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Shallow-water Pycnogonida from coral reefs at Moorea, Society Islands, with description of *Rhynchothorax tiahurensis* n. sp.

Hans-Georg Müller

Abstract. 13 species of shallow-water Pycnogonida are recorded from the fringing and barrier reefs surrounding the high volcanic island Moorea, Society Islands. Of these, one species was found to be new to science, which is described (*Rhynchothorax tiahurensis* n. sp.).

Key words. Pycnogonida, Moorea, Society Islands, records, *Rhynchothorax tiahurensis* n. sp.

Introduction

The class Pycnogonida was previously known to be represented at the Society Islands by 12 species in 8 genera (Child 1970, Müller, in press).

During a survey of the coral-reef-inhabiting invertebrates at Moorea, Society Islands from February—March 1988 some more species were collected by the author. Of the 13 species available, 5 are first reported from this group of islands, including one species new to science. This extends the number of pycnogonid species known from this area to 17.

Although pycnogonids have been found in the samples only in low numbers it seems that highest specific diversity occurs in more structurally complex habitats like the exposed fringing reef near Afareaitu and the barrier reef surrounding the island, instead of the structurally simpler habitats as the sheltered fringing reefs at Tiahura and Cook's Bay, where the author also carried out extensive sampling. At Cook's Bay only 1 and at the Tiahura fringing reef altogether 6 species have been found which occurred only at the channel coral slope with a moderately strong current, but not a single specimen could be collected there on the reef flat. Contrary, all species dealt with in this report are present on the barrier reef.

For a detailed characterization of most of the sampling locations see Galzin & Pointier (1985).

The research was carried out mainly at the marine biological station "Antenne Museum" (Ecole Pratique des Hautes Etudes, E. P. H. E.) at Moorea and the Laboratoire Biologie Marine et Malacologie, Université de Perpignan, France (director: Dr. Bernard Salvat).

Samples have been obtained by hand while skin diving, or while wading in very shallow water. The substratum was collected and transported to the laboratory in plastic barrels. After storing in 5 % formalin/sea water for some hours, the material has been washed with fresh water over a 0.5 mm sieve and preserved in 70 % ethanol.

Specimens are deposited as follows: Senckenberg-Museum, Frankfurt a. M., Germany (SMF); Zoologisches Forschungsinstitut und Museum Alexander Koenig, Germany (ZFMK); Museum National d'Histoire Naturelle, Paris, France (MNHN) and Zoölogisch Museum, Amsterdam, The Netherlands (ZMA).

Systematic Account

Ammotheidae

Achelia Hodge, 1864

Achelia assimilis (Haswell, 1885)
Figs. 1—10

Material: 2♂, 5 juv. (1 ♂, 5 juv. SMF 1086; 1 ♂ ZFMK); crest of Tiahura barrier reef, dead corals, 0.5—1 m, 25 March 1988.

This species is widely distributed throughout the Pacific Ocean and shows a marked intraspecific variability. Specimens from Moorea have a distinct suture line only at the first trunk segment and a short abdomen, which does not surpass the fourth lateral processes. All other characters agree well with the features shown by Stock (1954: 100, figs 47—48, sub *A. variabilis*).

Achelia sawayai Marcus, 1940
Fig. 40

Material: 1 ♂ (SMF 1087); channel coral slope of Tiahura fringing reef, dead corals, 1—2 m, 22—23 March 1988. 2 ♂ (1 ov.), 5 ♀ (SMF 1088); crest of Tiahura barrier reef, dead corals, 0.5—1 m, 25 March 1988. 1 ♂, 1 juv. (SMF 1089); coral slope of fringing reef near Afareaitu, dead corals, 1—2 m, 26 March 1988. 1 ♀ (SMF 1090); fringing reef near Afareaitu, dead corals near slope, 0.5 m, 29 March 1988. 1 ♂, 2 ♀ (ZFMK); about 2.6 km west of airport near Maharepa; dead corals near beach, 0.5—1 m, March 1988. 4 ♂ (ZMA); about 2.6 km west of airport near Maharepa, crest of barrier reef, dead corals, 0.5 m, March 1988.

