posteriorly, without robust setae; propodus with 1 slender seta and 2 distal locking setae along anterior margin; dactylus short, slender.

Oostegites from gnathopod 2 to peraeopod 5. *Gills* from gnathopod 2 to peraeopod 7, not pleated.

Pleonites 1 to 3 dorsally smooth. *Epimeron 1*: anteroventral corner rounded. *Epimeron 3*: posteroventral corner subquadrate. *Urosomites*: 1 to 3 dorsally smooth. *Uropod 1*: without long fine setae; peduncle with 3 dorsolateral, 1 apicolateral, 2 dorsomedial and 1 apicomedial robust setae; outer ramus slightly longer than inner ramus; outer ramus with 1 lateral robust seta; inner ramus without robust setae. *Uropod 2*: without fine setae; peduncle with 1 apicolateral and 2 apicomedial robust setae; rami subequal in length, outer ramus with 1 dorsal robust seta; inner ramus without robust setae, without constriction. *Uropod 3*: peduncle long, length 2 × breadth, without dorsolateral flange, without dorsal robust setae, midlateral robust or slender setae, distoventral robust setae or plumose setae; rami lanceolate, inner ramus reduced, about 0.6 × outer ramus; outer ramus 2-articulate, article 2 short; rami without robust setae, plumose setae absent in male and female. *Telson*: length 1.2 × breadth, notched (18%), without dorsal robust setae, with 1 marginal penicillate seta and 1 marginal simple seta on each lobe, without marginal robust setae.

Etymology. Named for John Mizeu, laboratory manager at the Christensen Research Institute and dive partner during the summer of 1990.

Remarks. *Riwo mizeui* is a scavenger living on hard coral bottoms. The black-speckled chromatophore pattern of this species is similar to patterns in scavenging isopod species of the *Cirolana parva* complex. These scavengers also live in hard coral habitats and the speckling may be an adaptive camouflage against predation. An interesting fact about *Riwo* is that it goes onto bait, yet the mouthpart morphology is very similar to that of taxa such as *Parawaldeckia, Lysianassa, Shoemakerella* and *Arugella* Pirlot, 1936, which have never been taken in traps.

Habitat and distribution. *Riwo mizeui* lives mainly on living coral bottoms in 3 to 51 m depth. It is known only from the Madang Lagoon on the north coast of Papua New Guinea.

Tryphosella Bonnier

Tryphosella Bonnier, 1893: 170.–Barnard & Karaman, 1991: 536.

Diagnosis. Mandible: molar with reduced column, proximally setose, with distal triturating surface. Maxilla 1: ST7 slightly displaced from ST6, broad and fully cuspidate down medial margin; STA–STD large, fully cuspidate down medial margin. Gnathopod 1 subchelate; coxa 1 reduced, tapering; propodus and carpus long, rectangular, usually subequal in length.

Remarks. *Tryphosella* belongs in the tryphosine group of the Lysianassidae. This group of about 50 genera is distinguished from other lysianassids by having a modified triturating molar, ST7 slightly displaced from ST6 and a subchelate first gnathopod. Within the group *Tryphosella* is distinguished from other tryphosine genera, except *Cedrosella* Barnard & Karaman, 1987 and *Thrombasia* J.L. Barnard, 1966, by the reduced, tapering first coxa and a proximally setose, distally triturating molar. *Cedrosella* differs from *Tryphosella* in the morphology of the setal-teeth on maxilla 1 outer plate and in having a shortened carpus on gnathopod 1. *Thrombasia* differs from *Tryphosella* in the morphology of the setal-teeth on maxilla 1 outer plate and the telson which is only cleft about halfway. *Galathella* Barnard & Karaman, 1987, also appears to be related to *Tryphosella*, but setal-tooth 7 is strongly displaced down the outer plate of maxilla 1. *Tryphosa* Boeck, 1871, has the same type of setal-teeth on maxilla 1, but it has a fully triturating non-columnar molar, a fully developed first coxa and a shortened carpus on gnathopod 1.

Barnard & Karaman (1991) recognised 54 species of *Tryphosella*. The only key to the genus (J.L. Barnard, 1962) confounds *Tryphosa, Tryphosella* and *Tmetonyx* Stebbing, 1906. *Tryphosella* is possibly the largest lysianassoid genus. It is in critical need of a thorough revision.

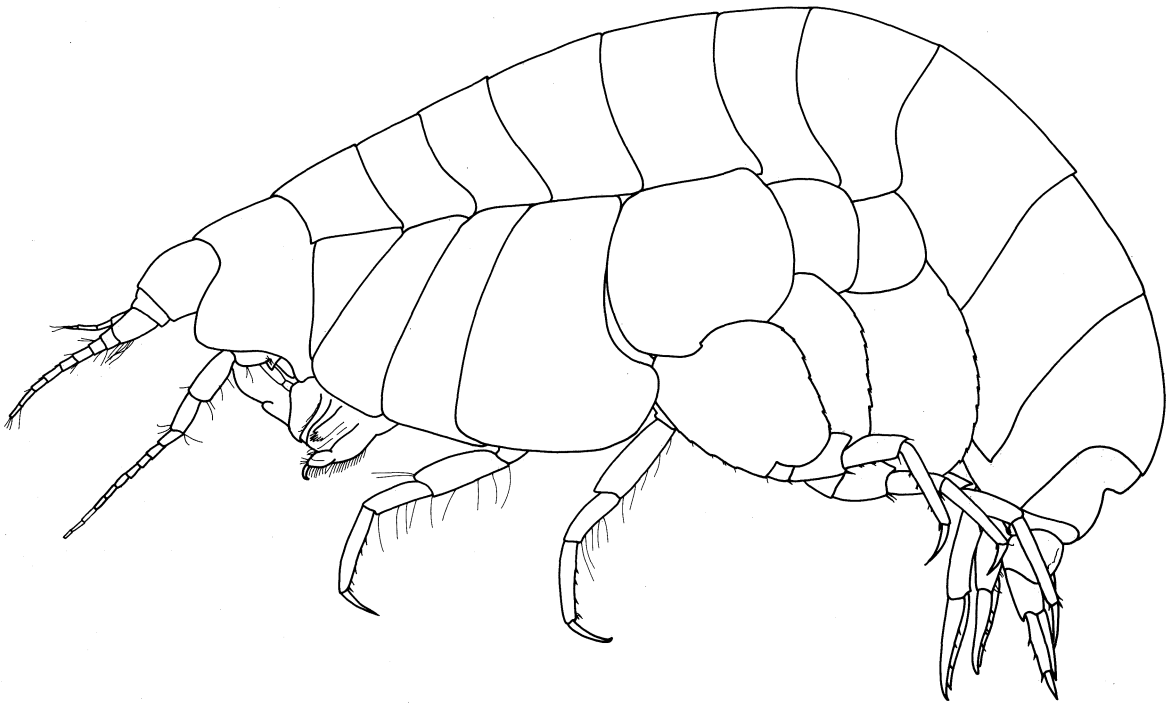

Fig. 20. *Tryphosella astrolabensis* n.sp., paratype female, 5.0 mm, AM P41588, outer barrier between Dam Awan (Rasch Passage) and Wongad, Astrolabe Bay, Papua New Guinea.

Tryphosella astrolabensis n.sp.

Figs 20–22

Type material. HOLOTYPE, female, ovigerous (4 eggs), 5.5 mm, AM P41586; PARATYPE, male, 4 mm, AM P41587; 16 PARATYPES, AM P41588; face of outer barrier between Dam Awan (Rasch Passage) and Wongad, Astrolabe Bay, Papua New Guinea, 5°08.59'S 145°49.65'E, baited trap, 390 m, J.K. Lowry & J. Mizeu, 26–27 January 1990, stn JKL/PNG-84. 23 PARATYPES, AM P41591, same locality, 440 m, stn JKL/PNG-85. 1 PARATYPE, male, 5.5 mm, AM P41589; 106 PARATYPES, AM P41590; east from Planet Rock, Astrolabe Bay, Papua New Guinea, 5°15.48'S 145°49.14'E, baited trap on silty mud bottom, about 500 m, J.K. Lowry, S.J. Keable, M.H.P. Jebb & A.A. Myers, 15–16 March 1991, stn JKL/PNG-231. 10 PARATYPES, BMNH 1995.635-644, same locality, stn JKL/PNG-233. 8 PARATYPES, USNM 274114, same locality, stn JKL/PNG-234.

Additional material examined. AM P41646 to P41650, P41754 from stations: JKL/PNG-79 (1), JKL/PNG-82 (2), JKL/PNG-83 (11), JKL/PNG-229 (13), JKL/PNG-232(2), JKL/PNG-236 (13).

Diagnosis. Lateral cephalic lobe large, broadly rounded. Eye weakly lageniform. Epistome: slightly produced, rounded. Maxilliped: outer plate with 3 apical robust setae. Epimeron 3: posteroventral corner with weak spine. Urosomite 1 dorsally rounded, with anterodorsal notch.

Description. Holotype female, 5.5 mm; paratype male, 5.5 mm. *Head and body*: colour whitish; without setae. *Head*: exposed, deeper than long; lateral cephalic lobe large, broadly rounded; rostrum absent; eyes weakly lageniform, red (fading in alcohol), enlarged in reproductive male. *Antenna 1*: medium length, 0.2 × body, peduncular article 1 short, length 1.2 × breadth; peduncular article 2 short, 0.22 × article 1; peduncular article 3 short, 0.15 × article 1; accessory flagellum medium length, 0.46 × primary flagellum, 5-articulate, article 1 long, 1.6 × article 2, not forming cap; flagellum 11-articulate (male 13), callynophore strong 2-field in female and male, with 1 small posterodistal robust seta, with 1 robust seta on article 3, calceoli absent in female (present in adult male). *Antenna 2*: subequal in length to antenna 1 (same in male), female strongly geniculate between peduncular articles 3–4, article 3 short, 0.5 × article 4 (same in male); peduncle without brush setae in female (weak in male); peduncular articles 4 and 5 not enlarged in male or female; flagellum 9+-articulate (male 20), calceoli absent in female (present in adult male).

Mouthpart bundle: subquadrate. *Epistome* and *upper lip*: separate, epistome produced, rounded, upper lip not produced, straight. *Mandible*: incisors symmetrical, large, with slightly convex margins; left lacinia mobilis present, a stemmed distally serrate blade; accessory setal row without distal setal tuft, left and right rows each with 3 long, slender, multiserrate robust setae, with "bottle-

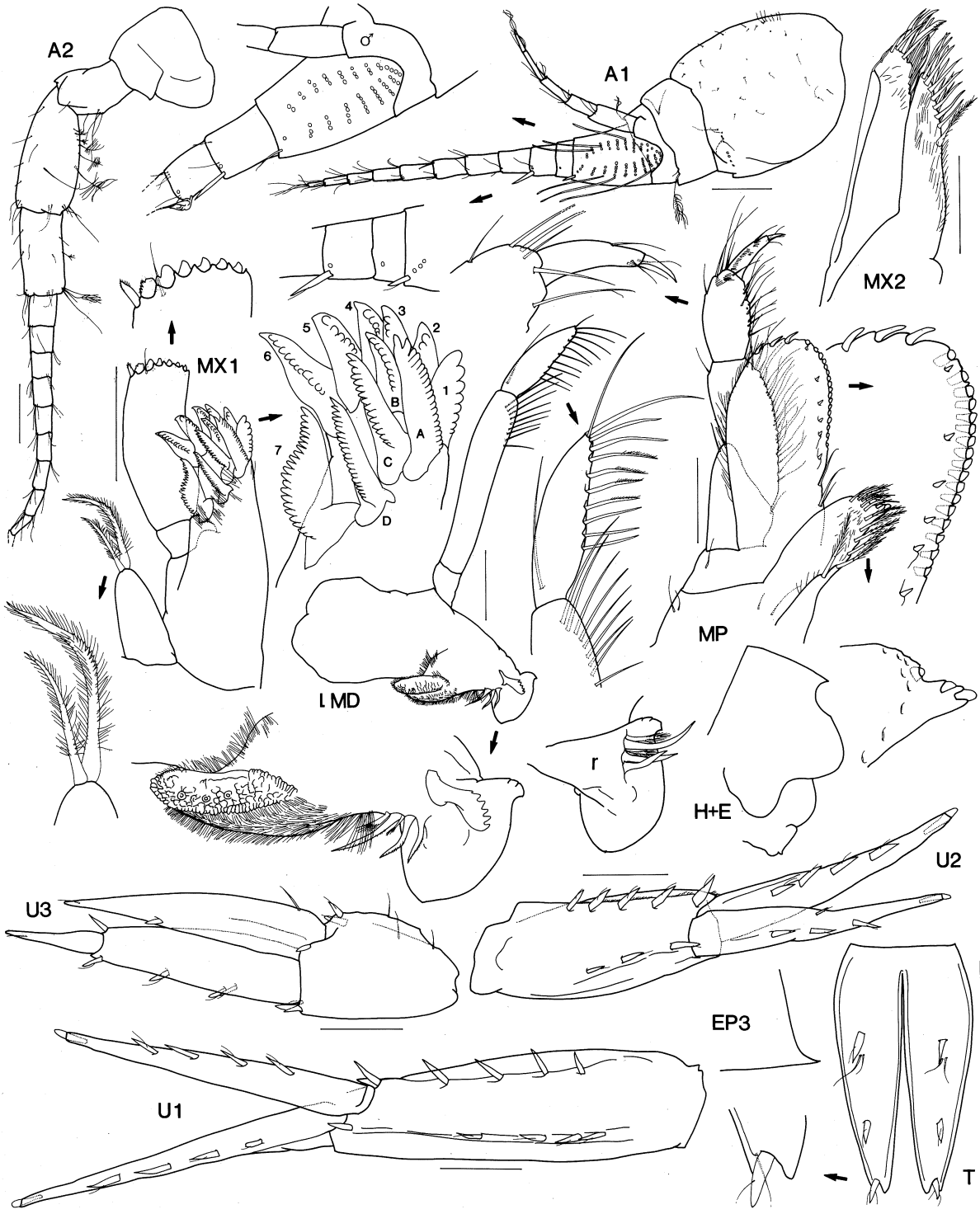

Fig. 21. *Tryphosella astrolabensis* n.sp., holotype female, 5.5 mm, AM P41586, paratype male, 4.0 mm, AM P41587, outer barrier between Dam Awan (Rasch Passage) and Wongad, Astrolabe Bay, Papua New Guinea. Scales represent 0.1 mm.

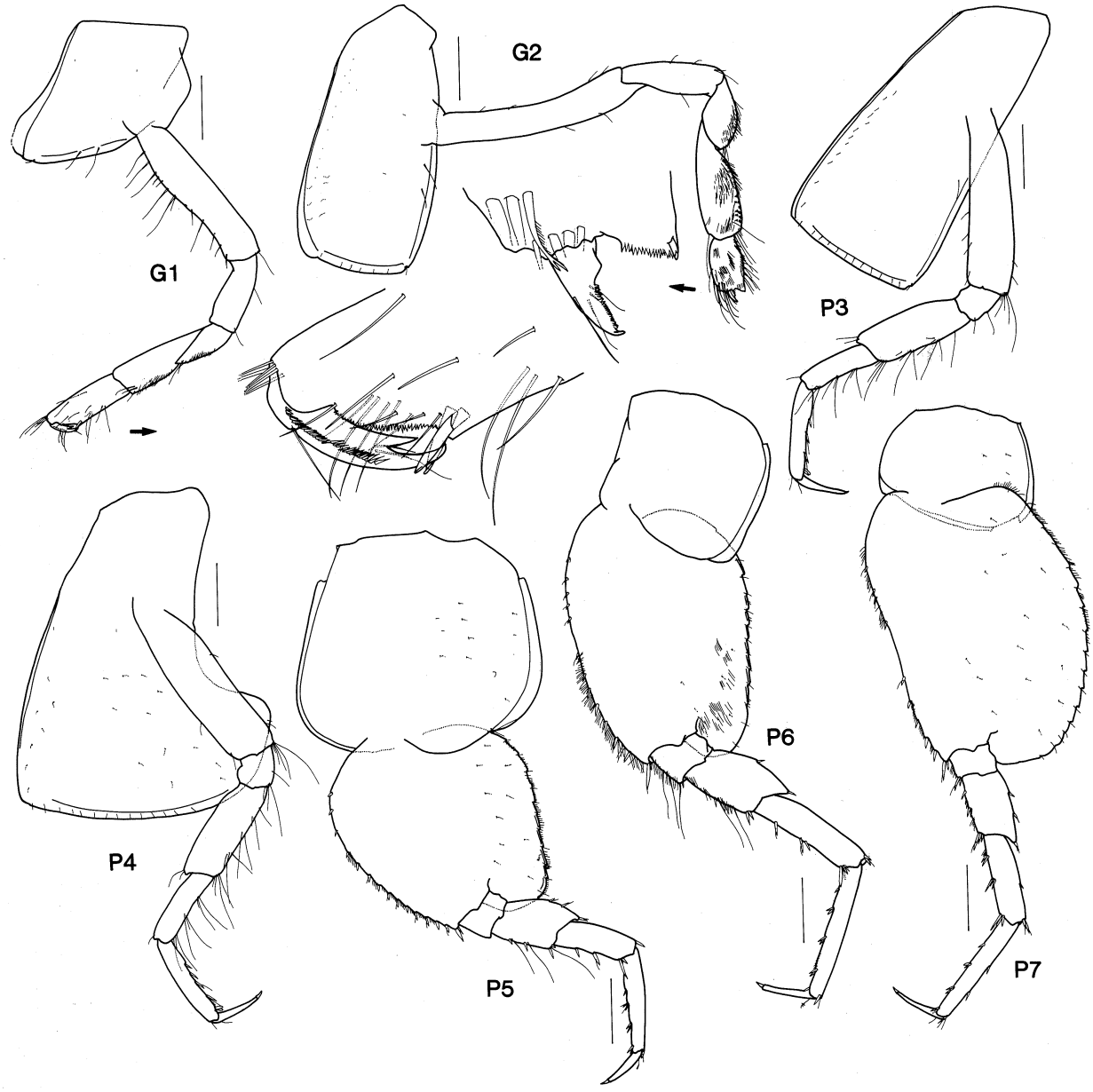

Fig. 22. *Tryphosella astrolabensis* n.sp., holotype female, 5.5 mm, AM P41586, outer barrier between Dam Awan (Rasch Passage) and Wongad, Astrolabe Bay, Papua New Guinea. Scales represent 0.1 mm.

brush" intermediate setae; molar proximally setose, distally triturating; mandibular palp attached midway, article 1 short, length 1.5 × breadth; article 2 elongate, slender, length 5.7 × breadth, 1.8 × article 3, with 9 (male 12) posterodistal A2-setae, article 3 falcate, long, length 3.4 × breadth, without B3-setae, with 1 (male 1) A3-seta, with 9 (male 13) D3-setae along most of posterior margin, and 2 apical E3-setae. *Maxilla 1*: inner plate narrow with 2 pappose apical setae, outer seta with denticulate row; outer plate with 11 setal-teeth in 6/5 arrangement; outer row with ST1 large, stout, multicuspidate, ST2–ST3 weakly cuspidate, ST4 large, stout, 5-cuspidate, ST5 large, stout, 6-cuspidate, ST6 large, stout, multicuspidate, ST7 symmetrical, slightly displaced from ST6, large, broad, with convex multicuspidate medial margin; inner row with STA large, very broad, slightly displaced from STB–STD, multicuspidate along entire medial margin, STB–STD long, broad, multicuspidate along entire medial margin; palp large, 2-articulate, with 6 short terminal conate setae, with 1 subterminal seta, flag seta present on distolateral corner, distomedial margin smooth. *Maxilla 2*: inner plate narrow, outer plate broad, subequal in length *Maxilliped*: inner plate large, subrectangular,

with 3 apical nodular setae, oblique setal row strong with 9 pappose setae; outer plate medium size, subovate, without apical setae, with 3 apical robust setae, medial robust setae small, submarginal setae short, simple; palp large, 4-articulate, article 2 slender, length 2.6 × breadth, 1.6 × article 3, article 3 short, broad, length 1.9 × breadth, dactylus well developed, with 3 subterminal setae, unguis present.

Gnathopod 1: subchelate; coxa reduced, tapering, anterior margin concave, anteroventral corner produced, rounded, posterior margin distally angled towards anterior margin; basis long, slender, length 4.5 × breadth, anterior margin smooth, with simple setae; ischium long, length 2.6 × breadth; merus, posterior margin with patch of short setae; carpus subrectangular, long, length 3.4 × breadth, longer than (1.3 ×) propodus, with patch of very fine setae near posterior margin; propodus large, subrectangular, length 2.9 × breadth, margins subparallel, posterior margin smooth, straight, without setae, without denticulate patch near posterior margin, palm acute, margin straight, serrate, posterodistal corner with 1 medial and 1 lateral robust setae; dactylus complex, with large subterminal spine and row of 29 medial robust setae. *Gnathopod 2*: minutely subchelate; coxa large, subequal in size to coxa 3; ischium long, length 2.9 × breadth; carpus long, length 3.1 × breadth, posterior margin broadly lobate; propodus subquadrate, short, length 1.8 × breadth, palm transverse, with straight, serrate margin, posterodistal corner with 1 medial robust seta; dactylus reaching corner of palm, posterior margin serrate.

Peraeopod 3: coxa large; merus not expanded anteriorly, male and female merus-carpus without plumose setae; propodus with 3 robust setae and 2 distal locking setae along posterior margin; dactylus long, slender. *Peraeopod 4*: coxa deeper than wide, with large posteroventral lobe, anterior margin slightly rounded, posterior margin slightly sloping anteriorly; merus not expanded anteriorly, male and female merus-carpus without plumose setae; propodus with 4 robust setae and 2 distal locking setae along posterior margin; dactylus long, slender. *Peraeopod 5*: coxa bilobate, posterior lobe slightly produced ventrally; basis expanded with posterior margin minutely crenate; merus slightly expanded posteriorly; propodus with 5 robust setae and 2 distal locking setae along anterior margin; dactylus long, slender. *Peraeopod 6*: coxa small, not lobate posteriorly; basis expanded posteriorly with minutely crenate posterior margin; merus slightly expanded and rounded posteroproximally, straight posterodistally with 2 robust setae; propodus with 7 robust setae and 2 distal locking setae along anterior margin; dactylus long, slender. *Peraeopod 7*: basis expanded posteriorly, posterior margin slightly rounded, minutely crenate, posteroventral corner rounded, posteroventral margin straight; merus anterior and posterior margins subparallel; propodus with 5 robust setae and 2 distal locking setae along anterior margin, with 2 robust setae and 1 distal seta along posterior margin; dactylus long, slender.

Oostegites from gnathopod 2 to peraeopod 5. *Gills* from gnathopod 2 to peraeopod 7, not pleated.

Pleonites 1 to 3 dorsally smooth. *Epimeron 1*: anteroventral corner rounded. *Epimeron 3*: posteroventral corner produced into weak spine. *Urosomites*: urosomite 1 with anterodorsal notch; urosomite 3, small dorsolateral robust seta not known. *Uropod 1*: without fine setae; peduncle with 4 dorsolateral, 1 apicolateral, 4 dorsomedial and 1 apicomedial robust setae, without robust setae along distal margin; outer ramus slightly longer than inner ramus; outer and inner rami each with 4 dorsal robust setae. *Uropod 2*: without fine setae; peduncle with 4 dorsolateral, 1 apicolateral, 2 dorsomedial and 1 apicomedial robust setae, without robust setae along distal margin; outer ramus slightly longer than inner ramus; outer ramus with 4 dorsal robust setae; inner ramus with 3 dorsal robust setae, without constriction. *Uropod 3*: peduncle short, length 1.5 × breadth, with 2 apicolateral and 1 apicomedial robust setae, without midlateral robust or slender setae, with 3 distoventral robust setae; rami lanceolate, inner ramus reduced, about 0.8 × outer ramus; outer ramus 2-articulate, article 2 short, article 1 with 4 lateral and 1 medial robust setae; inner ramus with 1 medial robust seta; plumose setae absent in female, present in mature male. *Telson*: length 1.8 × breadth, deeply cleft (91%), with 2 dorsal robust setae on each lobe, distal margins incised, with 1 marginal simple seta and 1 marginal robust seta on each lobe.

Etymology. This species is named for Astrolabe Bay, where it was first discovered.

Remarks. *Tryphosella astrolabensis* is remarkably similar to the type species *T. sarsi* Bonnier, 1893, from the Skagerrak, southern Norway. The main differences are: *T. sarsi* has a weaker female callynophore; does not have calceoli; does not have robust setae on the flagellum of antenna 1; has only 1 apical robust seta on the outer plate of the maxilliped; has a shorter ischium on gnathopod 1; has a less well developed notch on urosomite 1; and has several plumose setae on the rami of uropod 3 in the male.

Tryphosella ama Lowry & Stoddart, 1994, also has an elongate ischium on gnathopod 1, but it can be distinguished from *T. astrolabensis* by its poorly developed apical robust setae on the outer plate of the maxilliped, its rounded posteroventral corner on epimeron 3 and its constricted inner ramus on uropod 2.