A common cosmotropical species, which has been more often found in the Western Atlantic.

Females from Moorea lack — contrary to those from Bora Bora (Müller, in press) — any spiny tubercles on the lateral processes and have a distinct suture line between palp segments 3 and 4 (fig. 40).

Ammothea Leach, 1814

Ammothea hilgendorfi (Böhm, 1879)

Material: 1 ♂, 1 juv. (SMF 1091); crest of Tiahura barrier reef, dead corals, 0.5—1 m, 25 March 1988.

A. hilgendorfi is widely distributed throughout the tropical and temperate Indo-Pacific Ocean as well as in the Mediterranean (Krapp & Sconfietti 1982). It was already known from Moorea (Child 1970: 292)

Ammothella Verrill, 1900

Ammothella indica Stock, 1954

Material: 3 ♂, 2 ♀, 3 juv. (SMF 1092); channel coral slope of Tiahura fringing reef, dead corals, 1—2 m, 22—23 March 1988. 1 ♀ (SMF 1093); crest of Tiahura barrier reef, dead corals, 0.5—1 m, 25 March 1988. 4 ♂ (1 ov.), 2 ♀, 8 juv. (ZFMK); coral slope of fringing reef near Afareaitu, dead corals, 1—2 m, 26 March 1988. 3 ♀, 1 juv. (ZMA); about 2.6 km west of airport near Maharepa, crest of barrier reef, dead corals, 0.5 m, March 1988.

Müller (1988, in press) summarized the distribution of this very common species in the Indo-Pacific Ocean. At the Society Islands, it was already known from Tahiti (Child 1970: 292) and Bora Bora (Müller, in press).

Ammothella schmitti Child, 1970

Material: 2 ♂ (ov.), 1 ♀ (1 ov. ♂, 1 ♀ SMF 1094; 1 ov. ♂ MNHN); channel coral slope of Tiahura fringing reef, dead corals, 1—2 m, 26 March 1988. 1 ♂, 1 ♀ (ZFMK); about 2.6 km west of airport, crest of barrier reef near Maharepa, dead corals, 0.5 m.

A. schmitti is known only from the Society Islands from where is was described by Child (1970: 293) based on material from Bora Bora and Moorea.

Ammothella stauromata Child, 1982

Material: 1 juv. (SMF 1095); Cook's Bay, about 50 m south of "R. Gump South Pacific Biological Research Station", coral slope of fringing reef, 0.5—1 m, 25 March 1988. 1 juv. (ZFMK); about 2.6 km west of airport near Maharepa, dead corals near beach, 0.5—1 m, March 1988.

This species was previously known from the Marshall Islands (Child 1982: 271), the Philippines (Child 1988a: 5) and American Samoa (Nakamura & Child 1988: 809). It is easily recognizable through its long mid-dorsal trunk tubercles, even in juveniles.

Tanystylum Miers, 1879

Tanystylum bredini Child, 1970

Figs. 11—21

Material: 3 ♀ (MNHN); Temae, the Islet Reef, north of airport, crest of barrier reef, *Sargassum*, 0.5 m, 19—20 February 1988. 1 ♀ (SMF 1096); about 2.6 km west of airport near Maharepa, crest of barrier reef, *Sargassum*, 0—0.5 m, 15 March 1988. 1 ♂ (SMF 1097); channel coral slope of Tiahura fringing reef, dead corals, 1—3 m, 22—23 March 1988. 2 ♂ (1 ov.), 1 juv. (SMF 1098); crest of Tiahura barrier reef, dead corals, 0.5—1 m, 25 March 1988. 6 ♂, 4 ♀ (ZFMK); coral slope of fringing reef near Afareaitu, dead corals, 1—2 m, 26 March 1988. 1 ♂, 1 ♀ (ZMA); Temae, the Islet Reef, north-east of airport, dead corals near beach, 2 m, 31 March 1988. 7 ♂ (2 ov.), 13 ♀, 4 juv. (SMF 1099); about 2.6 km west of airport near Maharepa, crest of barrier reef, dead corals, 0.5 m, March 1988. 1 juv. (SMF 1100); about 2.6 km west of airport near Maharepa, dead corals near beach, 0.5—1 m, March 1988.