Tryphosella mucronatus (Pirlot, 1936) from the Banda Sea also has an elongate ischium on gnathopod 1, but is easily distinguished from both of these species by the "photophore-like" organ on the basis of peraeopod 5. *Tryphosella oupi* Lowry & Stoddart (1994) from New Caledonia and the three known Australian species, *T. camelus* (Stebbing, 1910), *T. miersi* (Stebbing, 1888) and *T. orana* J.L. Barnard (1972), all have a short ischium on the first gnathopod and a narrowly rounded posteroventral corner on epimeron 3.

Tryphosella astrolabensis has only been taken in traps. It occurs outside the lagoon on the face of the

barrier reef and into Astrolabe Bay.

Distribution. *Tryphosella astrolabensis* is known only from outside the barrier reef of the Madang Lagoon and northern Astrolabe Bay, northern Papua New Guinea in depths from 90 m to 500 m.

Tryphosella wongada n.sp.

Figs 23, 24

Type material. HOLOTYPE, female, ovigerous (2 eggs), 3.8 mm, AM P41592; PARATYPE, male, 3.0 mm, AM P41593; 50 PARATYPES, AM P41594; top of outer barrier near back edge, directly east of Wongad, patchy hard and soft corals, about 50% cover, large pieces of unconsolidated rubble, *Halimeda* flake sediment, baited trap, 6 m, J.K. Lowry & S.J. Keable, 12–13 March 1991, stn JKL/PNG-201. 60 PARATYPES, AM P41595, top of Padoz Natun reef, Madang Lagoon, Papua New Guinea, 5°09.60'S 145°48.77'E, baited trap sitting among *Porites* and *Acropora* plates, 2 m, J.K. Lowry & S.J. Keable, 17–18 March 1991, stn JKL/PNG-245. 21 PARATYPES, BMNH 1995.645-654, same locality, hard rubble near *Acropora* plates, 1.5 m, stn JKL/PNG-242. 21 PARATYPES, USNM 274115, same locality, rubble depression near large soft coral plates and *Acropora* plates, 2 m, stn JKL/PNG-244.

Additional material examined. AM P41651 to P41660, P41732 to P41753 from stations: JDT/PNG-11 (1), JKL/PNG-104 (2), JKL/PNG-105 (2), JKL/PNG-106 (8), JKL/PNG-107 (1), JKL/PNG-113 (1), JKL/PNG-114 (1), JKL/PNG-115 (6), JKL/PNG-191 (29), JKL/PNG-192 (23), JKL/PNG-193 (67), JKL/PNG-194 (84), JKL/PNG-195 (60), JKL/PNG-196 (185), JKL/PNG-197 (7), JKL/PNG-198 (23), JKL/PNG-199 (32), JKL/PNG-200 (10), JKL/PNG-201 (4), JKL/PNG-202 (55), JKL/PNG-203 (12), JKL/PNG-204 (17), JKL/PNG-205 (4), JKL/PNG-241 (133), JKL/PNG-242 (6), JKL/PNG-243 (7), JKL/PNG-244 (8), JKL/PNG-245 (9), JKL/PNG-246 (14), JKL/PNG-248 (2).

Diagnosis. Lateral cephalic lobe large, broadly rounded. Eye weakly lageniform. Epistome: produced, rounded. Maxilliped: outer plate with 1 apical robust seta. Epimeron 3: posteroventral corner subacutely produced. Urosomite 1 dorsally rounded, with anterodorsal notch.

Description. Holotype female, 3.8 mm; paratype male, 3.0 mm. *Head and body*: colour whitish; without setae. *Head*: exposed, deeper than long; lateral cephalic lobe large, broadly rounded; rostrum absent; eyes weakly lageniform, red (fading in alcohol), enlarged in adult male. *Antenna 1*: medium length, 0.2 × body, peduncular article 1 short, length 1.2 × breadth; peduncular article 2 short, 0.33 × article 1; peduncular article 3 short, 0.15 × article 1; accessory flagellum medium length, 0.44 × primary flagellum, 3-articulate, article 1 long, 1.2 × article 2 (male, long, 1.7 × article 2), not forming cap; flagellum 8-articulate (male 9), callynophore weak 2-field in female (strong 2-field in male), with 1 small posterodistal robust seta, with 1 robust seta on article 2; calceoli absent in female, present in adult male. *Antenna 2*: subequal in length to antenna 1 (same in male), female strongly geniculate between peduncular articles 3–4, article 3 short, 0.5 × article 4 (male strongly geniculate between peduncular articles 3–4, article 3 short, 0.6 × article 4); peduncle without brush setae in female, weak in male; peduncular article 1 not greatly enlarged; peduncular articles 4 and 5 not enlarged in male or female; flagellum 7-articulate (male 13), calceoli absent in female (present in adult male).

Mouthpart bundle: subquadrate. *Epistome* and *upper lip*: separate, epistome produced, rounded, upper lip not produced, straight. *Mandible*: incisors symmetrical, large, with slightly convex margins; left lacinia mobilis present, a stemmed distally serrate blade; accessory setal row without distal setal tuft, left and right rows each with 3 long, slender, "bushy" robust setae, with "bottle-brush" intermediate setae; molar proximally setose, distally triturating; mandibular palp attached midway, article 1 short, length 1.2 × breadth; article 2 elongate, slender, length 4.6 × breadth, 2 × article 3, with 5 (male 9) posterodistal A2-setae, article 3 falcate, long, length 3.2 × breadth, without B3-setae, with 1 (male 1) A3-seta, with 7 (male 10) D3-setae along most of posterior margin, and 2 apical E3-setae. *Maxilla 1*: inner plate narrow with 2 pappose apical setae, outer pappose seta with denticulate row; outer plate with 11 setal-teeth in 6/5 arrangement; outer row with ST1 large, stout, multicuspidate, ST2–ST3 weakly cuspidate, ST4 large, stout, 5-cuspidate, ST5 large, stout, 7-cuspidate, ST6 large, stout, multicuspidate, ST7 symmetrical, slightly displaced from ST6, large, broad, with convex multicuspidate medial margin; inner row with STA large, very broad, slightly displaced from STB–STD, multicuspidate along entire medial margin, STB–STD long, broad, multicuspidate along entire medial margin; palp large, 2-articulate, with 5 short terminal setae, with 1 subterminal seta, flag seta present on distolateral corner, distomedial margin smooth. *Maxilla 2*: inner plate narrow, outer plate broad, inner plate 0.8 × length outer plate. *Maxilliped*: inner plate large, subrectangular, with 3 apical nodular setae, oblique setal row strong with 7 pappose setae; outer plate medium size, subovate, without apical slender setae, with 1 apical robust seta, medial robust setae small, submarginal setae short, simple; palp large, 4-articulate, article 2 slender, length 2.7 × breadth, 1.6 × article 3, article 3 short, broad, length 2 × breadth, dactylus well developed, with 3 subterminal setae, unguis present.

Gnathopod 1: subchelate; coxa reduced, tapering, anterior margin concave, anteroventral corner produced, rounded, posterior margin distally angled towards anterior margin; basis long, slender, length 4.5 × breadth, anterior margin smooth, with simple setae; ischium long, length 2.1 × breadth; merus, posterior margin with patch of short setae; carpus subrectangular, long, length 2.8 × breadth, longer than (1.2 ×) propodus, with patch of very fine setae near posterior margin; propodus large, subrectangular, length 2.4 × breadth, margins subparallel, posterior margin smooth, straight, with setae, with very fine setae near posterior margin, palm acute, margin

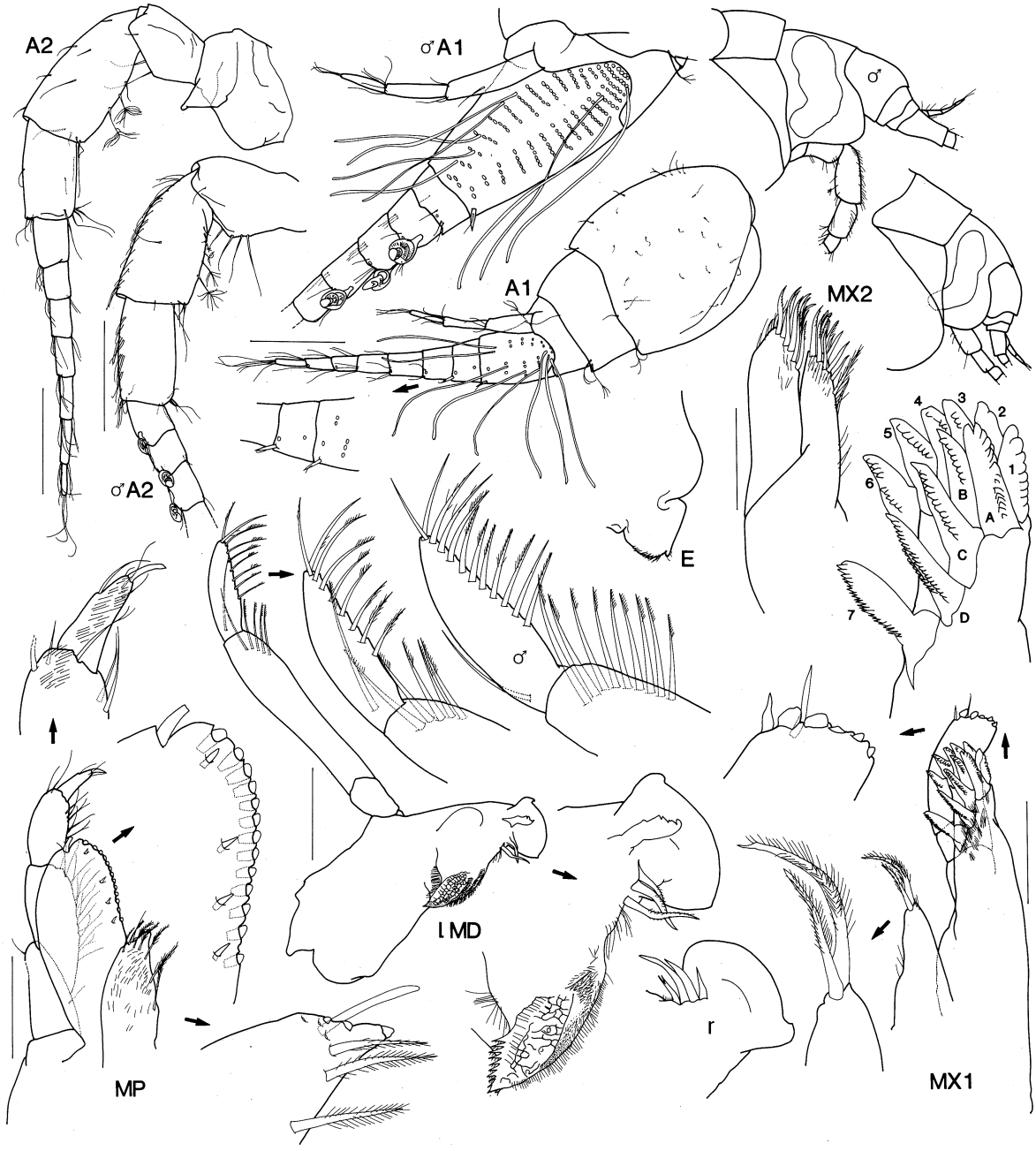

Fig. 23. *Tryphosella wongada* n.sp., holotype female, 3.8 mm, AM P41592; paratype male, 3.0 mm, AM P41593, top of outer barrier directly east of Wongad, Madang Lagoon, Papua New Guinea. Scales represent 0.1 mm.

straight, serrate, posterodistal corner with 1 medial and 1 lateral robust setae; dactylus complex, with large subterminal spine and row of 26 medial robust setae. *Gnathopod 2*: minutely subchelate; coxa large, subequal in size to coxa 3; ischium long, length 3.2 × breadth; carpus long, length 3.3 × breadth, posterior margin broadly lobate; propodus subquadrate, short, length 1.5 × breadth, palm transverse, with straight, serrate margin, posterodistal corner with 1 medial robust seta; dactylus reaching corner of palm, posterior margin serrate.

Peraeopod 3: coxa large; merus weakly expanded anteriorly, male and female merus-carpus without plumose setae; propodus with 3 robust setae and 2 distal locking setae along posterior margin; dactylus long, slender. *Peraeopod 4*: coxa deeper than wide, with large posteroventral lobe, anterior margin slightly rounded,

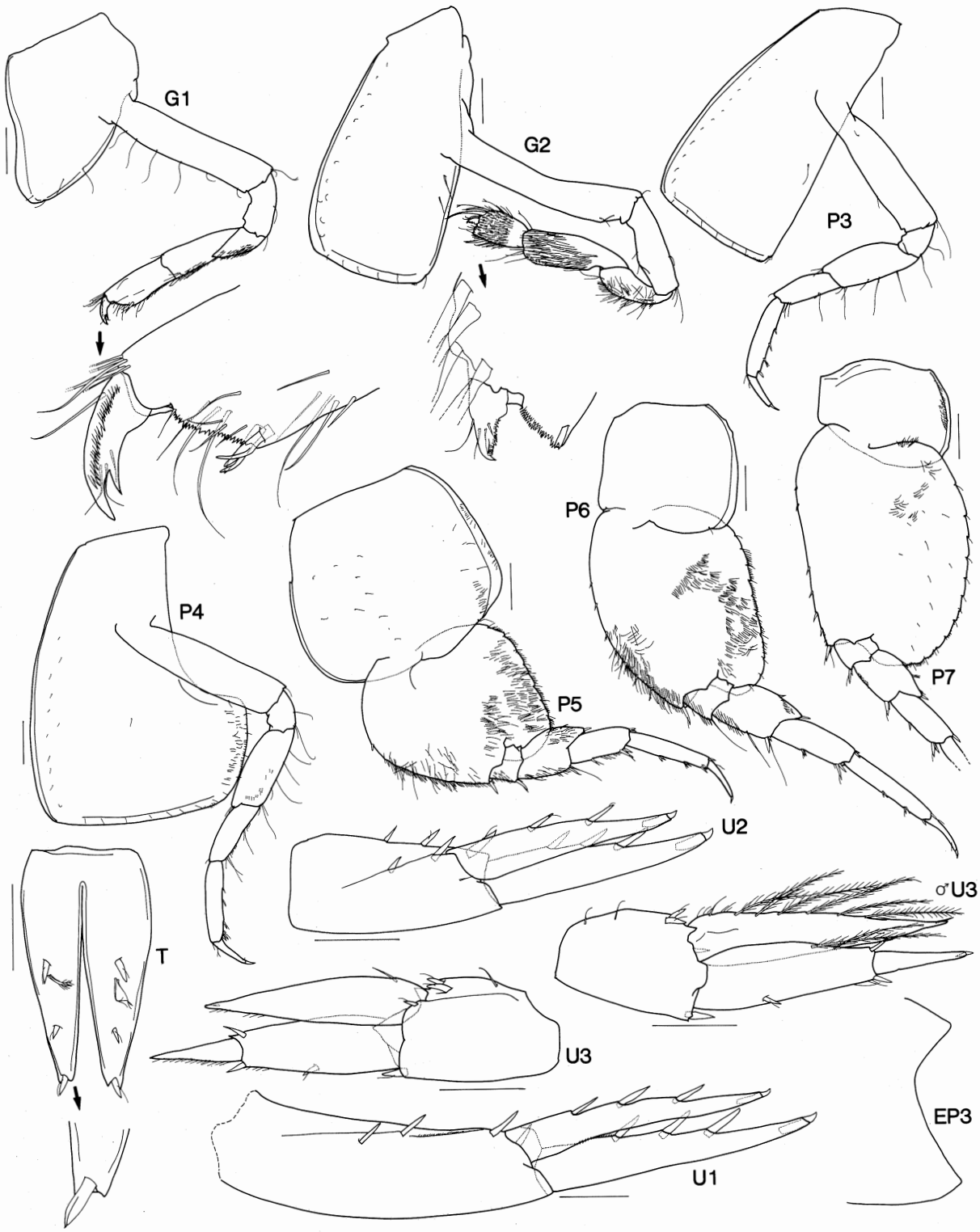

Fig. 24. *Tryphosella wongada* n.sp., holotype female, 3.8 mm, AM P41592, paratype male, 3.0 mm, AM P41593, top of outer barrier directly east of Wongad, Madang Lagoon, Papua New Guinea. Scales represent 0.1 mm.

posterior margin slightly sloping anteriorly; merus weakly expanded anteriorly, male and female merus-carpus without plumose setae; propodus with 3 robust setae and 2 distal locking setae along posterior margin; dactylus long, slender. *Peraeopod 5*: coxa bilobate, posterior lobe slightly produced ventrally; basis expanded with posterior margin minutely crenate; merus slightly expanded posteriorly; propodus with 4 robust setae and 2 distal locking setae along anterior margin; dactylus long, slender. *Peraeopod 6*: coxa small, not lobate posteriorly; basis expanded posteriorly with minutely crenate posterior margin; merus slightly expanded and rounded posteroproximally, straight posterodistally with 2 robust setae; propodus with 4 robust setae and 2 distal locking setae along anterior margin; dactylus long, slender. *Peraeopod 7*: basis expanded posteriorly, posterior margin slightly rounded, minutely crenate, posteroventral corner rounded, posteroventral margin straight; merus anterior and posterior margins subparallel; propodus and dactylus not known.

Oostegites from gnathopod 2 to peraeopod 5. *Gills* from gnathopod 2 to peraeopod 7, not pleated.

Epimeron 1: anteroventral corner rounded. *Epimeron 3*: posteroventral corner subacutely produced. *Urosomites*: urosomite 1 with anterodorsal notch; urosomite 3, small dorsolateral robust seta not known. *Uropod 1*: without fine setae; peduncle with 2 dorsolateral, 1 apicolateral and 1 apicomedial robust setae; outer ramus slightly longer than inner ramus; outer and inner rami each with 3 dorsal robust setae. *Uropod 2*: without fine setae; peduncle with 2 dorsolateral, 1 apicolateral, 1 dorsomedial and 1 apicomedial robust setae; outer ramus slightly longer than inner ramus; outer ramus with 3 dorsal robust setae; inner ramus with 2 dorsal robust setae, without constriction. *Uropod 3*: peduncle short, length 1.7 × breadth, with 2 apicolateral and 1 apicomedial robust setae, without midlateral slender or robust setae, with 1 distoventral robust seta, without plumose setae; rami lanceolate, inner ramus reduced, about 0.8 × outer ramus; outer ramus 2-articulate, article 2 short, article 1 with 2 lateral and 1 medial robust setae; inner ramus without robust setae; plumose setae present in male only. *Telson*: length 1.8 × breadth, deeply cleft (84%), with 2 dorsal robust setae on each lobe, distal margins incised, without marginal penicillate or simple setae, with 1 marginal robust seta on each lobe.

Etymology. This species is named for Wongad, where it was first discovered.

Remarks. *Tryphosella wongada* and *T. astrolabensis* are very closely related species. Morphologically *T. wongada* differs from *T. astrolabensis* in the number of setae on the articles of the mandibular palp, the number of setae on the inner plate and the number of apical robust setae on the outer plate of the maxilliped, the shape of epimeron 3 and uropods 1 to 3 have fewer robust setae. Adults of *T. wongada* are only half the size of *T. astrolabensis*.

Tryphosella wongada also has an elongate ischium on gnathopod 1. It differs from *T. ama* in having one well developed apical robust seta on the outer plate of the maxilliped and a subacutely produced posteroventral corner on epimeron 3.

Ecologically *T. wongada* is confined to shallow water in the Madang Lagoon whereas *T. astrolabensis* only occurs in deep water outside the lagoon. Both species have only been taken in traps.

Distribution. *Tryphosella wongada* is known only from the greater Madang Lagoon (in 1 to 17 m depth) on the north coast of Papua New Guinea.

Opisidae n.fam.

Diagnosis. *Head* deeper than long, lateral cephalic lobe large, broad, ventrolateral flap present. Antenna 1: callynophore present in female and male; calceoli present or absent in female and male. Antenna 2: peduncular article 1 not greatly enlarged; peduncular article 3 without distal hook. *Mouthpart bundle*: subquadrate or subconical. *Epistome* and *upper lip* fused or separate. *Mandible*: incisors asymmetrical; left lacinia mobilis usually absent, occasionally a stemmed blade; accessory setal row well developed, without distal setal tuft, with accessory setae, with or without intermediate setae; molar absent; palp with A2-setae only. *Maxilla 1*: outer plate setal-teeth in an 8/3 crown arrangement (sometimes modified), palp large, 2-articulate. *Maxilla 2*: without oblique setal row. *Maxilliped*: outer plate without apical slender setae, usually without robust setae, occasionally vestigial robust setae present, medial setae vestigial or absent; palp small, 3- or 4-articulate, dactylus usually absent, occasionally present, then unguis absent. *Gnathopod 1* chelate, occasionally subchelate, coxa reduced, posterior margin of propodus smooth, occasionally minutely serrate, dactylus simple, usually strongly curved. *Gnathopod 2*: coxa large; posterodistal corner of propodus with robust setae, occasionally absent. *Peraeopods 3–5* simple, without distal spurs. *Peraeopod 4*: coxa with large posteroventral lobe. *Peraeopods 5* and *6*: basis expanded, usually strongly crenate. *Gills*: from gnathopod 2 to peraeopod 6 or 7, not pleated. *Uropod 2*: inner ramus without constriction. *Urosomite 3* without small dorsolateral robust seta. *Uropod 3*: peduncle without dorsolateral flange, outer ramus 1- or 2-articulate, if 2-articulate then article 2 short. *Telson* entire to deeply cleft.

Type genus. *Opisa* Boeck, 1876.

Generic composition. The family contains 4 genera: *Normanion* Bonnier, 1893; *Opisa* Boeck, 1876; *Podoprionella* Sars, 1895; and *Podoprionides* Walker, 1906.

Remarks. The 8/3 crown arrangement of maxilla 1 outer plate setal-teeth may be derived from a simple 7/4 arrangement (Fig. 25a) in which eleven distal setal-teeth on the outer plate of maxilla 1 occur in two rows, an apical row of seven setal-teeth (known as ST1 to ST7) and a subapical row of four setal-teeth (known as STA to STD). In the 8/3 crown arrangement (Fig. 25b) the outer row (containing STA and ST1 to ST7) is curved around the distal margin of the plate and the inner row (containing STB to STD) extends down the medial face of the plate. Within some genera of the Opisidae individual setal-teeth may be absent.

Distribution. Cosmopolitan.

Key to Genera of Opisidae

1. Gnathopod 1 chelate or subchelate; uropod 3 peduncle equal to or shorter than rami 2

—— Gnathopod 1 subchelate; uropod 3, peduncle longer than rami ..... *Normanion*

2. Mandible, molar absent; maxillipedal palp 3-articulate; peraeopods 5–7 strongly serrate 3

—— Mandible, molar present, a large setose flap; maxillipedal palp 4-articulate; peraeopods 5–7 minutely serrate ..... *Opisa*

3. Uropod 3, peduncle with large distoventral spur, outer ramus 1-articulate; telson entire ..... *Podoprionella*

—— Uropod 3, peduncle without distoventral spur, outer ramus 2-articulate; telson deeply cleft ..... *Podoprionides*

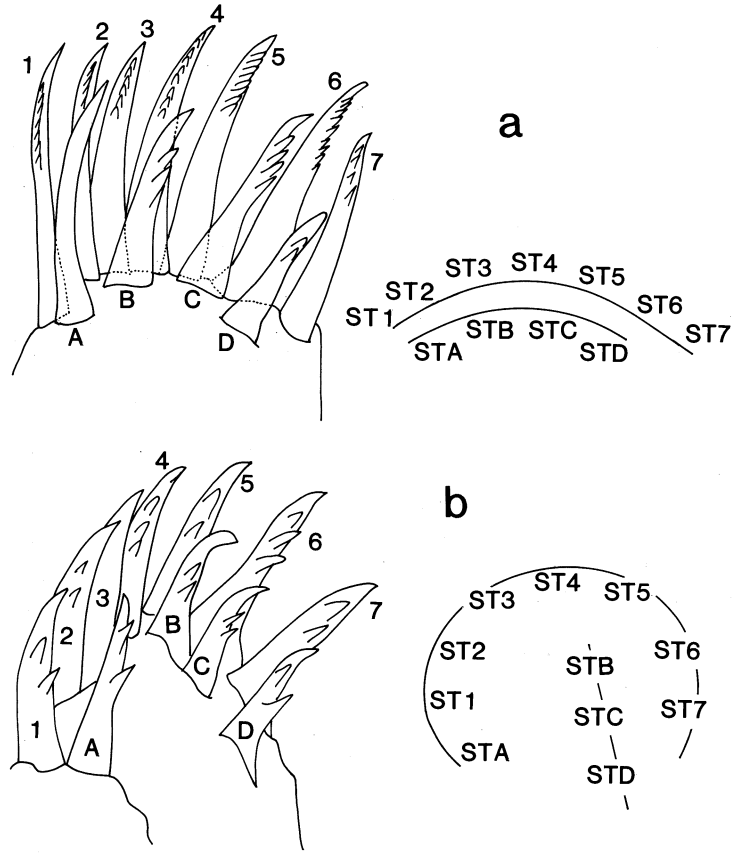

Fig. 25. Setal-teeth of maxilla 1 outer plate: a: simple 7/4 arrangement; b: 8/3 crown arrangement.

Normanion Bonnier

Normania Boeck, 1871: 119 (homonym).
Normanion Bonnier, 1893: 167.–Barnard & Karaman, 1991: 504.

Diagnosis. Mouthpart bundle subquadrate. Mandible: molar present; lacinia mobilis absent; mandibular palp attached midway to slightly proximal. Maxillipedal palp 3-articulate or with vestigial fourth article. Gnathopod 1 subchelate. Peraeopods 5–7, basis with smooth posterior margin. Uropod 3: peduncle longer than rami, without distoventral spur; outer ramus 1-articulate. Telson entire.

Type species. *Opis quadrimana* Bate & Westwood, 1868, monotypy.

Species composition. *Normanion* contains six species: *N. abyssi* Chevreux, 1903; *N. amblyops* Sars, 1895; *N. chevreuxi* Diviacco & Vader, 1988; *N. quadrimanus* (Bate & Westwood, 1868); *N. ruffoi* Diviacco & Vader, 1988; and *N. sarsi* Stebbing, 1906.

Remarks. *Normanion* differs from other opisid genera in having a very long peduncle and a 1-articulate outer ramus on uropod 3. *Normanion* and *Opisa* both have a large setose flap molar and posterodistal robust setae on the propodus of gnathopod 1. *Normanion* and *Podoprionella* both have a 3-articulate maxillipedal palp and an entire telson. *Normanion* and *Podoprionides* both have a 3-articulate maxillipedal palp.

Distribution. *Normanion* is known from the boreal and warm temperate North Atlantic Ocean in 20 to 2368 m depth.

Opisa Boeck

Opis Krøyer, 1842: 149 (homonym).
Opisa Boeck, 1876: 190.–Bousfield, 1987: 5.–Barnard & Karaman, 1991: 506.

Type species. *Opis eschrichtii* Krøyer, 1842, monotypy.

Diagnosis. Mouthpart bundle subquadrate. Mandible: molar present; lacinia mobilis present; mandibular palp attached midway. Maxillipedal palp 4-articulate. Gnathopod 1 chelate. Peraeopods 5–7, basis with minutely serrate posterior margin. Uropod 3: peduncle shorter than rami, without distoventral spur; outer ramus 2-articulate, article 2 short. Telson cleft.

Species composition. *Opisa* contains three species: *O. eschrichtii* (Krøyer, 1842); *O. odontochela* Bousfield, 1987; and *O. tridentata* Hurley, 1963.

Remarks. *Opisa* may be the most primitive opisid genus. It is the only genus with a lacinia mobilis, well developed A2-setae and D3-setae on the mandibular palp and a 4-articulate maxillipedal palp. It also has calceoli on the antennae, separate epistome and upper lip and a molar. *Opisa* and *Normanion* both have a large setose flap molar and posterodistal robust setae on the propodus of gnathopod 1. *Opisa, Podoprionides* and some *Podoprionella* have chelate first gnathopods, and *Opisa* and *Podoprionides* both have entire telsons.

Distribution. *Opisa* is known from the North Polar Sea, boreal Atlantic and Pacific south to California in 30 to 432 m depth.

Podoprionella Sars

Podoprionella Sars, 1895: 687.–Barnard & Karaman, 1991: 518.

Type species. *Podoprionella* Sars, 1895, monotypy.

Diagnosis. Mouthpart bundle subconical. Mandible: molar absent; lacinia mobilis absent; mandibular palp attached proximally. Maxillipedal palp 3-articulate. Gnathopod 1 chelate or subchelate. Peraeopods 5–7, basis with strongly serrate posterior margin. Uropod 3: peduncle shorter than rami, with distoventral spur; outer ramus 1-articulate. Telson entire or incised.

Species composition. *Podoprionella* contains three species: *P. dagadugaban* n.sp.; *P. fissicaudata* Ledoyer, 1977; and *P. norvegica* Sars, 1895.

Remarks. *Podoprionella* is closely related to *Podoprionides*. The main differences between these genera are: *Podoprionella* has a weakly developed accessory setal row, no distoventral spur on the peduncle of uropod 3, a 1-articulate outer ramus on uropod 3 and an entire or incised telson.

Distribution. North-east North Atlantic Ocean; Mediterranean Sea; Bismarck Sea, north-west South Pacific Ocean in 12 to 180 m depth.

Podoprionides Walker

Podoprionides Walker, 1906: 457.–Barnard & Karaman, 1991: 519.

Type species. *Podoprionides incerta* Walker, 1906, monotypy.

Diagnosis. Mouthpart bundle subconical. Mandible: molar absent; lacinia mobilis absent; mandibular palp attached extremely proximally. Maxillipedal palp 3-articulate. Gnathopod 1 chelate. Peraeopods 5–7, basis with strongly serrate posterior margin. Uropod 3: peduncle shorter than rami, without distoventral spur;

outer ramus 2-articulate, article 2 elongate. Telson cleft.

Species composition. *Podoprionides* contains one species: *P. incerta* Walker, 1906.

Remarks. See *Podoprionella*.

Distribution. Eastern Antarctica, Southern Ocean, depths uncertain.

Podoprionella Sars

Key to Species of *Podoprionella*

1. Gnathopod 1 chelate 2
—— Gnathopod 1 subchelate ..... *P. dagadugaban*
2. Mandibular palp, articles 2 and 3 subequal ..... *P. fissicaudata*
—— Mandibular palp, article 2 much longer than article 3 ..... *P. norvegica*

Podoprionella dagadugaban n.sp.

Figs 26–28

Type material. HOLOTYPE, female, 2.9 AM P41757, east side of Padoz Natun reef, Madang Lagoon, Papua New Guinea, 5°09.60'S 145°48.77'E, baited trap sitting among solid coral cover, over thin sediment and *Millipora* crust, 12 m, J.K. Lowry & S.J. Keable, 17–18 March, 1991, stn JKL/PNG-248.

Diagnosis. Maxilla 1: outer plate setal-teeth with cusps on both margins. Gnathopod 1 subchelate. Uropod 3: inner ramus vestigial. Telson entire.

Description. Holotype female, 3 mm; male not known. *Head and body*: without setae, colour not known. *Head*: exposed, deeper than long; lateral cephalic lobe large, broad, distally truncated; rostrum small; eyes oval. *Antenna 1*: short, 0.15 × body; peduncular article 1 short, length 1.1 × breadth; peduncular article 2 long, 0.5 × article 1; peduncular article 3 long, 0.22 × article 1; accessory flagellum medium length, 0.39 × primary flagellum, 2-articulate, article 1 long, 1.5 × article 2, not forming cap; flagellum 5-articulate, callynophore weak 1-field in female, without posterodistal robust or slender setae, without flagellar robust setae, calceoli absent in female. *Antenna 2*: slightly longer than antenna 1; peduncle without brush setae in female, peduncular article 1 not greatly enlarged, female weakly geniculate between peduncular articles 3–4, article 3 short, 0.37 × article 4, peduncular articles 4 and 5 not enlarged in female; flagellum 4-articulate, calceoli absent in female.

Mouthpart bundle: subconical. *Epistome* and *upper lip*: fused, slightly convex. *Mandible*: incisors symmetrical, large, with straight margins; laciniae mobilis absent; accessory setal row without distal setal tuft, left and right rows each with 2 short, slender, simple robust setae without intermediate setae; molar absent; mandibular palp attached extremely proximally; article 1 short, length 1.2 × breadth; article 2 elongate, slender, length 6 × breadth, 2.8 × article 3, with 2 posterodistal A2-setae, without D2-setae; article 3 tapering distally, short, length 2.8 × breadth, without A3-, B3- or D3-setae, with 1 apical E3-seta. *Maxilla 1*: inner plate not known, possibly absent; outer plate narrow with 7 setal-teeth in modified 8/3 crown arrangement; setal-teeth in outer row, cusps where present, in 2 rows, with ST1–ST3 large, stout, multicuspidate, ST4 large, stout, with 2 lateral and 4 medial cusps, ST5 large, slender, with 3 lateral and 4 medial cusps, ST6 large, slender, with 4 lateral and 3 medial cusps, ST7 absent; inner row with STA large, slender, without cusps, STB–STD absent; palp large, 2-articulate, with smooth apical margin, without subterminal setae, flag seta absent, distomedial margin smooth. *Maxilla 2*: inner plate broad, outer plate narrow, inner plate 0.74 × length outer plate. *Maxilliped*: inner plate large, subrectangular, without nodular setae, without distal robust setae on lateral face, oblique setal row absent; outer plate large, subovate, without apical slender or robust setae, medial robust setae vestigial, submarginal setae long, simple; palp small, 3-articulate, article 2 broad, length 1.6 × breadth, 1.3 × article 3, article 3 short, slender, length 2.2 × breadth, dactylus absent.

Peraeonites: 1 to 7 dorsally smooth. *Gnathopod 1*: subchelate; coxa reduced, anterior margin slightly convex, anteroventral corner rounded, posterior margin slightly convex; basis long, slender, length 4.7 × breadth, anterior margin smooth, with simple setae; ischium long, length 1.7 × breadth; merus, posterior margin with a few simple setae; carpus wedge-shaped, produced anteriorly, short, length 1 × breadth, subequal in length to propodus, propodus large, subquadrate, length 0.7 ×

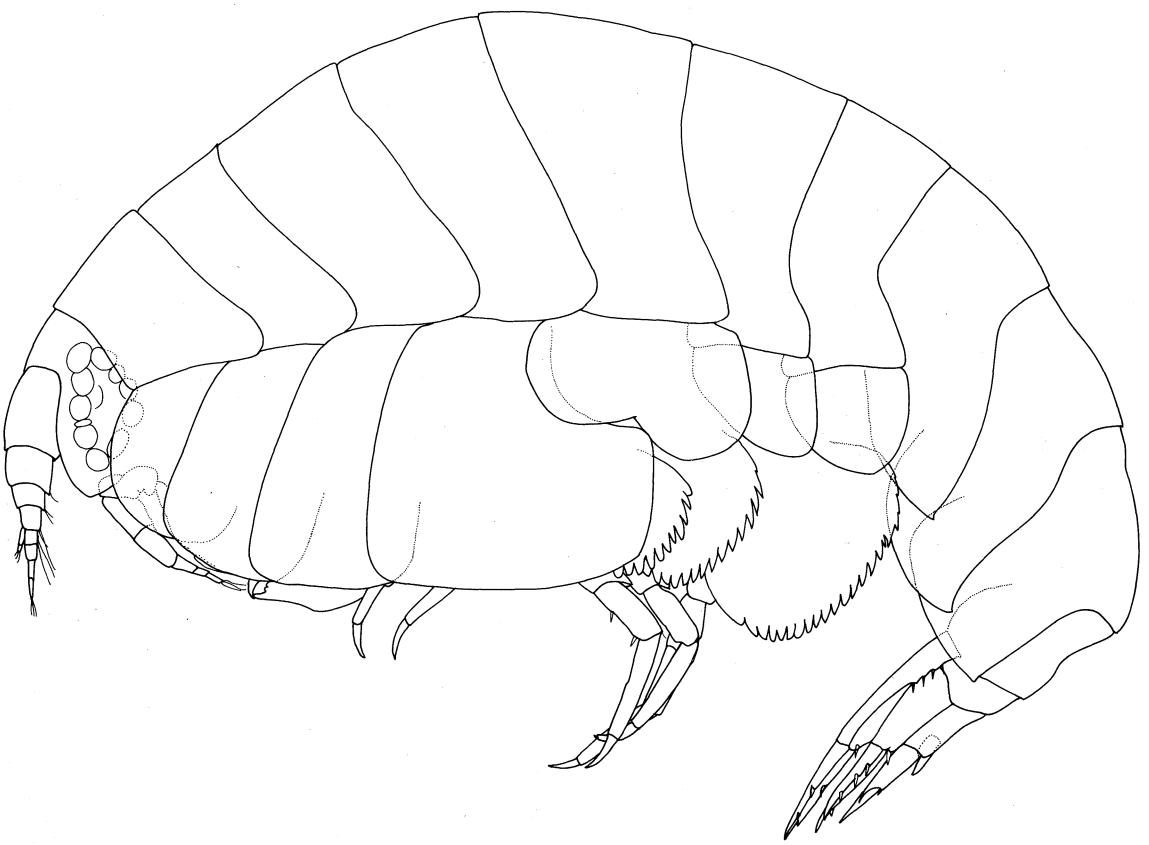

Fig. 26. *Podoprionella dagadugaban* n.sp., holotype female, 2.9 mm, AM P41757, Padoz Natun reef, Madang Lagoon, Papua New Guinea.

breadth, margins subparallel, posterior margin smooth, convex, without robust or slender setae, palm slightly obtuse, margin straight, castellate, posterodistal corner with produced spine; dactylus simple, with many subterminal spines. *Gnathopod 2*: minutely subchelate; coxa large, subequal in size to coxa 3; ischium long, length 3.5 × breadth; carpus very long, length 5.2 × breadth, posterior margin straight; propodus subrectangular, long, length 2.5 × breadth, palm slightly obtuse, with convex, serrate margin, posterodistal corner with 1 medial and 1 lateral robust seta; dactylus reaching corner of palm, posterior margin serrate.

Peraeopod 3: coxa large; merus not expanded anteriorly, female merus-carpus without plumose setae, male not known; propodus with 1 seta along posterior margin; dactylus short, slender. *Peraeopod 4*: coxa deeper than wide, with large posteroventral lobe, anterior and posterior margins subparallel; merus not expanded anteriorly, female merus-carpus without plumose setae, male not known; propodus with 1 seta along posterior margin; dactylus short, slender. *Peraeopod 5*: coxa equilobate; basis expanded with posterior margin strongly serrate; merus slightly expanded posteriorly; propodus with 1 robust seta along anterior margin; dactylus short, slender. *Peraeopod 6*: coxa small, not lobate posteriorly; basis expanded, posterior margin with many fine, deep serrations, without anteroventral lobe; merus slightly expanded posteriorly; propodus posterior margin without robust setae; dactylus short, slender. *Peraeopod 7*: basis expanded posteriorly, posterior margin almost straight, with many fine, deep serrations, posteroventral corner rounded, posteroventral margin rounded; merus slightly expanded posteriorly, with 1 robust seta; propodus with 1 robust seta and 1 distal locking seta along anterior margin and 1 seta along posterior margin; dactylus short, slender.

Oostegites from gnathopod 2 to peraeopod 5. *Gills* from gnathopod 2 to peraeopod 6, not pleated.

Epimeron 1: anteroventral corner rounded. *Epimeron 3*: posteroventral corner weakly notched. *Urosomites*: 1 to 3 dorsally smooth; urosomite 3 without small dorsolateral robust seta. *Uropod 1*: without fine setae; peduncle with 4 dorsolateral, 1 apicolateral, 1 dorsomedial and 1 apicomedial robust setae; rami subequal in length; outer ramus with 2 lateral and 2 medial robust setae; inner ramus with 3 lateral robust setae. *Uropod 2*: without fine setae; peduncle with 1 apicolateral and 1 apicomedial robust setae; outer ramus slightly shorter than inner ramus; outer ramus with 3 lateral robust setae in weak acclivities; inner ramus with 1 medial and 2

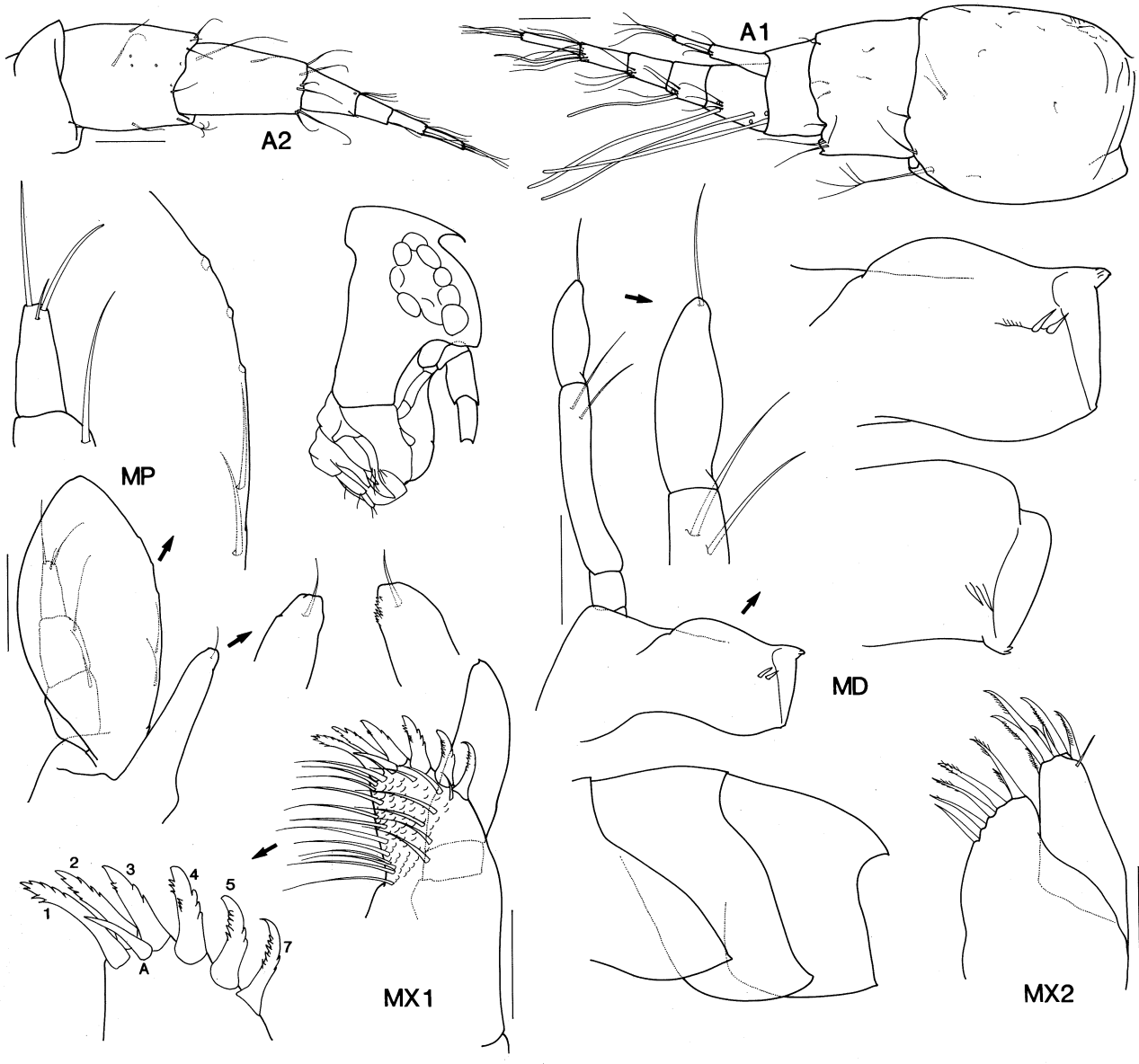

Fig. 27. *Podoprionella dagadugaban* n.sp., holotype female, 2.9 mm, AM P41757, Padoz Natun reef, Madang Lagoon, Papua New Guinea. Scales represent 0.1 mm.

lateral robust setae, without constriction. *Uropod 3*: peduncle short, length 1.8 × breadth, without dorsal robust setae, midlateral robust or slender setae, with large distoventral spine, without plumose setae; rami lanceolate, inner ramus reduced, about 0.1 × outer ramus; outer ramus 1-articulate; rami without robust setae, plumose setae absent in female. *Telson*: length 1.1 × breadth, entire, without dorsal robust setae, with sparse dorsal slender setae, distal margin rounded, with 2 simple submarginal setae, without marginal penicillate or robust setae.

Etymology. Named for Dagadugaban reef near Wongad in Madang Lagoon.

Remarks. *Podoprionella dagadugaban* differs from *P. norvegica* and *P. fissicaudata* in having only 2 robust setae in the mandibular accessory setal row, gnathopod 1 subchelate with a castellate transverse palm, uropod 3 inner ramus vestigial and distal margins of the telson regularly shaped. *Podoprionella dagadugaban* differs further from *P. fissicaudata* in having mandibular palp article 2 much longer than article 3.

Podoprionella dagadugaban was taken in a baited trap on a hard coral bottom at Padoz Natun reef. The mouthparts and gnathopods indicate that this species is not a scavenger. It is possible that *P. dagadugaban*, like its close relatives in the genera *Normanion* and *Opisa*, is an ectoparasite of fish and was attracted to the strong

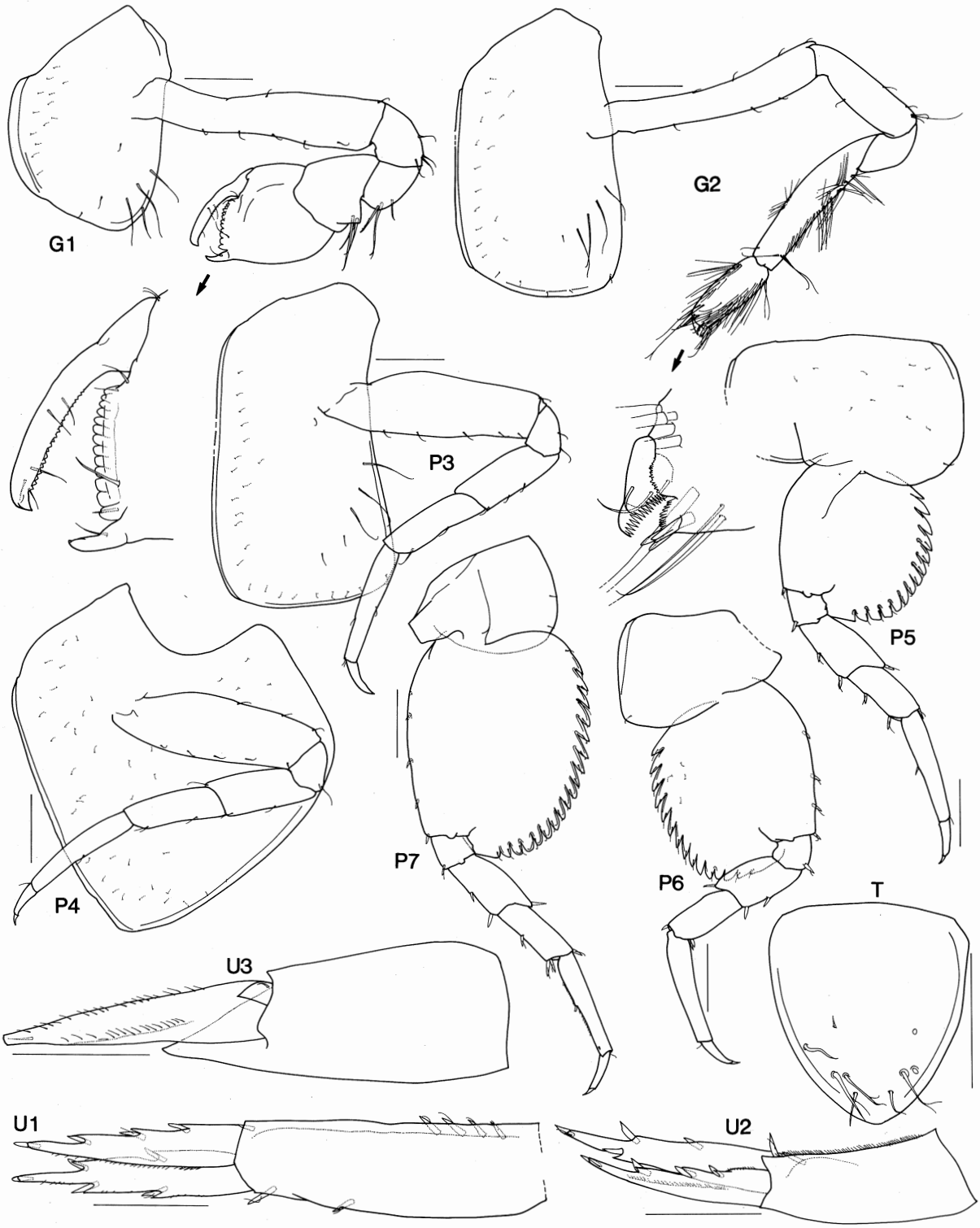

Fig. 28. *Podoprionella dagadugaban* n.sp., holotype female, 2.9 mm, AM P41757, Padoz Natun reef, Madang Lagoon, Papua New Guinea. Scales represent 0.1 mm.

smell of fish emanating from the trap. Lowry (personal observation) has collected known parasitic copepods, *Caligus kuroshio*, from traps baited with fish. These free-swimming stages of males, females and juveniles were probably seeking a potential fish host.

Distribution. *Podoprionella dagadugaban* is known only from the Madang Lagoon, northern Papua New Guinea in 12 m depth.

Uristidae

Ichnopus Costa

Ichnopus Costa, 1853: 169.–Lowry & Stoddart, 1992: 191.