This species was found to be the most common pycnogonid in shallow waters of the coral reefs at Moorea. It was described by Child (1970: 296) based on specimens from Bora Bora and Moorea. Later he recorded *T. bredini* from the Tuamotu Archipelago (Child: 1977: 441) and Aldabra Atoll at the Seychelles (Child 1988b: 52).

However, as Child did not show the variability of that species in detail, in particular its sexual dimorphism, it was found to be useful to figure it here again completely. In general, males have the anterodistal and posterodistal margins of the first coxae provided with shallow spiny tubercles, which in females are lacking. In some male individuals shallow antero-dorsodistal rounded tubercles are also present. The female oviger is much smaller in size than the male oviger, bearing only few short spines and being only 8-segmented instead of 10-segmented in the male.

Tanystylum nesiotes Child, 1970

Material: 1 ♀ (SMF 1101); about 2.6 km west of airport, crest of barrier reef near Maharepa, *Sargassum*, 0—0.5 m, 15 March 1988. 2 ♂ (SMF 1102); channel coral slope of Tiahura fringing reef, dead corals, 1—2 m, 22—23 March 1988. 9 ♂ (4 ov.), 3 ♀, 5 juv. 3 ♂ (1 ov.), 1 ♀, 5 juv. (SFM 1103); 2 ♂, 1 ♀ (ZFMK); 2 ♂ (1 ov.) (MNHN); 2 ♂ (ov.), 1 ♀ (ZMA); about 2.6 km west of airport near Maharepa, crest of barrier reef, dead corals, 0.5 m, March 1988.

Like *Ammothella schmitti*, *T. nesiotes* is known only from Bora Bora and Moorea (Child 1970: 299).

Tanystylum rehderi Child, 1970
Figs. 22—39

Material: 5 ♂, 1 ♀ (SMF 1104); coral slope of fringing reef near Afareaitu, dead corals, 1—2 m, 26 March 1988. 1 ♂ (ZFMK); Temae, the Islet Reef, north of airport, under coral rocks near beach, lower intertidal, 27 March 1988. 1 ♂ (ZMA); Temae, the Islet Reef, north-east of airport, dead corals near beach, 2 m, 31 March 1988.

To show the variability of this species in more detail than in the original description it is completely figured here again. The first coxae of the male bear three elongate spiny tubercles of which the anterolateral one of the first legs is bifurcate. These tubercles are greatly reduced in the female. Number and size of the lateral process tubercles may also vary and are more distinct in the male than in the female. The shape of the proboscis also varies slightly in both males and females. Some specimens lack a distinct suture line between third and fourth palp segment, in others a distinct suture line is clearly visible.

The female oviger is figured here for the first time. It is 10-segmented and much smaller than in the male.

Phoxichilidiidae

Anoplodactylus Wilson, 1878

Anoplodactylus erectus Cole, 1904
Figs. 41—44

Material: 11 ♂ (6 ov.), 6 ♀, 17 juv. (SMF 1105); channel coral slope of Tiahura fringing reef, dead corals, 1—2 m, 22—23 March 1988. 1 ♂, 1 juv. (ZFMK); Temae, the Islet Reef, north-east of airport, dead corals near beach, 2 m, 31 March 1988. 1 ♂ (ov.) (ZMA); about 2.6 km west of airport near Maharepa, dead corals near beach, 0.5—1 m, March 1988.

A. erectus seems to have a wide distribution in the temperate and tropical Pacific Ocean. It was already known from the Society Islands (Child 1970: 289; Müller, in press). Specimens from Moorea differ only slightly from individuals the author has available from Bora Bora. In the material from Moorea the proboscis is somewhat more robust, the cement gland tube slightly broadened distally and the propodal sole and heel bear a fewer number of spines. A somewhat longer propodal lamina can also be observed.