Ichnopus malpatun Lowry & Stoddart

Ichnopus malpatun Lowry & Stoddart, 1992: 210, figs 15, 16.–Lowry & Stoddart, 1994: 163.

Remarks. This species was recently described by Lowry & Stoddart, 1992. Although it may be a common species off the face of the outer barrier it is currently known from only one specimen.

Distribution. Off Madang Lagoon, northern Papua New Guinea; New Caledonia; in 95 to 165 m depth.

Nagada n.gen

Diagnosis. Antenna 1: peduncle without strong posterodistal spine; callynophore without posterodistal slender or robust setae. Epistome and upper lip fused, not strongly produced. Mandible: left lacinia mobilis a cuspidate peg; molar a setose tongue; mandibular palp with slender, subrectangular third article. Maxilla 2: inner plate shorter than outer. Gnathopod 1 simple, ischium and carpus short to long, dactylus with or without cuticular spines on posterior margin. Gnathopod 2 to peraeopod 6 with non-pleated gills, peraeopod 7 without gill. Telson entire.

Type species. *Nagada uwedoae* n.sp.

Variation. Epistome and upper lip produced or not. Gnathopod 1 ischium about as long as broad or 2.5 times as long as broad. Propodus with or without posterior cuticular spines. Long or short peraeopods 6 and 7.

Etymology. Named for Nagada Harbour in the Madang Lagoon.

Species composition. *Nagada* contains three species: *N. garagassi* n.sp., *N. papua* n.sp. and *N. uwedoae* n.sp.

Remarks. *Nagada* is closely related to *Ichnopus*. Both occur in the warm water Indo-West Pacific region. They have similar molars and first gnathopods. The cuticular spines on the propodus and the long ischium in *N. uwedoae* are character states shared with the *Ichnopus spinicornis* group. Another infrequent character state shared by both genera is two nodular setae on the inner plate of the maxilliped. *Nagada* differs from *Ichnopus* in the well developed lacinia mobilis, the long second article on the outer ramus of uropod 3 and the entire telson.

Nagada is even more closely related to *Gippsia* Lowry & Stoddart (1995). Both genera have: large swollen 2-field callynophore in the male; maxilliped inner plate with 2 nodular setae; gnathopod 1 simple; epistome and upper lip fused; uropod 3 outer ramus with long article 2; and entire telson. *Nagada* differs from *Gippsia* in the distinctively cusped setal-teeth on the inner row of maxilla 1 outer plate and in the plates of maxilla 2, in which the inner plate is shorter than the outer in *Nagada* and longer than the outer in *Gippsia*.

Species of *Nagada* are known only from baited trap samples.

Distribution. Currently recorded only from the north coast of Papua New Guinea.

Key to Species of *Nagada*

1. Gnathopod 1 ischium length about 2.5 × breadth; dactylus with 2 subterminal spines, medial robust setae and cuticular spines along posterior margin; uropod 3 peduncle short, length less than 2 × breadth ..... *Nagada uwedoae*

—— Gnathopod 1 ischium length less than 2 × breadth; dactylus with subterminal spine, without medial robust setae or cuticular spines along posterior margin; uropod 3 peduncle long, length at least 2 × breadth 2

2. Upper lip/epistome straight with small, central notch; uropod 2 inner ramus without constriction ..... *N. garagassi*

—— Upper lip/epistome with large, central bulge; uropod 2 inner ramus with weak constriction ..... *N. papua*

Nagada garagassi n.sp.

Figs 29, 30

Type material. HOLOTYPE, female, 5 mm, non-setose oostegites, AM P41596; PARATYPE, male, 3 mm, AM P41597; 13 PARATYPES, AM P41598; east from Planet Rock, Astrolabe Bay, Papua New Guinea, 5°15.48'S 145°49.14'E, baited trap on silty mud bottom, about 500 m, J.K. Lowry & S.J. Keable, M.H.P. Jebb & A.A. Myers, 15–16 March 1991, stn JKL/PNG-231.

Diagnosis. Epistome and upper lip straight with a median notch. Gnathopod 1 ischium twice as long as broad, propodus without posterior cuticular spines. Peraeopods 6 and 7 significantly longer than peraeopod 5. Uropod 3 peduncle twice as long as broad.

Description. Holotype female, 5 mm; paratype male, 3 mm. *Head and body*: head yellow, mouthpart bundle bright orange, antennae, body and peraeopods translucent yellow; without setae. *Head*: deeper than long; lateral cephalic lobe large, broadly rounded; rostrum absent; eyes oval, light brown, enlarged in reproductive male. *Antenna 1*: medium length, 0.2 × body; peduncular article 1 short, length 1.1 × breadth; peduncular article 2 short, 0.2 × article 1; accessory flagellum long, 0.8 × primary flagellum, 5-articulate, article 1 long, 1.8 × article 2, not forming cap; flagellum 7-articulate (male 7), callynophore weak 2-field in female (strong 2-field in male), without posterodistal slender or robust setae, calceoli absent in female and male. *Antenna 2*: slightly longer than antenna 1 (same in male), peduncle with brush setae in female and male; female weakly geniculate between peduncular articles 3–4, article 3 short, 0.3 × article 4; peduncular articles 4 and 5 not enlarged in male or female; flagellum 6-articulate (male 6), calceoli absent.

Mouthpart bundle: subquadrate. *Epistome* and *upper lip*: fused, with slight central notch. *Mandible*: incisors symmetrical, large, with slightly convex margins; left lacinia mobilis present, a cuspidate peg; accessory setal row without distal setal tuft, left row with 3, right with 4, short, slender, simple robust setae, without intermediate setae; molar a strongly setose tongue; mandibular palp attached midway, article 1 short, length 1.2 × breadth; article 2 elongate, slender, length 6.2 × breadth, 1.8 × article 3, with 5 (male 2) posterodistal A2-setae; article 3 slender, distally truncate, long, length 5 × breadth, without A3- or B3-setae, with 8 (male 6) distal D3-setae on posterior margin, and 2 apical E3-setae. *Maxilla 1*: inner plate narrow with 2 pappose apical setae; outer plate extremely narrow with 11 setal-teeth in 7/4 crown arrangement; with ST1 large, broad, distally cuspidate, ST2–ST3 large, slender, weakly cuspidate, ST4–ST6 large, slender, 3-cuspidate, ST7 symmetrical, displaced down medial face, small, shorter than ST6, broad, 3-cuspidate distally with large proximal cusp; with STA large, slender, displaced from STB–STD, 4-cuspidate, proximal cusp large, elongate, STB long, slender, 2-cuspidate, STC short, slender, 2-cuspidate, proximal cusp long, STD short, slender, 4-cuspidate, proximal cusp long; palp large, 2-articulate, with 3 short terminal conate setae, without subterminal setae, flag seta present on distolateral corner, distomedial margin serrate. *Maxilliped*: inner plate small, subrectangular, with 2 apical nodular setae, oblique setal row reduced with 4 pappose setae; outer plate medium size, subovate, without apical slender or robust setae, medial robust setae and submarginal setae vestigial; palp large, 4-articulate, article 2 slender, length 3.6 × breadth, 2.4 × article 3; article 3 long, slender, length 1.8 × breadth; dactylus well developed, with 2 subterminal setae, unguis present.

Gnathopod 1: simple; coxa large, as long as coxa 2, anterior margin straight, posterior margin straight; basis long, slender, length 3 × breadth, anterior margin smooth, without setae; ischium long, length 2 × breadth; merus, posterior margin with group of long simple setae; carpus subrectangular, short, length 1.9 × breadth, shorter than (0.8 ×) propodus, without denticulate patch near posterodistal margin; propodus large, subtriangular, length 3 × breadth, tapering distally, posterior margin smooth, straight, with few setae, without denticulate patch near posterior margin, palm absent; dactylus simple, with subterminal spine. *Gnathopod 2*: minutely subchelate; coxa large, subequal in size to coxa 3; ischium long, length 3.4 × breadth; carpus very long, length 4.8 × breadth, posterior margin straight; propodus subrectangular, long, length 2.9 × breadth, palm transverse, with convex, serrate margin, posterodistal corner with 1 medial and 1 lateral robust setae; dactylus reaching corner of palm, posterior margin smooth.

Peraeopod 3: coxa large; male and female merus-carpus without plumose setae; propodus with 9 slender and 1 large distal locking seta setae along posterior margin; dactylus short, slender. *Peraeopod 4*: coxa deeper than wide, with large posteroventral lobe, anterior margin slightly rounded, posterior margin slightly sloping anteriorly; male and female merus-carpus without plumose setae; propodus with 7 slender setae and 1 large distal locking seta along posterior margin; dactylus short, slender. *Peraeopod 5*: coxa bilobate, posterior lobe slightly produced ventrally; basis expanded with posterior margin minutely crenate; merus slightly expanded posteriorly; propodus with 4 robust setae and 2 distal locking setae along anterior margin; dactylus long, slender. *Peraeopod 6*: coxa small, strongly lobate posteriorly; basis expanded posteriorly with minutely crenate posterior margin, with anteroventral lobe; merus not expanded posteriorly; propodus with 6 robust setae and 2 distal locking setae along anterior margin; dactylus long, slender. *Peraeopod 7*: basis expanded posteriorly, posterior margin slightly rounded, minutely crenate, posteroventral corner rounded, posteroventral margin straight; merus not expanded posteriorly, with 2 robust setae; propodus with 6 robust setae and 2 locking setae along anterior margin and 1 robust seta along posterior margin; dactylus long, slender.

Oostegites from gnathopod 2 to peraeopod 5. *Gills*

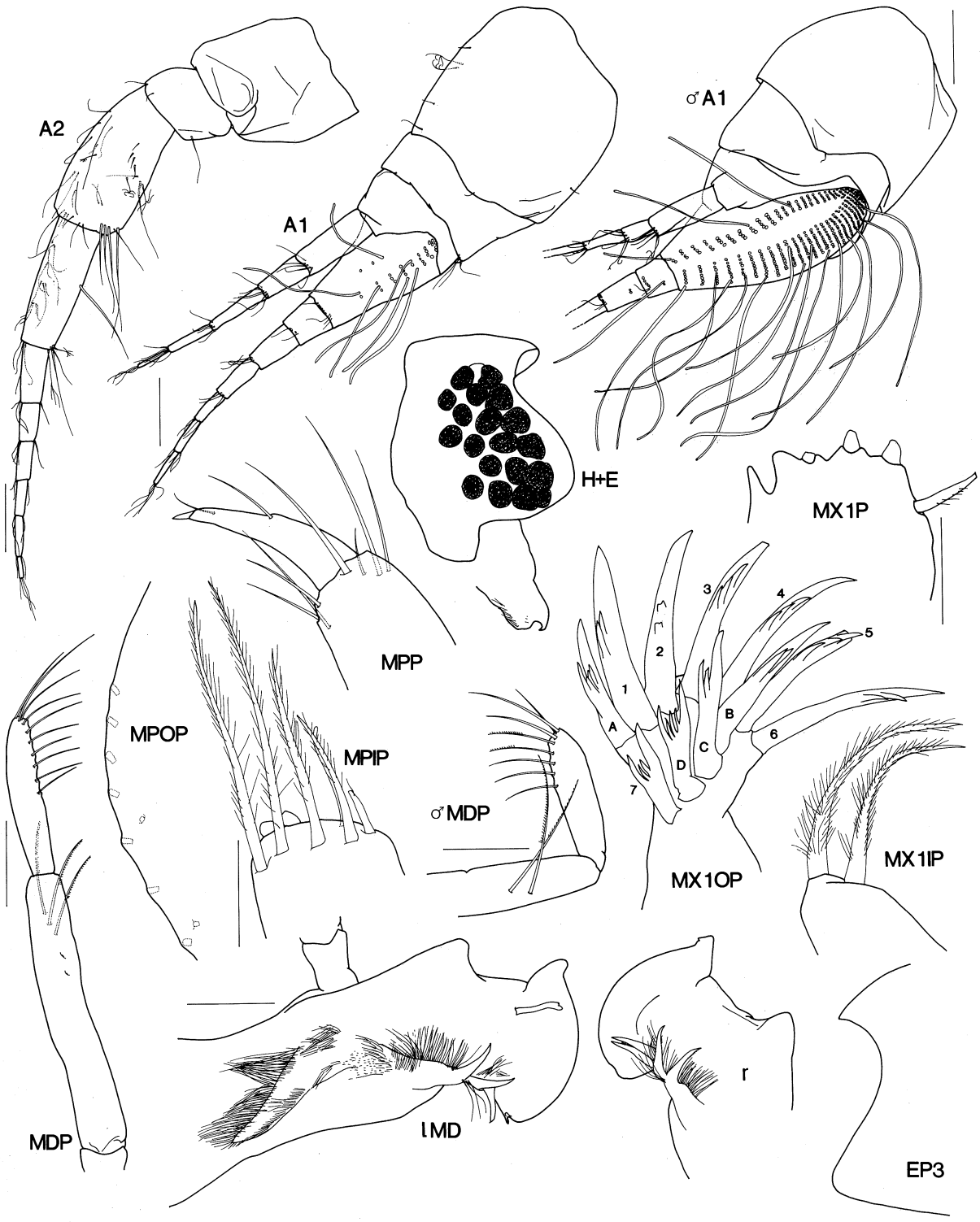

Fig. 29. *Nagada garagassi* n.sp., holotype female, 5 mm, AM P41596; paratype male, 3 mm, AM P41597, east of Planet Rock, Astrolabe Bay, Papua New Guinea. Scales for A1, 2 represent 0.1 mm, remainder represent 0.05 mm.

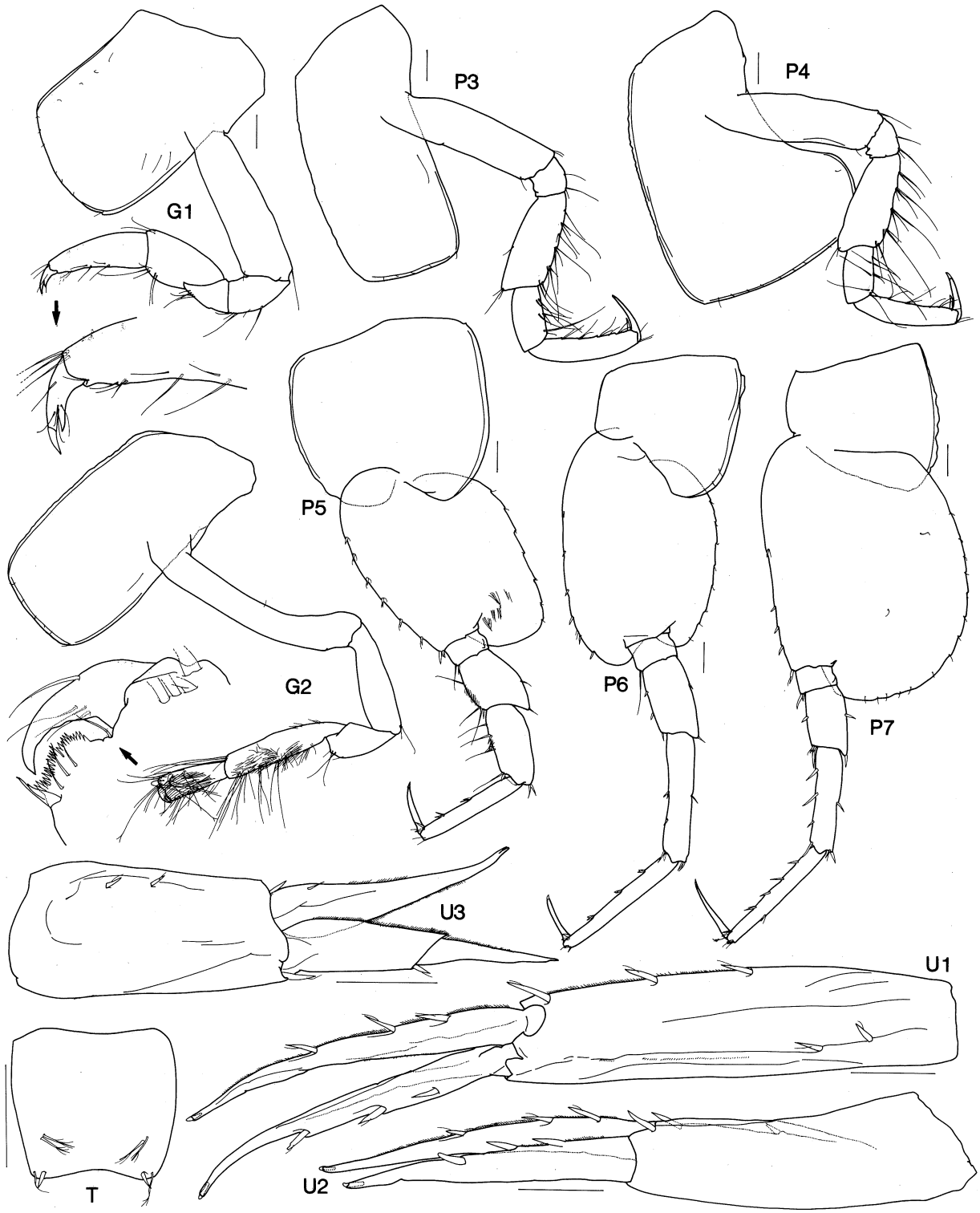

Fig. 30. *Nagada garagassi* n.sp., holotype female, 5 mm, AM P41596, east of Planet Rock, Astrolabe Bay, Papua New Guinea. Scales represent 0.1 mm.

from gnathopod 2 to peraeopod 6, not pleated.

Epimeron 1: anteroventral corner rounded. *Epimeron 3*: posteroventral corner produced, narrowly rounded. *Urosomites*: 1 to 3 dorsally smooth. *Urosomite 3*: with small dorsolateral robust seta. *Uropod 1*: without fine setae; peduncle with 2 dorsolateral, 1 apicolateral and 2 dorsomedial robust setae; outer ramus slightly shorter than inner ramus; outer ramus with 3 lateral robust setae; inner ramus with 3 lateral robust setae. *Uropod 2*: without long fine setae; peduncle with 1 apicolateral, 1 dorsomedial and 1 apicomedial robust setae; outer ramus slightly longer than inner ramus; outer ramus with 3 dorsal robust setae; inner ramus with 3 dorsal robust setae, without constriction. *Uropod 3*: peduncle long, length 2.1 × breadth, with 1 apicolateral, 2 dorsomedial and 1 apicomedial robust setae, without midlateral slender setae or robust setae, with 1 distoventral robust seta; rami lanceolate, subequal in length; outer ramus 2-articulate, article 2 long, article 1 with 1 lateral robust seta; inner ramus without robust setae; plumose setae absent in male and female. *Telson*: length 0.9 × breadth, emarginate, without dorsal robust setae, distal margin truncated, with 2 marginal penicillate setae and 2 marginal robust setae.

Etymology. Named for Garagassi Point at the eastern end of Astrolabe Bay, where Miklouchо-Maclay, the great Russian naturalist and humanitarian, made his first home in Papua New Guinea.

Remarks. *Nagada garagassi* is the sister taxon to *N. papua*. They are very closely related and differ mainly in the characters set out in the diagnosis.

Distribution. Astrolabe Bay, northern Papua New Guinea in 500 m depth.

Nagada papua n.sp.

Figs 31–33

Type material. HOLOTYPE, female, 3.8 mm, AM P41599; PARATYPE female, 4.2 mm, AM P41604; 8 PARATYPES, female, AM P41600; face of outer barrier between Dam Awan (Rasch Passage) and Wongad, Astrolabe Bay, Papua New Guinea, 5°08.59'S 145°49.65'E, baited trap, about 290 m, J.K. Lowry & J. Mizeu, 26–27 January 1990, stn JKL/PNG-82. PARATYPE male, 1.8 mm, AM P41601, 83 PARATYPES, AM P41602; 20 PARATYPES, AM P41603; 10 PARATYPES, BMNH 1995.582-591; 10 PARATYPES, USNM 274111; east of Planet Rock, Astrolabe Bay, Papua New Guinea, 5°15.48'S 145°49.14'E, baited trap on unknown bottom, 65 to 85 m, J.K. Lowry, S.J. Keable, M.H.P. Jebb & A.A. Myers, 15–16 March 1991, stn JKL/PNG-225.

Additional material examined. AM P41661 to P41663 from stations: JKL/PNG-81 (12), JKL/PNG-120 (7), JKL/PNG-121 (56), JKL/PNG-224 (29).

Diagnosis. Epistome and upper lip produced into rounded hump. Gnathopod 1 ischium about 1.4 times as long as broad, propodus without posterior cuticular spines. Peraeopods 6 and 7 significantly longer than peraeopod 5. Uropod 3 peduncle 3 times as long as deep.

Description. Holotype female, 3.8 mm; paratype female, 4.2 mm; paratype male, 1.8 mm. *Head and body*: without setae; colour of freshly preserved animals with translucent antennae, bodies and peraeopods; mouthpart bundle usually yellow, occasionally translucent; margins of peraeonites often yellow; guts vary depending on the food consumed, sometimes gut appears to be full of oil. *Head*: deeper than long; lateral cephalic lobe large, broadly rounded; rostrum absent; eyes oval, brown (fading to yellow in alcohol). *Antenna 1*: medium length, 0.2 × body, peduncular article 1 short, length 1 × breadth; peduncular article 2 short, 0.3 × article 1; accessory flagellum long, 0.7 × primary flagellum, 5-articulate, article 1 long, 1.5 × article 2, not forming cap; flagellum 7-articulate (male 6), callynophore weak 2-field in female (strong 2-field in male), without posterodistal slender or robust setae, calceoli absent in female and male. *Antenna 2*: length 1.3 × antenna 1; peduncle without brush setae in female and male, female weakly geniculate between peduncular articles 3–4, article 3 short, 0.5 × article 4, peduncular articles 4 and 5 not enlarged in female; flagellum 5-articulate (male 5), calceoli absent in female and male.

Mouthpart bundle: subquadrate. *Epistome* and *upper lip*: fused, with midmedial bulge. *Mandible*: incisors symmetrical, large, with slightly convex margins; left lacinia mobilis present, a cuspidate peg; accessory setal row without distal setal tuft, left row with 3, right with 4, short, slender, multiserrate robust setae, without intermediate setae; molar a strongly setose tongue; mandibular palp attached midway, article 1 short, length 1.5 × breadth; article 2 elongate, slender, length 5 × breadth, 1.5 × article 3, with 3 posterodistal A2-setae, article 3 slender, blade-like, long, length 4.3 × breadth, without A3- or B3-setae, with 4 distal D3-setae and 2 apical E3-setae. *Maxilla 1*: inner plate narrow with 2 pappose apical setae; outer plate extremely narrow with 11 setal-teeth in 7/4 crown arrangement; with ST1 large, broad, distally cuspidate, ST2–ST6 large, slender, multicuspidate, ST7 symmetrical, displaced down medial face, large, slender, multicuspidate distally; with STA large, displaced from STB–STD, 4-cuspidate, medial cusp large, elongate, STB long, slender, 2-cuspidate, STC–STD short, slender, 1-cuspidate; palp large, 2-articulate, with 3 short terminal conate setae, without subterminal setae, flag seta present on distolateral corner, distomedial margin serrate. *Maxilla 2*: inner and outer plates broad, inner plate 0.5 × length outer plate. *Maxilliped*: inner plate small, subrectangular, with 2 apical nodular setae, oblique setal row reduced with 4 pappose setae; outer plate medium size, subovate, without apical slender or robust setae, medial robust setae vestigial, submarginal setae vestigial; palp large, 4-articulate, article 2 broad, length 2.8 × breadth, 2.3 ×

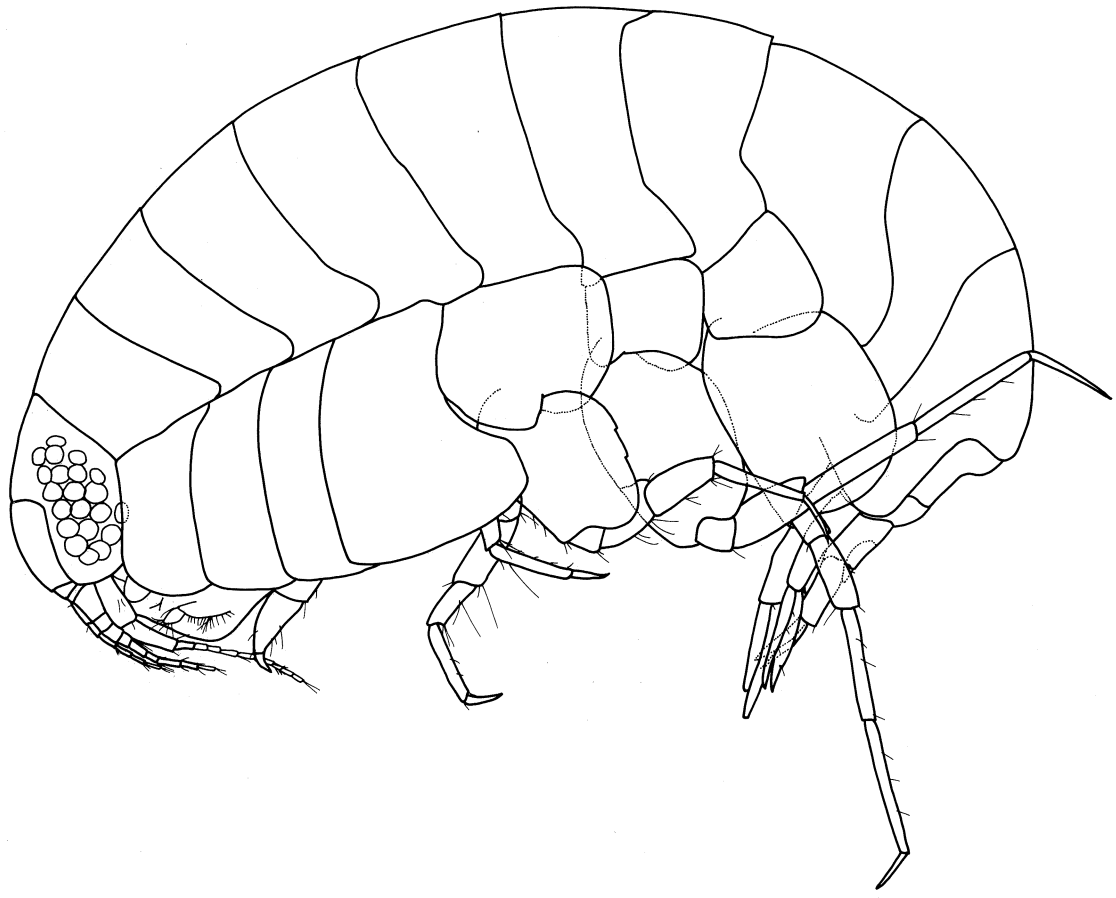

Fig. 31. *Nagada papua* n.sp., paratype female, 3.6 mm, AM P41600, outer barrier between Dam Awan (Rasch Passage) and Wongad, Astrolabe Bay, Papua New Guinea.

article 3; article 3 long, slender, length 1.8 × breadth; dactylus well developed, with 2 subterminal setae, unguis present.

Gnathopod 1: simple; coxa large, as long as coxa 2, anterior margin straight, posterior margin straight; basis long, slender, length 3.4 × breadth, anterior margin smooth, without setae; ischium short, length 1.3 × breadth; merus, posterior margin with a few simple setae; carpus subrectangular, short, length 1.75 × breadth, subequal in length to propodus, without denticulate patch near posterodistal margin; propodus large, subtriangular, length 2 × breadth, tapering distally, posterior margin smooth, straight, with few setae, without denticulate patch near posterior margin, palm absent; dactylus simple, with subterminal spine. *Gnathopod 2*: minutely subchelate; coxa large, subequal in size to coxa 3; ischium long, length 3.5 × breadth; carpus very long, length 4.6 × breadth, posterior margin straight; propodus subrectangular, long, length 2.1 × breadth, palm slightly obtuse, with straight, serrate margin, posterodistal corner without robust setae; dactylus reaching corner of palm, posterior margin serrate.

Peraeopod 3: coxa large; female merus-carpus without plumose setae; propodus with 2 slender setae and 1 distal locking seta along posterior margin; dactylus short, slender. *Peraeopod 4*: coxa deeper than wide, with large posteroventral lobe, anterior margin slightly rounded, posterior margin slightly sloping anteriorly; female merus-carpus without plumose setae; propodus with 2 slender setae and 1 distal locking seta along posterior margin; dactylus short, slender. *Peraeopod 5*: coxa equilobate; basis expanded with posterior margin smooth; merus slightly expanded posteriorly; propodus with 2 robust setae and 1 distal locking seta along anterior margin; dactylus long, slender. *Peraeopod 6*: coxa small, not lobate posteriorly; basis expanded posteriorly with minutely crenate posterior margin; merus not expanded posteriorly; propodus with 1 robust seta along anterior margin; dactylus long, slender. *Peraeopod 7*: basis expanded posteriorly, posterior margin slightly rounded, minutely crenate, posteroventral corner rounded, posteroventral margin rounded; merus not expanded posteriorly with 2 robust setae; propodus with 4 robust setae and 1 distal locking seta along anterior margin, with 1 seta and 1 distal robust seta along posterior margin; dactylus long, slender.

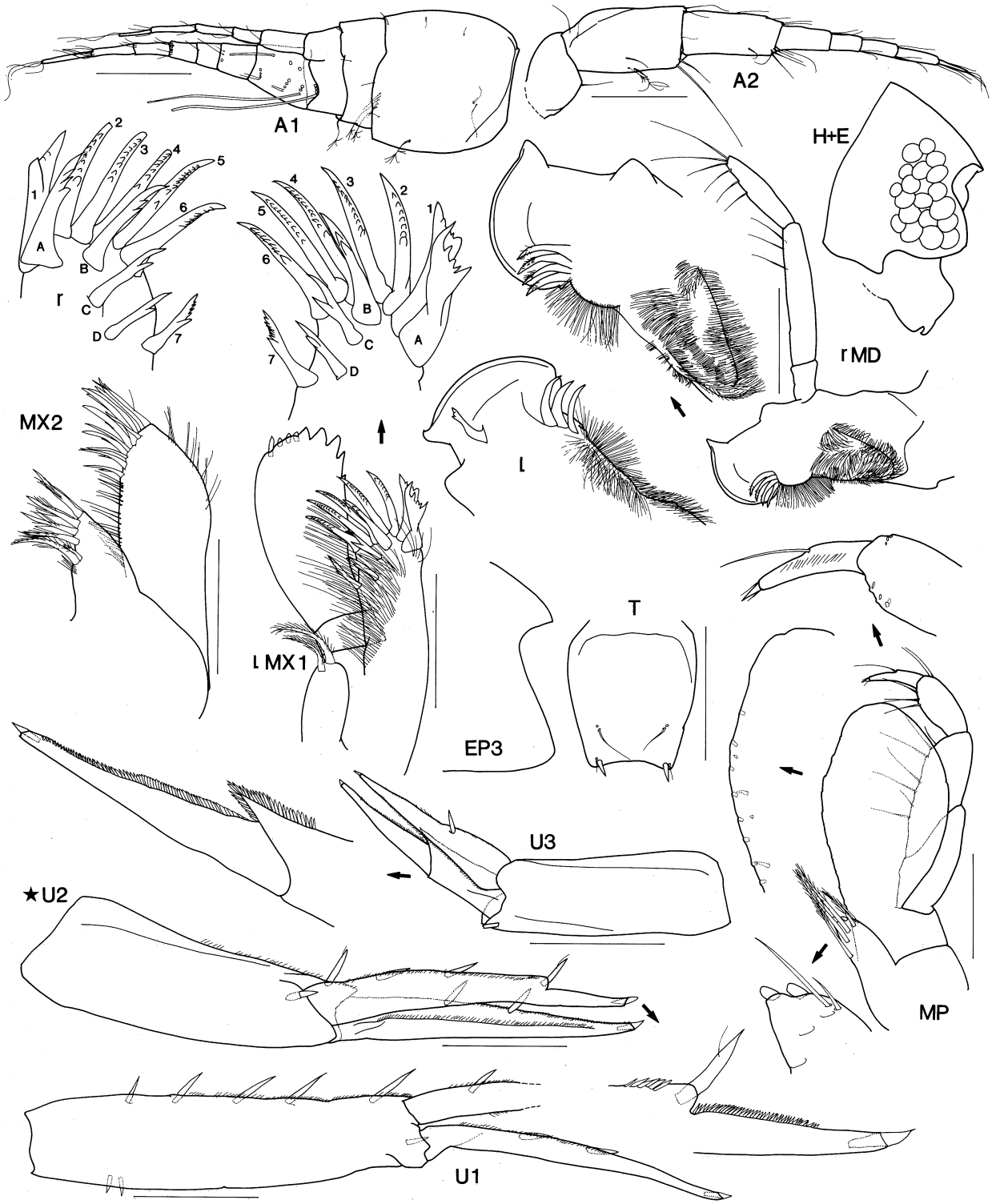

Fig. 32. *Nagada papua* n.sp., holotype female, 3.8 mm, AM P41599, U2 from paratype female, 4.2 mm, AM P41604: outer barrier between Dam Awan (Rasch Passage) and Wongad, Astrolabe Bay, Papua New Guinea. Scales represent 0.1 mm.

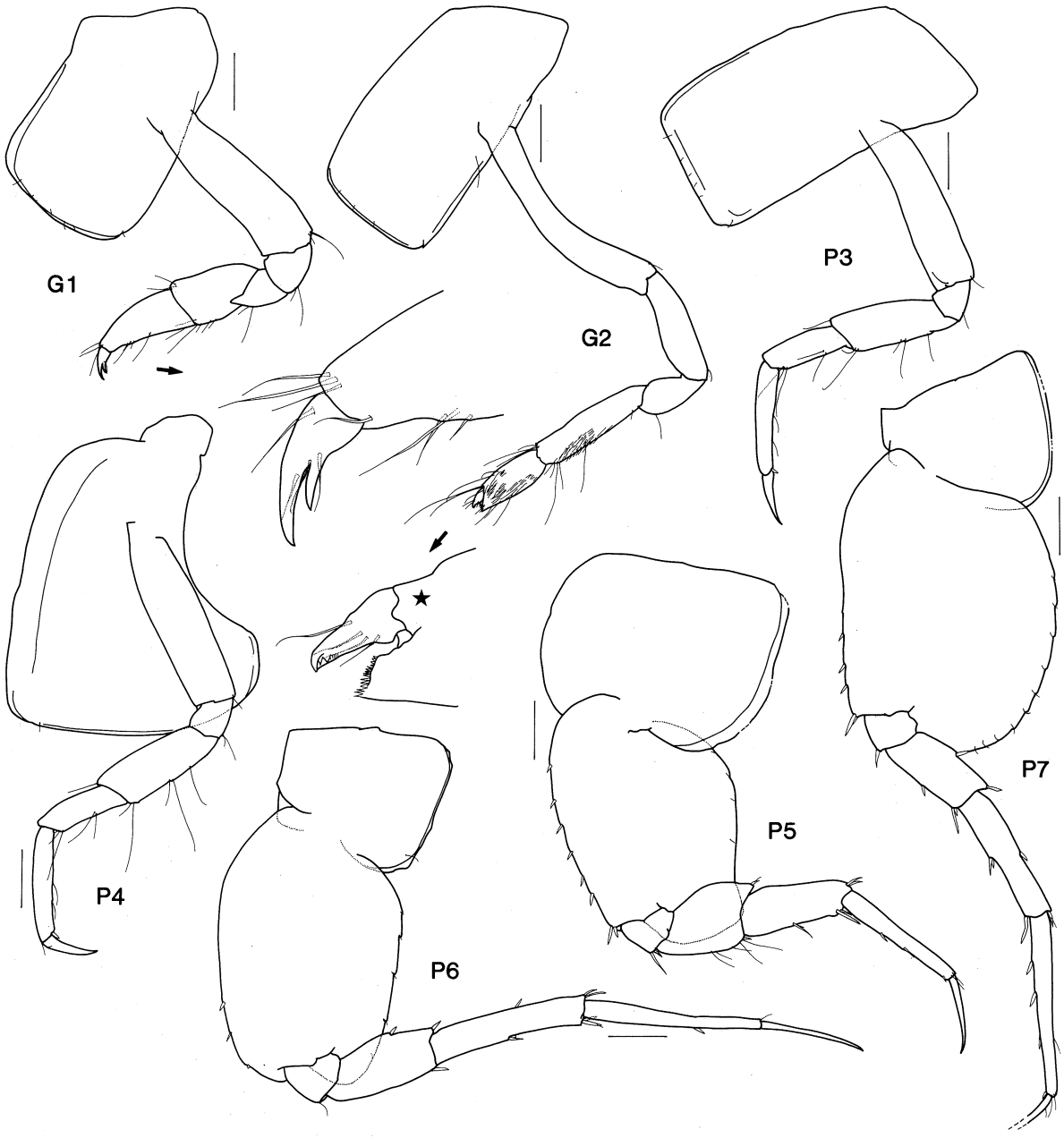

Fig. 33. *Nagada papua* n.sp., holotype female, 3.8 mm, AM P41599, G2 enlargement from paratype female, 4. 2 mm, AM P41604, outer barrier between Dam Awan (Rasch Passage) and Wongad, Astrolabe Bay, Papua New Guinea. Scales represent 0.1 mm.

Oostegites from gnathopod 2 to peraeopod 5. *Gills* from gnathopod 2 to peraeopod 6, not pleated.

Epimeron 1: anteroventral corner rounded. *Epimeron 3*: posteroventral corner narrowly rounded. *Urosomites*: 1 to 3 dorsally smooth; urosomite 3 with 1 small dorsolateral robust seta. *Uropod 1*: with long fine setae; peduncle with 4 dorsolateral, 1 apicolateral and 1 apicomedial robust setae; outer ramus damaged — in paratype female, rami subequal; outer ramus with 3 lateral robust setae; inner ramus with 2 lateral robust setae. *Uropod 2*: paratype female, without long fine setae; peduncle with 1 apicolateral and 1 apicomedial robust setae; rami subequal in length; outer ramus with 2 dorsal robust setae; inner ramus with 3 dorsal robust setae, with weak constriction. *Uropod 3*: peduncle long, length 3.1 × breadth, without dorsolateral flange, dorsal

robust setae, midlateral slender or robust setae, with 1 distoventral robust seta, without plumose setae; rami lanceolate, subequal in length; outer ramus 2-articulate, article 2 long; inner ramus with 1 robust seta; plumose setae absent in female and male. *Telson*: length 1.2 × breadth, entire, emarginate, without dorsal robust setae, distal margin truncate, with 2 marginal penicillate setae and 2 marginal robust setae.

Etymology. Named for Papua, the name given to the people of Papua New Guinea by early Portuguese sailors.

Remarks. *Nagada papua* is the sister taxon to *N. uwedoae*. They are very closely related and differ mainly in the characters set out in the diagnosis.

Nagada papua was found only on the face of the outer barrier.

Distribution. Known only from the Madang area, north coast of Papua New Guinea in 50 to 290 m.

Nagada uwedoae n.sp.

Figs 34–36

Type material. HOLOTYPE, female, 3.6 mm, AM P41605; 108 PARATYPES, AM P41606; face of outer barrier between Dam Awan (Rasch Passage) and Wongad, Astrolabe Bay, Papua New Guinea, 5°08.59'S 145°49.65'E, baited trap, about 290 m, J.K. Lowry & J. Mizeu, 26–27 January 1990, stn JKL/PNG-82. 79 PARATYPES, AM P41609, same locality, 340 m, stn JKL/PNG-83. 60 paratypes, USNM 274112, same locality, about 390 m, stn JKL/PNG-84. 33 paratypes, BMNH 1995.592-624, same locality, about 440 m, stn JKL/PNG-85. 1 PARATYPE, male, 2.1 mm, AM P41607; 288 PARATYPES, AM P41608; east of Planet Rock, Astrolabe Bay, Papua New Guinea, 5°15.48'S 145°49.14'E, baited trap on silty mud bottom, about 500 m, J.K. Lowry, S.J. Keable, M.H.P. Jebb & A.A. Myers, 15–16 March 1991, stn JKL/PNG-231.

Additional material examined. AM P41664 to P41673, P41704 to P41728, P41801, P41802 from stations: JKL/PNG-115 (1), JKL/PNG-116 (9), JKL/PNG-117 (1), JKL/PNG-118 (16), JKL/PNG-119 (22), JKL/PNG-120 (25), JKL/PNG-121 (33), JKL/PNG-128 (1), JKL/PNG-144 (1), JKL/PNG-145 (2), JKL/PNG-146 (9), JKL/PNG-147 (7), JKL/PNG-148 (4), JKL/PNG-149 (12), JKL/PNG-150 (31), JKL/PNG-166 (1), JKL/PNG-167 (5), JKL/PNG-168 (1), JKL/PNG-170 (62), JKL/PNG-171 (25), JKL/PNG-172 (27), JKL/PNG-173 (9), JKL/PNG-174 (3), JKL/PNG-175 (11), JKL/PNG-176 (9), JKL/PNG-177 (2), JKL/PNG-179 (14), JKL/PNG-180 (10), JKL/PNG-229 (37), JKL/PNG-232 (8), JKL/PNG-233 (54), JKL/PNG-234 (13), JKL/PNG-248 (1), JKL/PNG-249 (1), JKL/PNG-250 (7), JKL/PNG-251 (1), JKL/PNG-252 (3).

Diagnosis. Epistome and upper lip fused, slightly angled. Gnathopod 1 ischium long, 2.5 times as long as broad, propodus with about 18 posterior cuticular spines. Peraeopods 6 and 7 not much longer than peraeopod 5. Uropod 3 peduncle twice as long as broad.

Description. Holotype female, 3.6 mm; paratype male, 2.1 mm. *Head and body*: without setae; colour of freshly preserved animals: mouthpart bundle usually yellow, margins of peraeonites tan, some with completely orange bodies with oil droplets. *Head*: exposed, deeper than long; lateral cephalic lobe large, broadly rounded; rostrum absent; eyes oval, brown (fading to yellow in alcohol), enlarged in adult male. *Antenna 1*: short, 0.14 × body, peduncular article 1 short, length 1.1 × breadth; accessory flagellum long, 0.5 × primary flagellum, 3-articulate, article 1 long, about 1.6 × article 2, not forming cap; flagellum 7-articulate (male 6), callynophore weak 2-field in female (strong 2-field in male), without posterodistal slender or robust setae, calceoli absent in female and male. *Antenna 2*: subequal in length to antenna 1 (same in male); peduncle without brush setae in female or male, female weakly geniculate between peduncular articles 3–4, article 3 short, 0.5 × article 4, peduncular articles 4 and 5 not enlarged in male or female; flagellum 6-articulate (male 5), calceoli absent in female and male.

Mouthpart bundle: subquadrate. *Epistome* and *upper lip*: fused, with slight proximal indentation. *Mandible*: incisors symmetrical, large, with slightly convex margins; left lacinia mobilis present, a cuspidate peg; accessory setal row without distal setal tuft, left row with 3, right with 4 short, slender, simple robust setae, without intermediate setae; molar a strongly setose tongue; mandibular palp attached midway, article 1 short, length 0.9 × breadth; article 2 elongate, slender, length 5.6 × breadth, 1.7 × article 3, with 3-4 (male 3) posterodistal A2-setae; article 3 slender, blade-like, long, length 3.8 × breadth, without A3- or B3-setae, with 2 (male 3) distal D3-setae and 2 apical E3-setae. *Maxilla 1*: inner plate broad, short, with 2 apical pappose setae; outer plate extremely narrow with 11 setal-teeth in 7/4 crown arrangement; with ST1 large, broad, distally cuspidate, ST2–ST6 large, slender, multicuspidate, ST7 symmetrical, displaced down medial face, small, shorter than ST6, broad, 5-cuspidate distally with large proximal tooth; with STA large, slender, displaced from STB–STD, 3-cuspidate, proximal cusp elongate, STB–STD long, slender, 1-cuspidate; palp large, 2-articulate, with 3 short conate setae, without subterminal slender setae, flag seta present on distolateral corner, distomedial margin serrate. *Maxilla 2*: inner and outer plates broad, inner plate 0.5 × length outer plate. *Maxilliped*: inner plate small, subrectangular, with 2 apical nodular setae, oblique setal row reduced with 4 pappose setae; outer plate medium size, subovate, without subapical notch, without apical slender or robust setae, medial robust setae vestigial, submarginal setae vestigial; palp large, 4-articulate, article 2 broad, length 2.3 × breadth, 1.7 × article 3; article 3 short, slender, length 2.2 × breadth; dactylus well developed, with 2 subterminal setae, unguis present.

Gnathopod 1: simple; coxa large, as long as coxa 2, anterior margin straight, posterior margin straight; basis long, slender, length 3.3 × breadth, anterior margin smooth, without setae; ischium long, length 2.75 × breadth; merus, posterior margin with patch of short

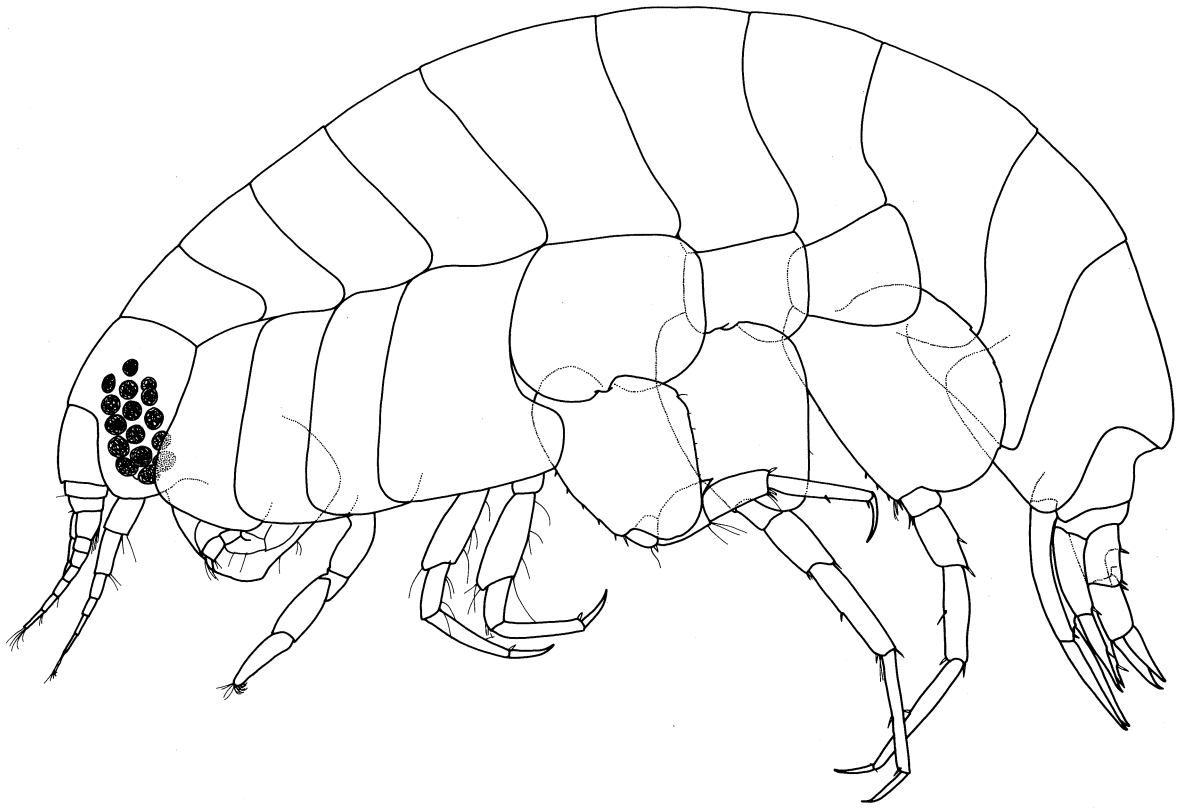

Fig. 34. *Nagada uwedoae* n.sp., paratype female, 3.1 mm, AM P41606, outer barrier between Dam Awan (Rasch Passage) and Wongad, Astrolabe Bay, Papua New Guinea.

setae; carpus subrectangular, long, length 2.4 × breadth, longer than (1.25 ×) propodus, without denticulate patch near posterodistal margin; propodus large, subtriangular, length 2.4 × breadth, tapering distally, posterior margin smooth, straight, with few simple setae, without denticulate patch near posterior margin, palm absent; dactylus complex, with 2 large subterminal spines, row of 4 medial robust setae and row of 17 short cuticular spines along posterior margin. *Gnathopod 2*: minutely subchelate; coxa large, subequal in size to coxa 3; ischium long, length 4 × breadth; carpus very long, length 4.8 × breadth, posterior margin straight; propodus subrectangular, long, length 2.1 × breadth, palm slightly obtuse, with straight, serrate margin, posterodistal corner without robust setae; dactylus reaching corner of palm, posterior margin serrate.

Peraeopod 3: coxa large; female and male merus-carpus without plumose setae; propodus with 2 slender setae and 1 distal locking seta along posterior margin; dactylus short, slender. *Peraeopod 4*: coxa deeper than wide, with large posteroventral lobe, anterior margin slightly rounded, posterior margin slightly sloping anteriorly; female and male merus-carpus without plumose setae; propodus with 2 setae and 1 distal locking seta along posterior margin; dactylus short, slender. *Peraeopod 5*: coxa equilobate; basis expanded with posterior margin smooth; merus slightly expanded posteriorly; propodus with 1 robust seta and 1 distal locking seta along anterior margin; dactylus short, slender. *Peraeopod 6*: coxa small, slightly lobate posteriorly; basis expanded posteriorly with minutely crenate posterior margin; merus not expanded posteriorly; propodus with 1 distal locking seta along anterior margin; dactylus short, slender. *Peraeopod 7*: basis expanded posteriorly, posterior margin almost straight, minutely crenate, posteroventral corner rounded, posteroventral margin rounded; merus not expanded posteriorly with 2 robust setae; propodus with 1 robust seta along anterior margin and 1 robust seta along posterior margin; dactylus short, slender.