Anoplodactylus squalidus Clark, 1973
Figs. 45—56

Anoplodactylus squalida Clark, 1973, 30—33, fig. 2A—G; *Anoplodactylus rimulus* Child, 1988, 60—61, fig. 3; *Anoplodactylus rimulus*, — Nakamura & Child, 1988, 815, fig. 2G—I.

Material: 1 ♂ (SMF 1106); coral slope of fringing reef near Afareaitu, dead corals, 1—2 m, 26 March 1988. 1 ♂, 1 ♀ (SMF 1107); Temae, the Islet Reef, north-east of airport, dead corals near beach, 2 m, 31 March 1988.

Child (1988b: 60) described *A. rimulus* from Aldabra Atoll based on two females. Somewhat later Nakumura & Child (1988: 815) found the unknown male of this species at American Samoa which in most features agreed with the material available to the author from Moorea (figs. 45—50). However, re-examination of the type-material of *Anoplodactylus squalidus* Clark, 1973 from New Britain, which seemed to resemble *rimulus* closely, revealed that the original description of that species lacks important details. It is figured here again, so far as this was possible without dissecting the holotype (figs. 52—56). The condition of the holotype let me presume that it was squeezed under a cover-glass some time.

The only differences to *rimulus* are the somewhat larger size, the lack of suture lines between trunk segments, the basally slightly broadened cement gland tube and a more robust proboscis, tapering only in its distal fourth. The ventral swelling of the proboscis mentioned by Child (1988b) and Nakamura & Child (1988) in the material from Aldabra Atoll and Samoa seems to be a variable character. It was not observed in both the material from New Britain and Moorea.

All the other features of *rimulus* agree well with *squalidus*, leading me to the decision to consider the former to be a junior synonym of the latter.

The records listed above clearly show that *squalidus* is widely distributed in the tropical Indo-Pacific Ocean.

Endeidae

Endeis Philippi, 1843

Endeis meridionalis (Böhm, 1879)

Material: 1 ♂ (SMF 1108); crest of Tiahura barrier reef, dead corals, 0.5—1 m, 25 March.

"Widely distributed throughout the Indian and western Pacific Oceans; one record from the West Indies" (Stock 1982: 189). The record from Moorea extends the range of *E. meridionalis* to the south-eastern Pacific Ocean.

Rhynchothoracidae

Rhynchothorax Costa, 1861

Rhynchothorax tiahurensis n. sp.
Figs. 58—62

Holotype: ♂ (SMF 1109); crest of Tiahura barrier reef, dead corals, 0.5—1 m, 25 March 1988. Paratype: Juv. (SMF 1110), together with holotype.

Diagnosis: *R. tiahurensis* n. sp. is distinguished from all other members of the genus through the following combination of characters: Three strong toothlike processes on posterior margin of ocular tubercle; 2 strongly developed processes on dorsal surface of first and second palp segment and a similar process on mid-dorsal surface of each femur.

Description (♂): Outline of trunk oval, tapering posteriorly; suture line lacking between third and fourth segments. Lateral processes narrowly separated, all with

short dorsal tubercles bearing short seta; shallow posterolateral tubercles present on first lateral processes; large rounded mid-dorsal processes on each trunk-segment bearing pair of short simple setae and numerous fine, bifid sensory hairs. Ocular tubercle cone-like, projecting well forward of ocular segment and over proboscis, armed with several small tubercles and two short simple setae, as well as three strong toothlike processes posteriorly.

Eyes large, oval, lightly pigmented.

Proboscis oval, dorsally with some granules, downcurved in distal half.

Abdomen long-cylindrical, overreaching distal margin of second coxae.

Chelifores entirely lacking.

Palpi 4-segmented, segments decreasing in length distally; first and second segment with large dorsal process bearing simple seta at its tip. In particular, third and fourth segment covered with many simple setae.

Oviger 10-segmented, second and third segments subequal, seventh, eighth and ninth segment subequal: 2—3 blunt spines on inner margin of segments 7—10. Terminal segment with curved, robust claw.