Oostegites from gnathopod 2 to peraeopod 5. *Gills* from gnathopod 2 to peraeopod 6, not pleated.

Epimeron 1: anteroventral corner rounded. *Epimeron 3*: posteroventral corner narrowly rounded. *Urosomites*: 1 to 3 dorsally smooth; urosomite 3 with 1 small dorsolateral robust seta. *Uropod 1*: without long fine setae; peduncle with 2 dorsolateral, 1 apicolateral and 3 dorsomedial robust setae; rami subequal in length; outer ramus with 2 lateral robust setae; inner ramus with 2 medial robust setae. *Uropod 2*: without long fine setae; peduncle with 1 apicolateral and 1 apicomedial robust setae, without robust setae along distal margin; outer ramus slightly longer than inner ramus; outer ramus

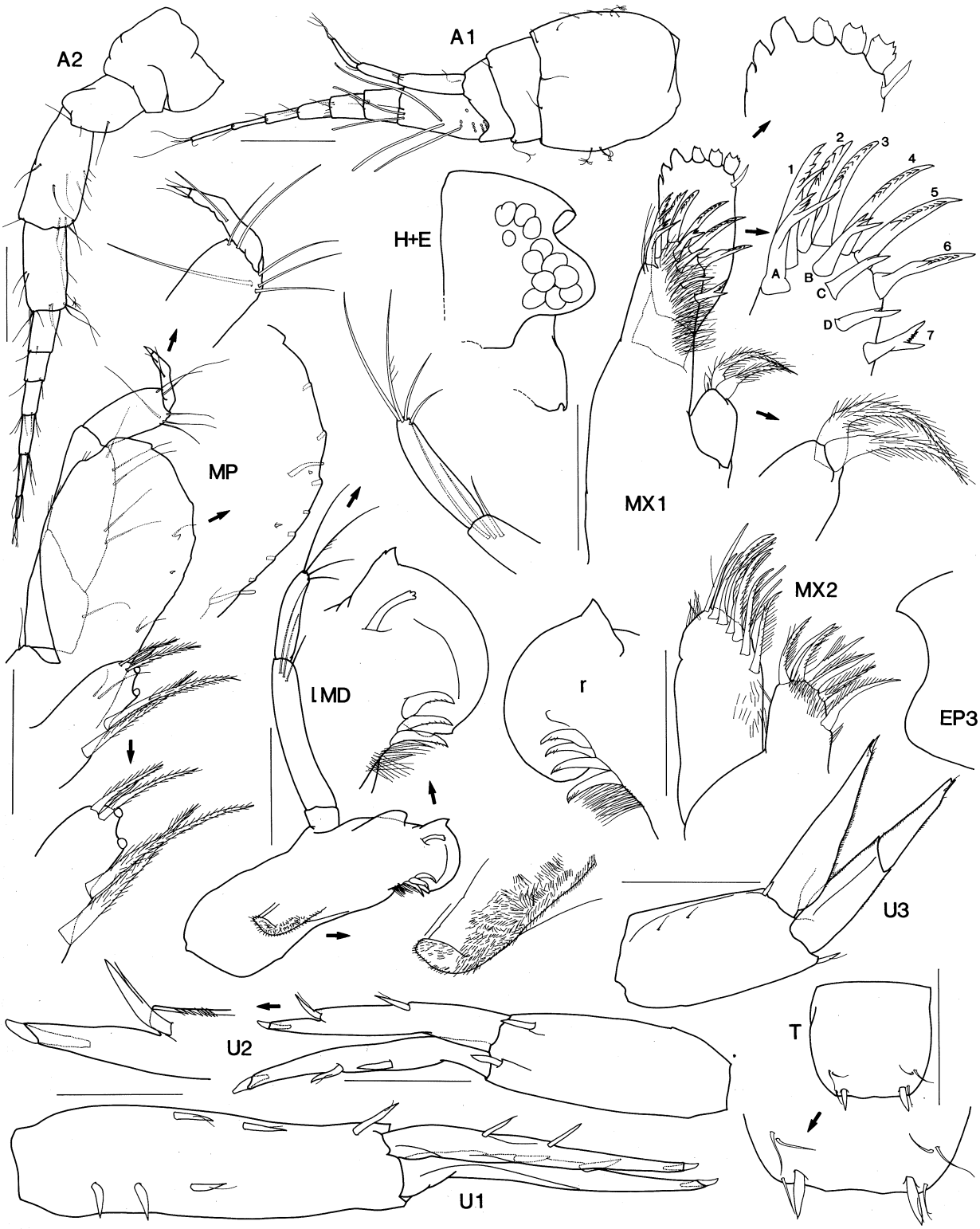

Fig. 35. *Nagada uwedoae* n.sp., holotype female, 3.6 mm, AM P41605, outer barrier between Dam Awan (Rasch Passage) and Wongad, Astrolabe Bay, Papua New Guinea. Scales represent 0.1 mm.

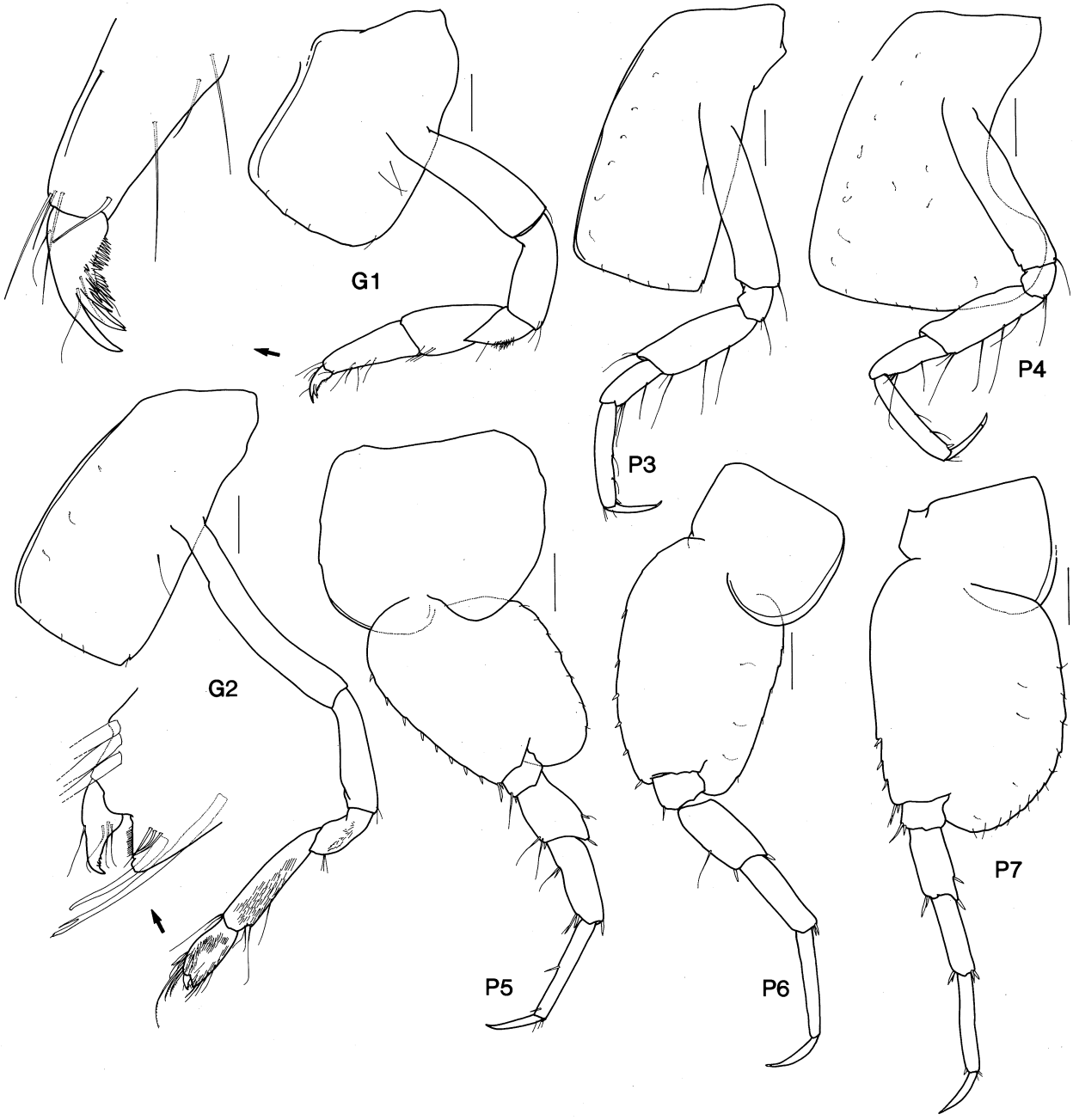

Fig. 36. *Nagada uwedoae* n.sp., holotype female, 3.6 mm, AM P41605, outer barrier between Dam Awan (Rasch Passage) and Wongad, Astrolabe Bay, Papua New Guinea. Scales represent 0.1 mm.

with 2 dorsal robust setae; inner ramus with 2 dorsal robust setae, with weak constriction. *Uropod 3*: peduncle short, length 2 × breadth, without dorsolateral flange, with 1 dorsolateral robust seta, without midlateral robust or slender setae, with 1 distoventral robust seta, without plumose setae; rami lanceolate, subequal in length; outer ramus 2-articulate, article 2 long; rami without robust setae, plumose setae absent in female and male. *Telson*: length 1 × breadth, entire, without dorsal robust setae, distal margin truncate, without marginal penicillate setae, with 2 simple marginal setae and 2 marginal robust setae.

Etymology. Named for Rosella Uwedo, station manager, Christensen Research Institute, good friend and invaluable guide during the first season in Papua New Guinea.

Remarks. *Nagada uwedoae* is the sister taxon to *N. papua*. They are very closely related and differ mainly in the characters set out in the diagnosis. The similarity between the first gnathopods of *N. uwedoae* and those of the *Ichnopus spinicornis* group is striking, in particular the cuticular spines on the propodus and the long ischium.

Nagada uwedoae is a common species which occurs on soft bottoms in the lagoon and out into Astrolabe Bay.

Distribution. Known from Madang Lagoon and Astrolabe Bay, north coast of Papua New Guinea, in 15 to 500 m depth.

Wandinidae

Pseudocyphocaris Ledoyer

Pseudocyphocaris Ledoyer, 1986: 802.–Lowry & Stoddart, 1990: 164.–Barnard & Karaman, 1991: 523.

Pseudocyphocaris gosema Lowry & Stoddart

Pseudocyphocaris gosema Lowry & Stoddart, 1990: 164, figs 4, 5, 8C.

Material examined. 2 specimens, AM P41610, stn JDT/PNG-76.

Remarks. Although rare, the new material of *P. gosema* from Tab and *P. lobata* from Wongad confirms that two separate species are living among coral rubble in the Madang Lagoon.

Distribution. Known only from northern Papua New Guinea.

Pseudocyphocaris lobata Lowry & Stoddart

Pseudocyphocaris lobata Lowry & Stoddart, 1990: 167, figs 6, 7, 8B.

Material examined. 1 specimen, AM P41611, stn JDT/PNG-81. Two specimens, AM P41612, stn JDT/PNG-85.

Distribution. Known only from northern Papua New Guinea.

Stegocephaloidea

Stegocephalidae

Andaniotes Stebbing

Andaniotes Stebbing, 1897: 30.–Barnard & Karaman, 1991: 678.
Metandania Stephensen, 1925: 136.
Glorandaniotes Ledoyer, 1986: 957.–Barnard & Karaman, 1991: 679.

Species composition. *Andaniotes* contains 7 species: *A. bagabag* n. sp.; *A. corpulentus* (Thomson, 1882); *A. fissicaudata* (Ledoyer, 1986); *A. ingens* Chevreux, 1906; *A. karkar* n.sp.; *A. linearis* K.H. Barnard, 1932; and *A. wallaroo* J.L. Barnard, 1972.

Remarks. Barnard & Karaman (1991) could find no reason to maintain *Glorandaniotes* as a separate genus. We implement their suggestion that *G. fissicaudata* Ledoyer (1986) should be included in *Andaniotes* and give a key to all species.

Key to Species of *Andaniotes*

1. Urosomites 2 & 3 coalesced 2

—— Urosomites 2 & 3 not coalesced 4

2. Uropod 3 outer ramus 1-articulate ..... *A. wallaroo*

—— Uropod 3 outer ramus 2-articulate 3

3. Female pleonite 3 dorsodistally truncate; gnathopod 2 propodus with 2 serrate robust setae on posterior margin; peraeopod 7 posteroventral lobe of merus extending beyond carpus ..... *A. karkar*

—— Female pleonite 3 dorsodistally rounded; gnathopod 2 propodus with 4 serrate robust setae on posterior margin; peraeopod 7 posteroventral lobe of merus not reaching end of carpus ..... *A. bagabag*

4. Uropod 3 outer ramus 1-articulate ..... *A. ingens*

—— Uropod 3 outer ramus 2-articulate 5

5. Peraeopod 6 basis subrectangular, length about 3 × breadth, posterior margin straight or slightly concave ..... *A. linearis*

—— Peraeopod 6 basis subovate, length about 1.5 × breadth, posterior margin slightly convex 6

6. Maxilla 1 palp reduced, not reaching end of outer plate ..... *A. corpulentus*

—— Maxilla 1 palp well developed, exceeding length of outer plate ..... *A. fissicaudata*

Andaniotes bagabag n.sp.

Figs 37–39

Type material. HOLOTYPE, female, 3.6 mm, AM P41613; 2 PARATYPES, juveniles, AM P41614, east of Planet Rock, Astrolabe Bay, Papua New Guinea, 5°15.48'S 145°49.14'E, baited trap on unknown bottom, about 385 m, J.K. Lowry, S.J. Keable, M.H.P. Jebb & A.A. Myers, 15–16 March 1991, stn JKL/PNG-229.

Diagnosis. Mandible not shortened; lacinia mobilis a stemmed blade. Maxilla 1: palp small, 2-articulate. Gnathopod 2: propodus with 4 serrate robust setae. Pleonite 3 not truncate in female. Oostegites: 3 pairs. Uropod 3: outer ramus 2-articulate.

Description. Holotype female, 3.6 mm. *Head*: exposed, much deeper than long, extending below insertion of antenna 2; lateral cephalic lobe small, subquadrate; rostrum small; eyes inconspicuous, oval. *Antenna 1*: medium length, 0.23 × body; peduncular article 1 short, length 0.9 × breadth; peduncular article 2 short, 0.3 × article 1; peduncular article 3 short, 0.2 × article 1; accessory flagellum very short 0.22 × primary flagellum, 2-articulate, article 1 long, 9.5 × article 2, with 1 long serrate distal robust seta; flagellum 4-articulate, callynophore weak 2-field, articles 1–2 each with 1 large, serrate robust seta, calceoli absent. *Antenna 2*: slightly longer than antenna 1, peduncle without brush setae, peduncle weakly geniculate, article 3 short, 0.4 × article 4, flagellum 5-articulate, calceoli absent.

Mouthpart bundle: subconical. *Epistome* and *upper lip*: separate, epistome long, slightly convex. *Mandible*: incisors symmetrical, large, with straight margins; left lacinia mobilis present, a stemmed distally serrate blade; accessory setal row absent; molar absent; left and right mandible each with 1 long, slender, simple seta set in depression on lateral surface. *Maxilla 1*: inner plate broad with 7 apicomedial pappose setae; outer plate broad with 9 setal-teeth in modified 7/4 arrangement; outer row with ST1–ST5 long, slender, multicuspidate, ST6 apparently absent, ST7 long, slender, 5-cuspidate; inner row with STA–STC long, slender, weakly cuspidate, STD apparently absent; palp large, 1-articulate, with 5 long slender terminal setae. *Maxilla 2*: inner plate broad, oblique setal row with 10 large pappose setae, outer plate small, narrow, 0.54 × length of inner plate, with long, simple terminal robust setae. *Maxilliped*: inner plate large, broad, subrectangular, with 3 apical nodular setae, oblique setal row reduced with 4 simple setae; outer plate medium size, subovate, with long, slender medial setae and submarginal setae; palp large, 4-articulate; article 2 slender, length 2.2 × breadth, 1.2 × article 3; article 3 long, slender, length 3.4 × breadth; dactylus large, unguis absent.

Gnathopod 1: simple; coxa reduced, triangular, apically subacute; basis long, slender, length 4 × breadth, anterior margin smooth, with simple setae, posterior margin with few long setae; ischium short, length 1.3 × breadth; merus, posterior margin with distal group of plumose setae; carpus subrectangular, short, length 1.4 × breadth, shorter than (0.75 ×) propodus, with long plumose setae along posterior margin; propodus large, subrectangular, length 2.3 × breadth, margins slightly converging distally, posterior margin, with 5 robust setae and 5 plumose setae, palm absent, robust seta at base of dactylus; dactylus simple. *Gnathopod 2*: subchelate; coxa large, slender, subequal in size to coxa 3; ischium long, length 2.3 × breadth, with 2 long, posterodistal plumose setae; carpus long, length 2.1 × breadth, posterior margin slightly convex; propodus subrectangular, long, length 2.6 × breadth, palm extremely acute, with concave, smooth margin, posterodistal corner with 4 strongly serrate robust setae; dactylus reaching corner of palm, posterior margin minutely serrate.

Peraeopod 3: coxa large, slender; merus weakly expanded anterodistally; propodus without robust or slender setae; dactylus long, slender. *Peraeopod 4*: coxa with large posteroventral lobe, anterior margin straight, posterior margin merging into broadly rounded ventral margin; basis, anterior margin with 2 plumose distal setae, posterior margin with 2 groups of long simple setae; ischium, posterior margin with group of short, plumose setae; merus weakly expanded anterodistally; propodus without robust or slender setae; dactylus long, slender. *Peraeopod 5*: coxa small, anteriorly lobate; basis linear, not expanded posteriorly; merus slightly expanded

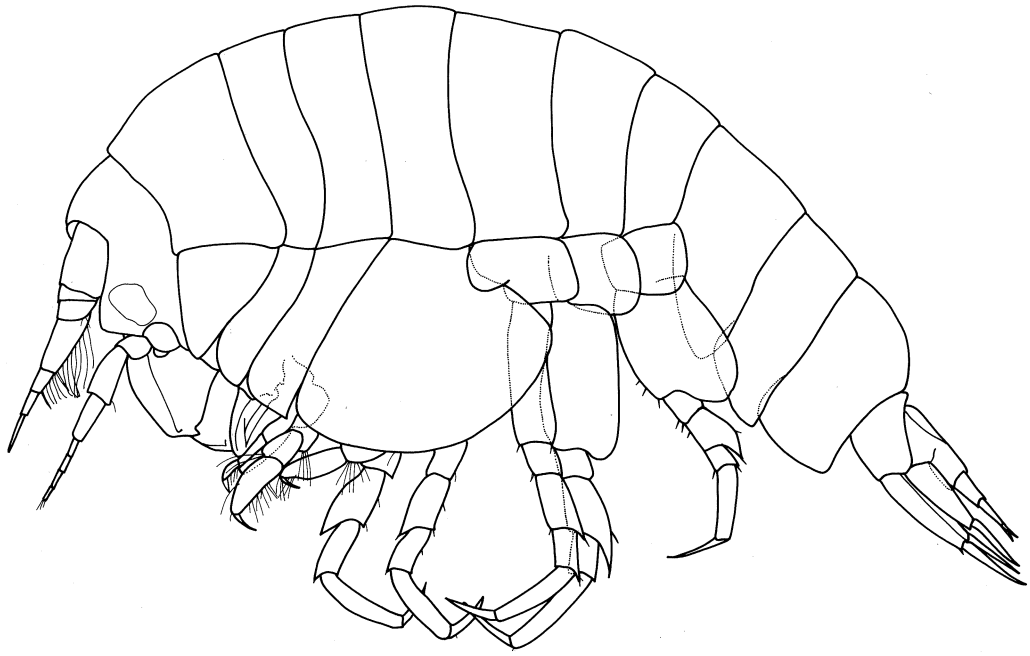

Fig. 37. *Andaniotes bagabag* n.sp., holotype female, 3.6 mm, AM P41613, east of Planet Rock, Astrolabe Bay, Papua New Guinea.

posterodistally; propodus without robust or slender setae, anterior margin minutely denticulate; dactylus long, slender. *Peraeopod 6*: coxa small, not lobate; basis slightly expanded posteriorly, with smooth posterior margin, with small posteroventral lobe and with 3 long medial setae; merus slightly expanded and produced posterodistally, with rounded posterior margin; propodus with minutely denticulate anterior margin; dactylus long slender. *Peraeopod 7*: basis expanded posteriorly, posterior margin smooth, nearly straight, with posteroventral lobe and 1 small midmedial robust seta; merus expanded and produced posterodistally, with rounded posterior margin; propodus with minutely denticulate anterior margin; dactylus long slender.

Oostegites from peraeopods 3 to 5. *Gills* from gnathopod 2 to peraeopod 7, not pleated.

Pleonites 1 to 3 dorsally smooth. *Epimeron 3*: posteroventral corner narrowly rounded. *Urosomites*: urosomites dorsally smooth; urosomites 2–3 fused. *Uropod 1*: peduncle with 5 dorsolateral, 1 apicolateral, 1 dorsomedial and 1 apicomedial robust setae; outer ramus slightly longer than inner, outer ramus with 1 lateral robust seta; inner ramus without robust setae. *Uropod 2*: peduncle with 3 dorsolateral, 1 apicolateral and 1 apicomedial robust setae; outer ramus slightly longer than inner ramus; outer ramus with 1 lateral robust seta; inner ramus without robust setae. *Uropod 3*: peduncle short, length 1.5 × depth, without robust setae; rami lanceolate, subequal in length; outer ramus without robust setae, 2-articulate, article 2 elongate; inner ramus without robust setae; plumose setae absent. *Telson*: as long as broad, tapering distally, moderately cleft (41%), without dorsal robust setae.

Etymology. Named for the island of Bagabag, which is near the type locality.

Remarks. See under *A. karkar*.

Distribution. Known only from Astrolabe Bay, northern Papua New Guinea in about 385 m depth.

Andaniotes karkar n.sp.

Figs 40, 41

Type material. HOLOTYPE, female, 3.7 mm, AM P41615; PARATYPE, ?male, 4.2 mm, AM P41616; 4 PARATYPES, AM P41619; off north-east face of Mizegwadan (Tripod) reef, Madang Lagoon, Papua New Guinea, 5°09.57'S 145°49.36'E, baited trap on muddy bottom, 34 m, J.K. Lowry & S.J. Keable, 5–6 March 1991, stn JKL/PNG-176. 1 PARATYPE, female, AM P41617, off Padoz Natun reef, Madang Lagoon, Papua New Guinea, 5°09.60'S 145°49.77'E, baited trap on soft mud, with small cones, burrows and *Ampelisca* tubes, 35 m, J.K. Lowry & S.J. Keable, 17–18 March 1991, stn JKL/PNG-254. 1 PARATYPE, female, AM P41618, same locality, stn JKL/PNG-256.

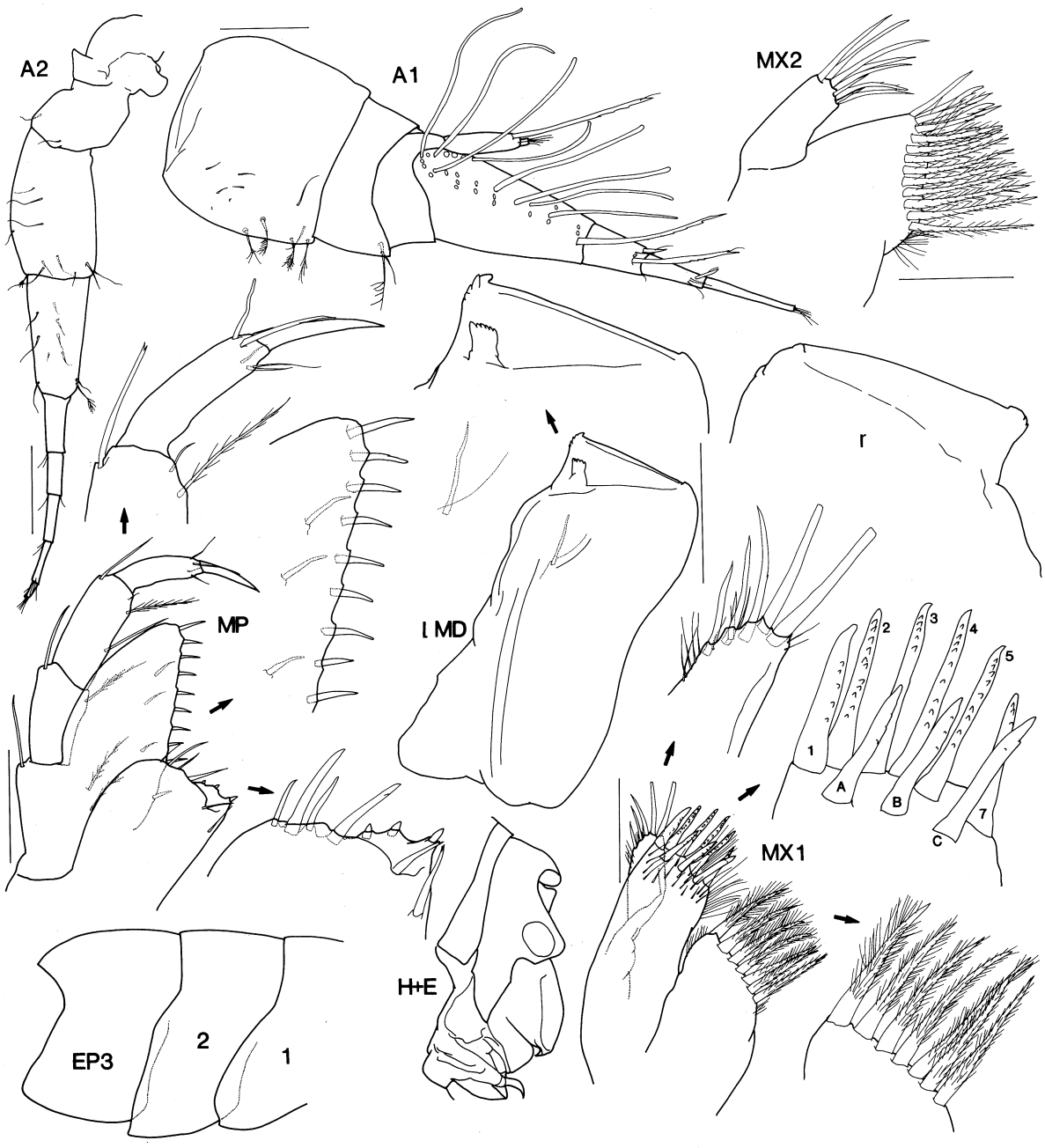

Fig. 38. *Andaniotes bagabag* n.sp., holotype female, 3.6 mm, AM P41613, east of Planet Rock, Astrolabe Bay, Papua New Guinea. Scales represent 0.1 mm.

Diagnosis. Mandible not shortened; lacinia mobilis a stemmed blade. Maxilla 1: palp small, 2-articulate. Gnathopod 2: propodus with 2 serrate robust setae. Pleonite 3 truncate in female. Oostegites: 2 pairs. Uropod 3: outer ramus 2-articulate.

Description. Based on holotype female, 3.7 mm; paratype male 4.2 mm. *Head* including antennae and mouthparts like *A. bagabag*.

Gnathopod 1: simple; coxa reduced, triangular, apically subacute; basis long, slender, length 3.9 × breadth, anterior margin smooth, with few simple setae and 1 distal plumose seta, posterior margin with 6 long simple setae; ischium long, length 1.5 × breadth; merus, posterior margin with distal group of plumose setae; carpus subrectangular, short, length 1.3 × breadth, shorter than (0.8 ×) propodus, with long plumose setae along posterior margin; propodus large, subrectangular,

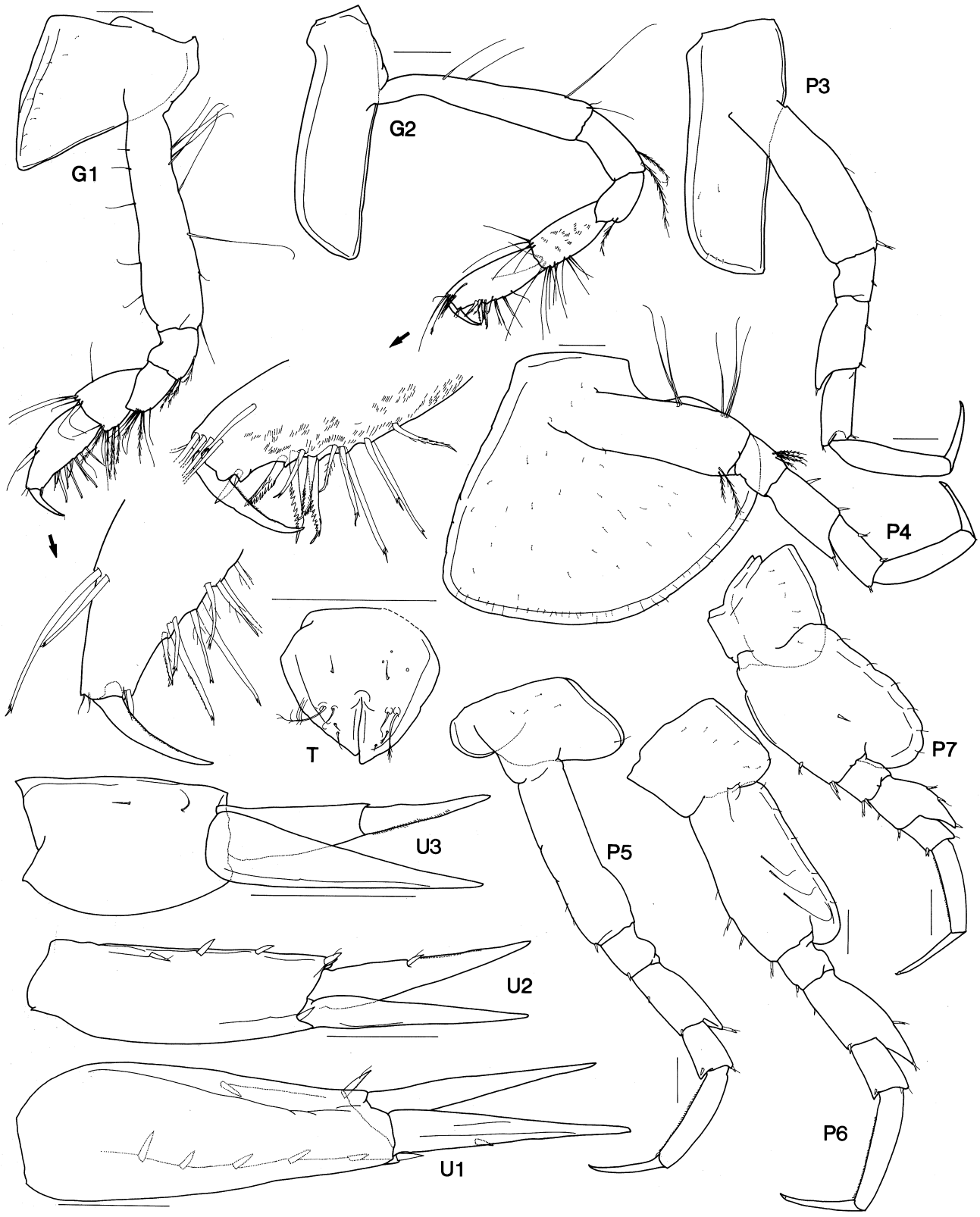

Fig. 39. *Andaniotes bagabag* n.sp., holotype female, 3.6 mm, AM P41613, east of Planet Rock, Astrolabe Bay, Papua New Guinea. Scales represent 0.1 mm.

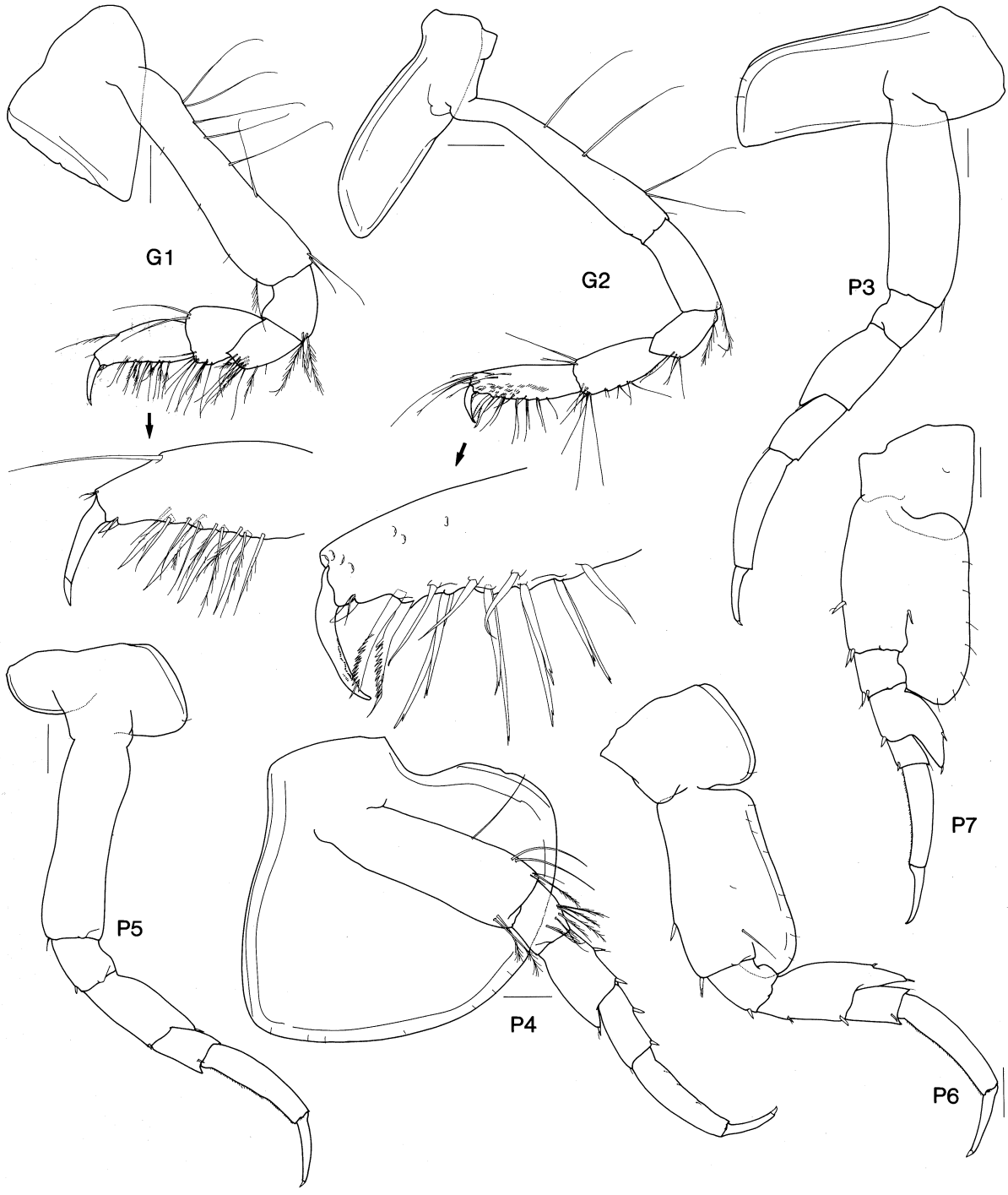

Fig. 40. *Andaniotes karkar* n.sp., holotype female, 3.7 mm, AM P41615, Mizegwadan reef, Madang Lagoon, Papua New Guinea. Scales represent 0.1 mm.

length 2.2 × breadth, margins converging distally, posterior margin smooth, with 4 robust setae and 9 plumose setae and a robust seta at base of dactylus; dactylus simple. *Gnathopod 2*: subchelate; coxa large, slender, subequal in size to coxa 3; ischium long, length 2.5 × breadth, with 2 long posterodistal plumose setae; carpus long, length 2 × breadth, posterior margin slightly convex; propodus subrectangular, long, length 2.9 × breadth, palm extremely acute, with concave, smooth margin, posterodistal corner with 2 strongly

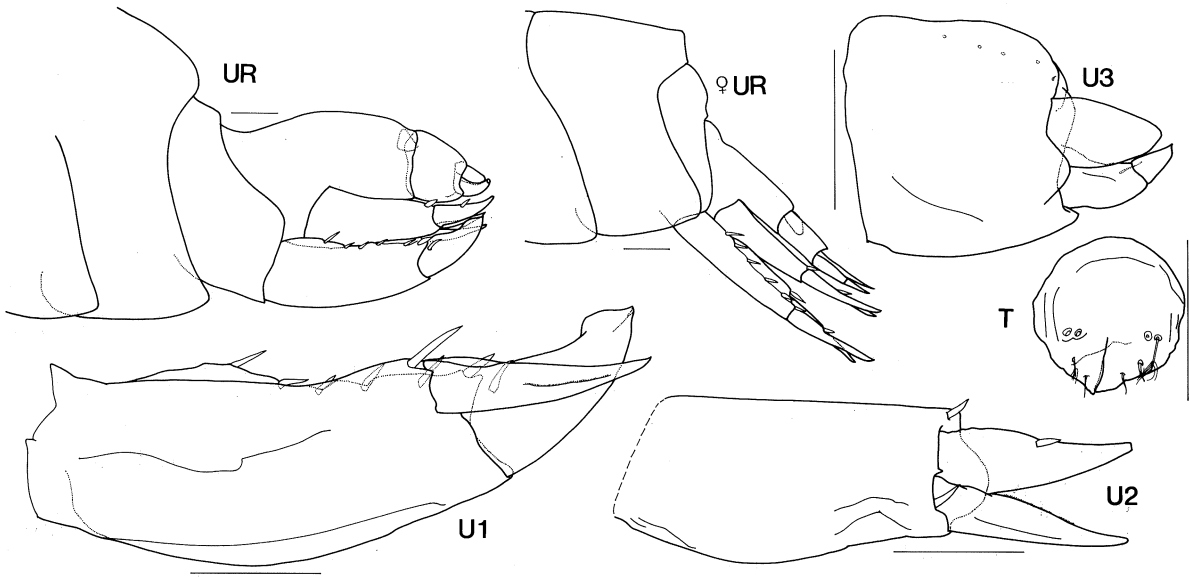

Fig. 41. *Andaniotes karkar* n.sp., paratype male, 4.2 mm, AM P41616; female UR: holotype female, 3.7 mm, AM P41615, Mizegwadan reef, Madang Lagoon, Papua New Guinea. Scales represent 0.1 mm.

serrate robust setae (same in male); dactylus reaching corner of palm, posterior margin minutely serrate.

Peraeopod 3: coxa large, slender; merus weakly expanded anterodistally; propodus without robust or slender setae; dactylus long, slender. *Peraeopod 4*: coxa with large posteroventral lobe, anterior margin straight, posterior margin merging into broadly rounded ventral margin; basis, anterior margin with 2 plumose distal setae, posterior margin with 3 long simple setae and 2 distal plumose setae; ischium, posterior margin with group of long plumose setae; merus weakly expanded anterodistally; propodus with 3 setae along posterior margin; dactylus long, slender. *Peraeopod 5*: coxa small, anteriorly lobate; basis linear, not expanded posteriorly; merus slightly expanded posterodistally; propodus without robust or slender setae; dactylus long, slender. *Peraeopod 6*: coxa small, not lobate; basis slightly expanded posteriorly with smooth posterior margin and small posteroventral lobe, with 1 medial seta; merus slightly expanded and produced posterodistally, with rounded posterior margin; propodus with minutely denticulate anterior margin; dactylus long slender. *Peraeopod 7*: basis expanded posteriorly, with posteroventral lobe and 1 small medial robust seta, posterior margin smooth, nearly straight, posteroventral corner rounded, posteroventral margin rounded; merus expanded and produced posterodistally, with rounded posterior margin; propodus with minutely denticulate anterior margin; dactylus long slender.

Oostegites on peraeopods 4–5. *Gills* from gnathopod 2 to peraeopod 7, not pleated.

Pleonite 3 truncated dorsodistally in female, rounded in male. *Epimeron 3*: posteroventral corner narrowly rounded *Urosomites*: urosomites dorsally smooth; urosomites 2–3 fused. *Uropod 1*: peduncle with 5 dorsolateral, 1 apicolateral and 1 apicomedial robust setae; outer ramus slightly longer than inner ramus; outer ramus with 1 lateral robust seta; inner ramus without robust setae (in male, outer ramus enlarged with hardened dorsodistal flange, rami without robust setae). *Uropod 2*: peduncle with 1 apicolateral and 1 apicomedial robust setae; rami subequal in length; outer ramus with 1 robust seta; inner ramus without robust setae (in male, peduncle and rami shorter than in female). *Uropod 3*: peduncle short, length 1.5 × depth (in male as long as deep), without robust setae; rami lanceolate (in male, short, stubby), subequal in length; outer ramus without robust setae, 2-articulate, article 2 elongate; inner ramus without robust setae; plumose setae absent in male and female. *Telson*: as long as broad, tapering distally, moderately cleft (39%), without dorsal robust setae.

Etymology. Named for the island of Karkar, which is near the type locality.

Remarks. The urosome and uropods of the male are broader, stockier and more robust than those of the female. The outer ramus of uropod 1 and the peduncle and rami of uropod 3 are particularly modified and similar to those of the male of *A. corpulentus* (Thomson, 1882) as described by Stebbing, 1897. The single male specimen of *A. karkar* is the same as the females in all other aspects and, although these animals are extremely rare in our collections, the male was taken in the same sample as the females.

Andaniotes karkar differs from *A. bagabag* in having only 2 serrate robust setae on the propodus of gnathopod

2; a truncate pleonite 3 in the female; and 2 (rather than 3) pairs of oostegites.

Andaniotes bagabag and *A. karkar* differ from all other species of *Andaniotes* in the shape of the peraeopod 7 basis. In addition *A. ingens* Chevreux, 1906 and *A. wallaroo* J.L. Barnard, 1972, have a 1-articulate outer ramus on uropod 3; *A. ingens* has a very short mandible, a reduced palp on maxilla 1 and a broadened and strongly setose gnathopod 1 basis; and *A. corpulentus, A. ingens, A. linearis* K.H. Barnard, 1932 and *A. wallaroo* all have a simple robust seta for the lacinia mobilis. In *A. fissicaudata* urosomites 2 and 3 are not fused.

Distribution. Known only from Madang Lagoon, northern Papua New Guinea in about 34 m depth.

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Table 1. Tropical Indo-West Pacific lysianassoid species. **1**, African Plate: western Indian Ocean; **2**, Arabian Plate: Red Sea, Gulf of Aden and Persian Gulf; **3**, Indo-Australian Plate: central Indian Ocean; **4**, Indo-Australian Plate: eastern Indian Ocean, northern Australia and the Coral Sea; **5**, Burma Plate; **6**, Eurasian Plate: south-east Asia; **7**, Philippine Plate; **8**, Mariana Plate; **9**, Caroline Plate; **10**, Bismarck Plate; **11**, Solomon Plate; **12**, Fijian Plate; **13**, Pacific Plate.

Notes: *i*, records from deep sea trenches marking the boundaries between two plates have been scored for both plates; *ii*, taxa occurring in the Red Sea have been scored for both the Arabian and African plates; *iii*, *Anonyx amaurus* Giles, 1888, is not a lysianassoid and has not been included in the table; *iv*, *Anonyx indicus* is not identifiable (Barnard & Karaman, 1991, suggest that it may be the same as *Orchomenella mannarensis* Rabindranath, 1971).

Records: 1—Andres, 1981. 2—J.L. Barnard, 1961. 3—J.L. Barnard, 1965. 4—J.L. Barnard, 1970. 5—J.L. Barnard & Ingram, 1990. 6—K.H. Barnard, 1937. 7—Birstein & Vinogradov, 1958. 8—Birstein & Vinogradov, 1960. 9—Birstein & Vinogradov, 1963. 10—Birstein & Vinogradov, 1964. 11—Bucklin *et al.*, 1987. 12—Dahl, 1959. 13—Echelman & Fishelson 1990a, 1990b. 14—Giles, 1890. 15—Greze, 1971. 16—Haswell, 1879. 17—Imbach, 1967. 18—Intes, 1978. 19—Kamenskaya, 1981. 20—Ledoyer, 1978a. 21—Ledoyer, 1979a. 22—Ledoyer, 1984. 23—Ledoyer, 1986 (including records in Ledoyer, 1967, 1968, 1972, 1978b, 1979b). 24—Lowry, 1984. 25—Lowry & Stoddart, 1983. 26—Lowry & Stoddart, 1989. 27—Lowry & Stoddart, 1990. 28—Lowry & Stoddart, 1992. 29—Lowry & Stoddart, 1993. 30—Lowry & Stoddart, 1994. 31—Lowry & Stoddart, this paper. 32—Lyons & Myers, 1991. 33—Miers, 1884. 34—Monod, 1937. 35—Myers, 1985. 36—Myers, 1986. 37—Myers, 1989. 38—Myers, 1990. 39—Nayar, 1959. 40—Nayar, 1966. 41—Pirlot, 1933. 42—Pirlot, 1936. 43—Rabindranath, 1971. 44—Rao, 1972. 45—Repelin, 1978. 46—Rudwick, 1951. 47—Ruffo, 1938. 48—Ruffo, 1969. 49—Russo, 1989. 50—Schellenberg, 1926a. 51—Schellenberg, 1938. 52—Sivaprakasam, 1968. 53—Spandl, 1924. 54—Stebbing, 1888. 55—Stebbing, 1897. 56—Stephensen, 1931. 57—Vinogradov, 1991. 58—Walker, 1904. 59—Walker, 1905. 60—Walker, 1909. 61—Walker & Scott, 1903. 62—Wilson *et al.*, 1985.

Tectonic Plates:	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
Amaryllis sp.	—	—	—	41	—	41	—	—	—	—	—	—	—
Amaryllis sp. (as *A. macrophthalma*)	20,23 60	—	—	—	—	—	—	—	—	—	—	—	—
Amaryllis sp.	15,32	6,15 32	—	—	—	—	—	—	—	—	—	—	—
Ambasiopsis brevipes Ledoyer, 1986	23	—	—	—	—	—	—	—	—	—	—	—	—
Anonyx indicus Giles, 1890	—	—	14	—	—	—	—	—	—	—	—	—	—
Aristias coriolis L.&S., 1993	—	—	—	—	—	29	—	—	—	—	—	—	—
Aristias madagascarensis Ledoyer, 1972	23	—	—	—	—	—	—	—	—	—	—	—	—
Aristias stenopodus Ledoyer, 1986	23	—	—	—	—	—	—	—	—	—	—	—	—
Aristias symbioticus K.H. Barnard, 1916	23,32	32	—	—	—	—	—	—	—	—	—	—	—
Aristias tropicus Schellenberg, 1938	—	—	—	—	—	—	—	—	—	51	—	—	—
Aristias thio L.&S., 1994	—	—	—	30	—	—	—	—	—	—	—	—	—
Aristias uokonia L.&S., 1994	—	—	—	30	—	—	—	—	—	—	—	—	—
Aristias verdensis L.&S., 1993	—	—	—	—	—	29	29	—	—	—	—	—	—
Aristias sp. K.H. Barnard, 1937	—	—	6	—	—	—	—	—	—	—	—	—	—
Aroui hamatopodus L.&S., 1989	—	—	—	26	—	—	—	—	—	—	—	—	—
Arugella heterodonta Pirlot, 1936	—	—	—	42	—	42	—	—	—	—	—	—	—
Arugella indica Rabindranath, 1971	—	—	43	—	—	—	—	—	—	—	—	—	—
Azotostoma fusta J.L. Barnard, 1965	23	—	—	—	—	—	—	—	—	—	—	—	3
Bathyamaryllis ouvea L.&S., 1994	—	—	—	30	—	—	—	—	—	—	—	—	—
Bathyamaryllis perezii Pirlot, 1933	—	—	—	—	—	41	—	—	—	—	—	—	—
Bathycallisoma armata Ledoyer, 1986	23	—	—	—	—	—	—	—	—	—	—	—	—
Bathycallisoma schellenbergi (B.&V., 1958)	—	—	—	8	—	—	—	—	—	—	—	—	8
Clepidecrella tropicalis L.&S., 1994	—	—	—	30	—	—	—	—	—	—	—	—	—
Coriolisa novacaledonia L.&S., 1994	—	—	—	30	—	—	—	—	—	—	—	—	—
Crybelocephalus barnardi B.&V., 1963	—	—	—	—	—	9	9	—	—	—	—	—	—
Crybelocephalus crassipes B.&V., 1960	—	—	—	—	—	—	—	—	—	—	—	—	8
Crybelocephalus megalurus Tattersall, 1906	—	—	—	—	—	—	7	—	—	—	—	—	—
Crybelocephalus obensis B.&V., 1964	10	—	—	—	—	—	—	—	—	—	—	—	—
Cyclocaris tahitensis Stebbing, 1888	—	—	—	—	—	—	—	—	—	—	—	—	30,54 62
Cyphocaris anonyx Boeck, 1871	6,10 50	—	10,50	10,50	10	9,10 41	9,41	7,8	—	8	8	—	7,8,45
Cyphocaris bellona L.&S., 1994	—	—	—	30	—	—	—	—	—	—	—	—	—

Table 1. Continued.

Tectonic Plates:	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
Cyphocaris bouvieri Chevreux, 1916	10	—	—	—	—	—	—	—	—	—	—	—	—
Cyphocaris challengeri Stebbing, 1888	6,10 50,60	—	10,50	10	10	41	41	—	—	8	8	—	8
Cyphocaris cornuta Ledoyer, 1978	23	—	—	—	—	—	—	—	—	—	—	—	—
Cyphocaris faurei K.H. Barnard, 1916	2,6 10,23	—	10	—	2	10,41 29	—	—	—	8	—	—	8,45
Cyphocaris geyserensis Ledoyer, 1986	23	—	—	—	—	—	—	—	—	—	—	—	—
Cyphocaris richardi Chevreux, 1905a	10	—	10	10	10	10	—	—	—	—	—	—	8,45
Douniaella longichelata Ledoyer, 1986	23	—	—	—	—	—	—	—	—	—	—	—	—
Drummondia parviramus Lowry, 1984	—	—	—	24	—	—	—	—	—	—	—	—	—
Ensayara angustipes Ledoyer, 1978	20,23	—	—	—	—	—	—	—	—	—	—	—	—
Ensayara microphthalma Ledoyer, 1986	23	—	—	—	—	—	—	—	—	—	—	—	—
Eucallisoma barnardi L.&S., 1993	—	—	—	—	—	29	—	—	—	—	—	—	—
Euonyx coecus Pirlot, 1933	—	—	—	—	—	41	—	—	—	—	—	—	—
Eurythenes gryllus (Lichtenstein, 1822)	6	—	—	18,30	—	29	—	—	—	8	8	—	8,11 30,62
Eurythenes obesus (Chevreux, 1905c)	10	—	10	10,50	—	10	—	—	—	—	—	—	—
Figorella corindon L.&S., 1993	—	—	—	—	—	29	—	—	—	—	—	—	—
Figorella tasmanica Lowry, 1984	—	—	—	30	—	—	—	—	—	—	—	—	—
Galathella latipes (Ledoyer, 1986)	23	—	—	—	—	—	—	—	—	—	—	—	—
Hippomedon bandae Pirlot, 1933	—	—	—	—	—	41	—	—	—	—	—	—	—
Hippomedon benthedii Ledoyer, 1986	23	—	—	—	—	—	—	—	—	—	—	—	—
Hippomedon normalis K.H. Barnard, 1955	23	—	—	—	—	—	—	—	—	—	—	—	—
Hippomedon onconotus Ledoyer, 1986	23	—	—	—	—	—	—	—	—	—	—	—	—
Hippomedon vao L.&S., 1994	—	—	—	30	—	—	—	—	—	—	—	—	—
Hirondellea gigas (B.&V., 1955)	—	—	—	—	—	5,12	5,12 19	19	19	—	—	—	19
Ichnopus annasona L.&S., 1992	—	—	—	28,30	—	29	—	—	—	—	—	—	28
Ichnopus capricornus L.&S., 1992	—	—	—	28	—	—	—	—	—	—	—	—	—
Ichnopus comorensis L.&S., 1992	23,28	—	—	—	—	—	—	—	—	—	—	—	—
Ichnopus malpatun L.&S., 1992	—	—	—	28	—	—	—	—	—	28	—	—	—
Ichnopus pelagicus Schellenberg, 1926a	10,23	—	10	8,10 28,45 50	—	—	—	—	—	—	—	—	8,28
Ichnopus pseudoserricrus Ledoyer, 1986	23	—	—	—	—	—	—	—	—	—	—	—	—
Ichnopus serricrus Walker, 1909	13,53 60	13,28 53	—	—	—	—	—	—	—	—	—	—	—
Ichnopus tenuicornis (Haswell, 1879)	—	—	—	16,28	—	—	—	—	—	—	—	—	—
Ichnopus teretis (Andres, 1981)	1	1	—	—	—	—	—	—	—	—	—	—	—
Ichnopus wardi L.&S., 1992	—	—	—	28	—	29,42	42	—	—	—	—	—	—
Ichnopus woodmasoni (Giles, 1890)	—	—	—	—	14	—	—	—	—	—	—	—	—
Ichnopus sp. Walker, 1904 (as *I. taurus*)	—	—	—	58	—	—	—	—	—	—	—	—	—
Kerguelenia koutoumo L.&S., 1994	—	—	—	30	—	—	—	—	—	—	—	—	—
Kerguelenia lifou L.&S., 1994	—	—	—	30	—	—	—	—	—	—	—	—	—
Kerguelenia macropoda Ledoyer, 1986	23	—	—	—	—	—	—	—	—	—	—	—	—
Kerguelenia microphthalma Ledoyer, 1986	23	—	—	—	—	—	—	—	—	—	—	—	—
Koroga megalops Holmes, 1908	6	—	10	10	—	10	—	—	—	—	—	—	—
Lepidepecreella pamanzi Ledoyer, 1986	23	—	—	—	—	—	—	—	—	—	—	—	—
Lepidepecreella sarcelle L.&S., 1994	—	—	—	30	—	—	—	—	—	—	—	—	—
Lepidepecreum madagascarensis Ledoyer, 1986	23	—	—	—	—	—	—	—	—	—	—	—	—
Lepidepecreum sp. (as *L. foraminiferum*)	—	—	39	—	—	—	—	—	—	—	—	—	—
Lepidepecreum sp.	15	15	—	—	—	—	—	—	—	—	—	—	—
Lysianassa ceratina (Walker, 1889)	13,15 23,34 47,48 60	13,15 34,46 47,48 60	44	—	—	—	—	—	—	—	—	—	—
Lysianassa cinghalensis (Stebbing, 1897)	6,48 23,60	6,48	52,55 58,59	—	—	17	—	—	—	—	—	—	—
Lysianassa cinghalensis latipes Ledoyer, 1986	23	—	—	—	—	—	—	—	—	—	—	—	—
Lysianassa coelochir (Walker, 1904)	—	6	58	—	—	—	—	—	—	—	—	—	—

Table 1. Continued.

Tectonic Plates:	1	2	3	4	5	6	7	8	9	10	11	12	13
Lysianassa kerakae Lyons & Myers, 1991	32	32	—	—	—	—	—	—	—	—	—	—	—
Lysianassa urodus (Walker & Scott, 1903)	61	—	—	—	—	—	—	—	—	—	—	—	—
Lysianassa variegata (Stimpson, 1855)	6,23	—	—	—	—	—	—	—	—	—	—	—	—
Lysianassa sp. (as *L. nasuta*)	23	—	—	—	—	—	—	—	—	—	—	—	—
Mesocyclocaris gracilis B.&V., 1964	—	—	10	—	—	—	—	—	—	—	—	—	—
Mesocyphocaris longicaudatus B.&V., 1960	—	—	10	—	—	—	—	—	—	—	—	—	8
Metacyphocaris helgae Tattersall, 1906	10	10	10	10,50	—	10	—	8	—	—	—	—	8,45
Microlysias xenokeras Stebbing, 1918 (as *M. indica*)	—	6	—	—	—	—	—	—	—	—	—	—	—
Nagada garagassi n.sp.	—	—	—	—	—	—	—	—	—	31	—	—	—
Nagada papua n.sp.	—	—	—	—	—	—	—	—	—	31	—	—	—
Nagada uwedoae n.sp.	—	—	—	—	—	—	—	—	—	31	—	—	—
Onesimoides abyssalis L.&S., 1994	—	—	—	30	—	—	—	—	—	—	—	—	—
Onesimoides carinatus Stebbing, 1888	—	—	—	29,54	—	41	—	—	—	—	—	—	30
Onesimoides castellatus L.&S., 1993	—	—	—	—	—	29	29	—	—	—	—	—	—
Onesimoides chelatus Pirlot, 1933	—	—	—	—	—	41	—	—	—	—	—	—	—
Onesimoides mindoro L.&S., 1993	—	—	—	—	—	2,12	29	—	—	—	—	—	—
Onesimoides sp. (as *O. cavimanus*)	23	—	—	—	—	—	—	—	—	—	—	—	—
Orchomene plicata Schellenberg, 1925	23	—	—	—	—	—	—	—	—	—	—	—	—
Orchomene sp.	—	—	—	—	—	—	—	—	—	—	—	—	62
Orchomenella abyssorum (Stebbing, 1888)	10,30	—	—	—	—	—	—	—	—	—	—	—	—
Orchomenella affinis Holmes, 1908	—	—	52	—	—	—	—	—	—	—	—	—	—
Orchomenella distinctus B.&V., 1960	—	—	—	30	—	—	—	—	8	—	—	—	—
Orchomenella gerulicorbis (Shulenberger & Barnard, 1976)	—	—	—	—	—	—	—	—	—	—	—	—	30
Orchomenella mannarensis Rabindranath, 1971	—	—	43	—	—	—	—	—	—	—	—	—	—
Orchomenella sp. (as *O. nana*)	—	—	40,58	—	—	—	—	—	—	—	—	—	—
Orchomenella pelagica B.&V., 1960	—	—	—	8	—	—	—	—	—	—	—	—	8
Pachynus denticulatum Lowry, 1984	—	—	—	24	—	—	—	—	—	—	—	—	—
Paracallisoma alberti Chevreux, 1903	—	—	10	—	—	—	—	—	—	—	—	—	—
Paracallisoma sp.	—	—	—	—	—	—	—	—	—	—	—	—	62
Paracentromedon pacificus L.&S., 1993	—	—	—	—	—	29	—	—	—	—	—	—	—
Paracyphocaris brevicornis B.&V., 1955	—	—	—	—	—	—	—	—	—	—	8	—	—
Paracyphocaris distinctus B.&V., 1963	—	—	—	—	—	9	9	—	—	—	—	—	—
Paracyphocaris praedator Chevreux, 1905b	10	—	10	—	—	—	—	—	—	—	—	—	—
Paralysianopsis incerta (Ledoyer, 1986)	23	—	—	—	—	—	—	—	—	—	—	—	—
Paralysianopsis mauritiensis Ledoyer, 1978	20	—	—	—	—	—	—	—	—	—	—	—	—
Paralysianopsis mazamos n.sp.	—	—	—	—	—	—	—	—	—	31	—	—	—
Paralysianopsis padoz n.sp.	—	—	—	—	—	—	—	—	—	31	—	—	—
Parambasia forbesi Walker & Scott, 1903	61	—	—	—	—	—	—	—	—	—	—	—	—
Parawaldeckia lowryi Myers, 1985	—	—	—	35,36	—	—	—	—	—	31	—	—	—
Paronesimoides lignivorus Pirlot, 1933	—	—	—	—	—	2,41	—	—	—	—	—	—	—
Podoprionella dagadugaban n.sp.	—	—	—	—	—	—	—	—	—	31	—	—	—
Procyphocaris induratus (K.H. Barnard, 1926)	23	—	—	30	—	—	—	—	—	—	—	—	—
Pseudamaryllis andresi L.&S., 1993	—	—	—	—	—	29	—	—	—	—	—	—	—
Pseudamaryllis nonconstricta Andres, 1981	1,23	1	—	—	—	—	—	—	—	—	—	—	—
Pseudambasia acuticaudata (Ledoyer, 1984)	—	—	—	22	—	—	—	—	—	31	—	—	30
Pseudambasia indentata (Ledoyer, 1986) (as *Socarnoides indentatus*)	23	—	—	—	—	—	—	—	—	—	—	—	—
Pseudambasia nui (Myers, 1985)	—	—	—	35	—	—	—	—	—	—	—	—	37,38
Pseudambasia sp. (as *Lysianassa* sp.)	—	—	—	—	—	21	—	—	—	—	—	—	—
Pseudocyphocaris coxalis Ledoyer, 1986	23	—	—	—	—	—	—	—	—	—	—	—	—
Pseudocyphocaris gosema L.&S., 1990	—	—	—	—	—	—	—	—	—	27,31	—	—	—
Pseudocyphocaris lobata L.&S., 1990	—	—	—	—	—	—	—	—	—	27,31	—	—	—
Rhinolabia elliotti n.sp.	—	—	—	—	—	—	—	—	—	31	—	—	—
Rhinolabia jebbi n.sp.	—	—	—	—	—	—	—	—	—	31	—	—	—
Rhinolabia paeowai n.sp.	—	—	—	—	—	—	—	—	—	31	—	—	—
Riwo mizeui n.sp.	—	—	—	—	—	—	—	—	—	31	—	—	—
Schisturella parachelata Ledoyer, 1986	23	—	—	—	—	—	—	—	—	—	—	—	—

Table 1. Continued.

Tectonic Plates:	1	2	3	4	5	6	7	8	9	10	11	12	13
Scolopostoma prionoplax Monod, 1937	23,34	6,34	—	—	—	—	—	—	—	—	—	—	—
Scolopostoma sp. (as *S. prionoplax*)	—	—	—	25	—	—	—	—	—	—	—	—	—
Scopelocheiropsis abyssalis Schellenberg, 1926b	—	—	10	—	—	—	—	—	—	—	—	—	—
Shoemakerella ewa (J.L. Barnard, 1970)	—	—	—	—	—	—	—	—	—	—	—	—	4,49
Shoemakerella sp. (as *Lysianassa ewa*)	20,23	—	—	—	—	—	—	—	—	—	—	—	—
Socarnella bonnieri Walker, 1904	—	—	52,58	—	—	—	—	—	—	—	—	—	—
Socarnes rurutu L.&S., 1994	—	—	—	—	—	—	—	—	—	—	—	—	30
Socarnes tiendi L.&S., 1994	—	—	—	30	—	—	—	—	—	—	—	—	—
Socarnes tuscarora L.&S., 1994	—	—	—	—	—	—	30	—	—	—	—	—	30
Socarnes sp.	13	13	—	—	—	—	—	—	—	—	—	—	—
Socarnopsis allecta (Andres, 1981)	1	1	—	—	—	—	—	—	—	—	—	—	—
Socarnopsis dissimulantia (Imbach, 1967)	—	—	—	—	—	17	—	—	—	—	—	—	—
Socarnopsis honiara L.&S., 1994	—	—	—	—	—	—	—	—	—	—	—	—	30
Socarnopsis tandai L.&S., 1994	—	—	—	—	—	—	—	—	—	—	—	—	30
Socarnopsis sp. (as *Socarnes schmardae*)	—	—	58	—	—	—	—	—	—	—	—	—	—
Socarnopsis spp. (as *S. obesa*)	23	—	—	—	—	—	—	—	—	—	—	—	—
Stephonyx biscayensis (Chevreux, 1908)	2,23	—	—	—	—	—	—	—	—	—	—	—	—
Stephonyx sp.	—	—	—	30	—	—	—	—	—	—	—	—	—
Stomacontion capense K.H. Barnard, 1916	—	6	—	—	—	—	—	—	—	—	—	—	—
Thoriella islandica Stephensen, 1915	—	—	6	—	—	—	—	—	—	—	—	—	—
Trischizostoma crosnieri L.&S., 1993	—	—	—	—	—	29	—	—	—	—	—	—	—
Trischizostoma denticulatum Ledoyer, 1978	23	—	—	—	—	—	—	—	—	—	—	—	—
Trischizostoma richeri L.&S., 1994	—	—	—	30	—	—	—	—	—	—	—	—	—
Trischizostoma tanjae Vinogradov, 1991	57	—	—	—	—	—	—	—	—	—	—	—	—
Tryphosa cucullata Walker, 1904	—	—	58	—	—	—	—	—	—	—	—	—	—
Tryphosella ama L.&S., 1994	—	—	—	30	—	—	—	—	—	—	—	—	—
Tryphosella astrolabensis n.sp.	—	—	—	—	—	—	—	—	—	31	—	—	—
Tryphosella mucronatus (Pirlot, 1936)	—	—	—	—	—	—	42	—	—	—	—	—	—
Tryphosella oupi L.&S., 1994	—	—	—	30	—	—	—	—	—	—	—	—	—
Tryphosella wongada n.sp.	—	—	—	—	—	—	—	—	—	31	—	—	—
Vijaya tenuipes Walker, 1904	—	—	58	—	—	—	—	—	—	—	—	—	—
Waldeckia crenulata Pirlot, 1936	—	—	—	—	—	42	—	—	—	—	—	—	—
Waldeckia enoei Stephensen, 1931	—	—	—	42	—	42,56	—	—	—	—	—	—	—
Waldeckia nudum (Imbach, 1967) (as *Lepidepecreum nudum*)	—	—	—	—	—	17	—	—	—	—	—	—	—
Waldeckia sp. (as *W. kroyeri*)	—	—	—	33,42	—	42	42	—	—	—	—	—	—
Waldeckia sp. 1	—	—	—	—	—	—	—	—	—	—	—	—	30
Waldeckia sp. 2	—	—	—	30	—	—	—	—	—	—	—	—	—
Wandin griffini L.&S., 1990	—	—	—	27	—	—	—	—	—	—	—	—	—

Table 2. Tropical Indo-West Pacific lysianassoid genera. 1—African Plate: western Indian Ocean. 2—Arabian Plate: Red Sea, Gulf of Aden and Persian Gulf. 3—Indo-Australian Plate: central Indian Ocean. 4—Indo-Australian Plate: eastern Indian Ocean, northern Australia and the Coral Sea. 5—Burma Plate. 6—Eurasian Plate: south-east Asia. 7—Philippine Plate. 8—Mariana Plate. 9—Caroline Plate. 10—Bismark Plate. 11—Solomon Plate. 12—Fijian Plate. 13—Pacific Plate. × — records from the literature, including this paper; + — unpublished records.

Taxon	1	2	3	4	5	6	7	8	9	10	11	12	13
Amaryllis Haswell, 1879	×	×	–	×	–	×	–	–	–	–	–	–	–
Ambasiopsis Ledoyer, 1986	×	–	–	–	–	–	–	–	–	–	–	–	–
Aristias Boeck, 1871	×	×	×	×	–	×	×	–	–	×	–	–	–
Aroui Chevreux, 1911	–	–	–	×	–	–	–	–	–	–	–	–	–
Arugella Pirlot, 1936	–	–	×	×	–	×	–	–	–	–	–	–	–
Azotostoma J.L. Barnard, 1965	×	–	–	+	–	–	–	–	–	–	–	–	×
Bathyamaryllis Pirlot, 1933	–	–	–	×	–	×	–	–	–	–	–	–	–
Bathycallisoma Dahl, 1959	×	–	–	×	–	–	–	–	–	–	–	–	×
Clepidecrella J.L. Barnard, 1962	–	–	–	×	–	–	–	–	–	–	–	–	–
Coriolisa Lowry & Stoddart, 1994	–	–	–	×	–	–	–	–	–	–	–	–	–
Crybelocephalus Tattersall, 1906	×	–	–	–	–	×	×	–	–	–	–	–	×
Cyclocaris Stebbing, 1888	–	–	–	–	–	–	–	–	–	–	–	–	×
Cyphocaris Boeck, 1871	×	–	×	×	×	×	×	×	–	×	×	–	×
Douniaella Ledoyer, 1986	×	–	–	–	–	–	–	–	–	–	–	–	–
Drummondia Lowry, 1984	–	–	–	×	–	–	–	–	–	–	–	–	–
Endevoura Chilton, 1921	–	–	–	+	–	–	–	–	–	–	–	–	–
Ensayara J.L. Barnard, 1964	×	–	–	–	–	–	–	–	–	–	–	–	–
Eucallisoma J.L. Barnard, 1961	–	–	–	–	–	×	–	–	–	–	–	–	–
Euonyx Norman, 1867	–	–	–	+	–	×	–	–	–	–	–	–	–
Eurythenes Smith, 1882	×	–	×	×	–	×	–	–	–	×	×	–	×
Figorella J.L. Barnard, 1961	–	–	–	×	–	×	–	–	–	–	–	–	–
Galathella Barnard & Karaman, 1987	×	–	–	–	–	–	–	–	–	–	–	–	–
Hippomedon Boeck, 1871	×	–	–	×	–	×	–	–	–	–	–	–	–
Hirondellea Chevreux, 1889	–	–	–	–	–	×	×	×	×	–	–	–	×
Ichnopus Costa, 1853	×	×	×	×	×	×	×	–	–	×	–	–	×
Kerguelenia Stebbing, 1888	×	–	–	×	–	–	–	–	–	–	–	–	–
Koroga Holmes, 1908	×	–	×	×	–	×	–	–	–	–	–	–	–
Lepidepecreella Schellenberg, 1926b	×	–	–	×	–	–	–	–	–	–	–	–	–
Lepidepecreum Bate & Westwood, 1868	×	×	×	+	–	–	–	–	–	–	–	–	–
Lysianassa Milne Edwards, 1830	×	×	×	–	–	×	–	–	–	–	–	–	–
Mesocyclocaris B. & V., 1964	–	–	×	–	–	–	–	–	–	–	–	–	–
Mesocyphocaris B. & V., 1960	–	–	×	–	–	–	–	–	–	–	–	–	×
Metacyphocaris Tattersall, 1906	×	×	×	×	–	×	–	×	–	–	–	–	×
Microlysias Stebbing, 1918	–	×	–	+	–	–	–	–	–	–	–	–	–
Nagada n.gen.	–	–	–	+	–	–	–	–	–	×	–	–	–
Onesimoides Stebbing, 1888	×	–	–	×	–	×	×	–	–	–	–	–	×
Orchomene Boeck, 1871	×	–	–	–	–	–	–	–	–	–	–	–	×
Orchomenella Sars, 1890	×	–	×	×	–	–	–	–	×	–	–	–	×
Pachynus Bulycheva, 1955	–	–	–	×	–	–	–	–	–	–	–	–	–
Paracallisoma Chevreux, 1903	–	–	×	–	–	–	–	–	–	–	–	–	×
Paracentromedon Chevreux & Fage, 1925	–	–	–	–	–	×	–	–	–	–	–	–	–
Paracyphocaris Chevreux, 1905	×	–	×	–	–	×	×	–	–	–	×	–	–
Paralysianopsis Schellenberg, 1931	×	–	–	+	–	+	–	–	–	×	–	–	–
Parambasia Walker & Scott, 1903	×	–	–	–	–	–	–	–	–	–	–	–	–
Parawaldeckia Stebbing, 1910	–	–	–	×	–	–	–	–	–	×	–	–	–

Table 2. Continued

Taxon	1	2	3	4	5	6	7	8	9	10	11	12	13
Paronesimoides Pirlot, 1933	–	–	–	–	–	×	–	–	–	–	–	–	–
Podoprionella Sars, 1895	–	–	–	–	–	–	–	–	–	×	–	–	–
Procyphocaris J.L. Barnard, 1961	×	–	–	×	–	–	–	–	–	–	–	–	–
Pseudamaryllis Andres, 1981	×	×	–	–	–	×	–	–	–	–	–	–	–
Pseudambasia Stephensen, 1927	×	–	–	×	–	×	–	–	–	×	–	–	×
Pseudocyphocaris Ledoyer, 1986	×	–	–	–	–	–	–	–	–	×	–	–	–
Rhinolabia Ruffo, 1972	–	–	–	–	–	–	–	–	–	×	–	–	–
Riwo n.gen.	–	–	–	–	–	–	–	–	–	×	–	–	–
Schisturella Norman, 1900	×	–	–	–	–	–	–	–	–	–	–	–	–
Scolopostoma Lowry & Stoddart, 1983	×	×	–	×	–	+	–	–	–	–	–	–	–
Scopelocheiropsis Schellenberg, 1926b	–	–	×	–	–	–	–	–	–	–	–	–	–
Shoemakerella Pirlot, 1936	×	–	–	×	–	–	–	–	–	–	–	–	×
Socarnella Walker, 1904	–	–	×	–	–	–	–	–	–	–	–	–	–
Socarnes Boeck, 1871	×	×	–	×	–	×	–	–	–	–	–	–	×
Socarnopsis Chevreux, 1911	×	×	×	–	–	×	–	–	–	–	–	–	×
Stephonyx Lowry & Stoddart, 1989	×	–	–	×	–	–	–	–	–	–	–	–	–
Stomacontion Stebbing, 1899	–	×	–	–	–	–	–	–	–	–	–	–	–
Thoriella Stephensen, 1915	–	–	×	–	–	–	–	–	–	–	–	–	–
Trischizostoma Boeck, 1861	×	–	–	×	–	×	–	–	–	–	–	–	–
Tryphosa Boeck, 1871	–	–	×	–	–	–	–	–	–	–	–	–	–
Tryphosella Bonnier, 1893	–	–	–	×	–	–	×	–	–	×	–	–	–
Vijaya Walker, 1904	–	–	×	–	–	–	–	–	–	–	–	–	–
Waldeckia Chevreux, 1906	–	–	–	×	–	×	×	–	–	–	–	–	×
Wandin Lowry & Stoddart, 1990	–	–	–	×	–	–	–	–	–	–	–	–	–

Table 3. General distribution of shallow-water tropical Indo-West Pacific lysianassoid genera. *Anonyx, Orchomene* and *Tryphosa* are considered to be mis-identifications of genera which do not occur in the Indo-West Pacific.

Cosmopolitan	Post-Tethyan	Post-Gondwanan	Endemic
Aristias	*Aroui*	*Amaryllis*	*Arugella*
Ensayara	*Ichnopus*	*Azotostoma*	*Galathella*
Hippomedon	*Lysianassa*	*Drummondia*	*Nagada*
Kerguelenia	*Podoprionella*	*Endevoura*	*Riwo*
Lepidepecreum	*Rhinolabia*	*Microlysias*	*Socarnella*
Orchomenella	*Shoemakerella*	*Pachynus*	*Vijaya*
Tryphosella	*Socarnes*	*Paralysianopsis*	*Wandin*
Socarnopsis	*Parawaldeckia*		
	Pseudamaryllis		
	Pseudambasia		
	Pseudocyphocaris		
	Scolopostoma		
	Stomacontion		
	Waldeckia		

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