Legs short and robust, with few simple setae. Coxae subequal in length; first coxa with strong mid-dorsal tubercle, on 3rd leg also with posterolateral tubercle; second coxa of legs III and IV with posterolateral tubercle; third coxa unarmed; femur slightly shorter than total length of tibiae, with long spine at dorsodistal margin and conspicuous mid-dorsal process, bearing simple seta at its tip; first tibia 1.5 times longer than second, each with long dorsal spine; tarsus short, slightly longer than wide, with 3—4 ventral setae; propodus slightly curved, subequal in length to femur, with 3 dorsal spines; propodal sole with four slender spines in two distal thirds: terminal claw curved, robust with blunt tip, having almost the diameter of propodus.

Measurements (mm):

Length of trunk (anterior margin ocular tubercle to tip of abdomen)	0.66
Width of trunk (across first lateral processes)	0.32
Length of proboscis	0.25
Length of abdomen	0.15
Third leg:	
Coxa 1	0.06
Coxa 2	0.06
Coxa 3	0.05
Femur	0.13
Tibia 1	0.11
Tibia 2	0.07
Tarsus	0.04
Propodus	0.12
Claw	0.07

♀: unknown.

Etymology: The specific name is an adjective of male gender, derived from the type locality.

Distribution: Moorea, Society Islands.

Remarks: In its general habitus *R. tiahurensis* n. sp. shows close affinities to *Rhynchothorax barnardi* from the Galapagos-archipelago, from which it can easily be distinguished through the strong dorsal process of the femora and a similar process on palp segments 1 and 2 (see Child & Hedgpeth 1971: 626, fig. 7).

Acknowledgements

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Zusammenfassung

Es wird über 13 Korallenriff-bewohnende Pantopoden-Arten berichtet, die vom Verfasser auf Moorea, Gesellschaftsinseln, gesammelt wurden. *Rhynchothorax tiahurensis* n. sp. wird beschrieben.

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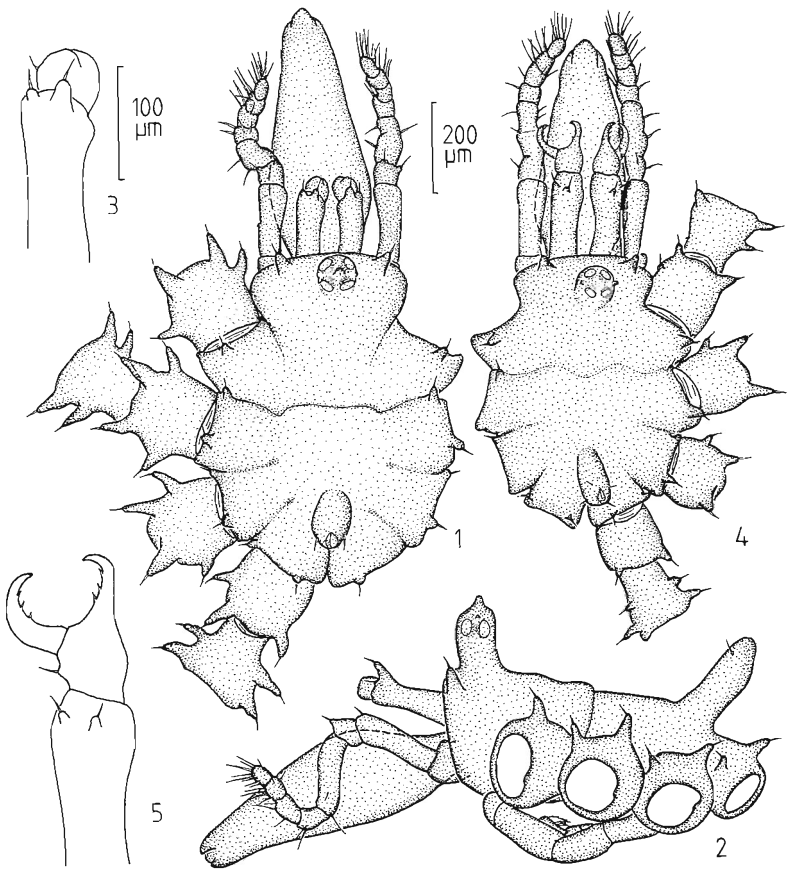
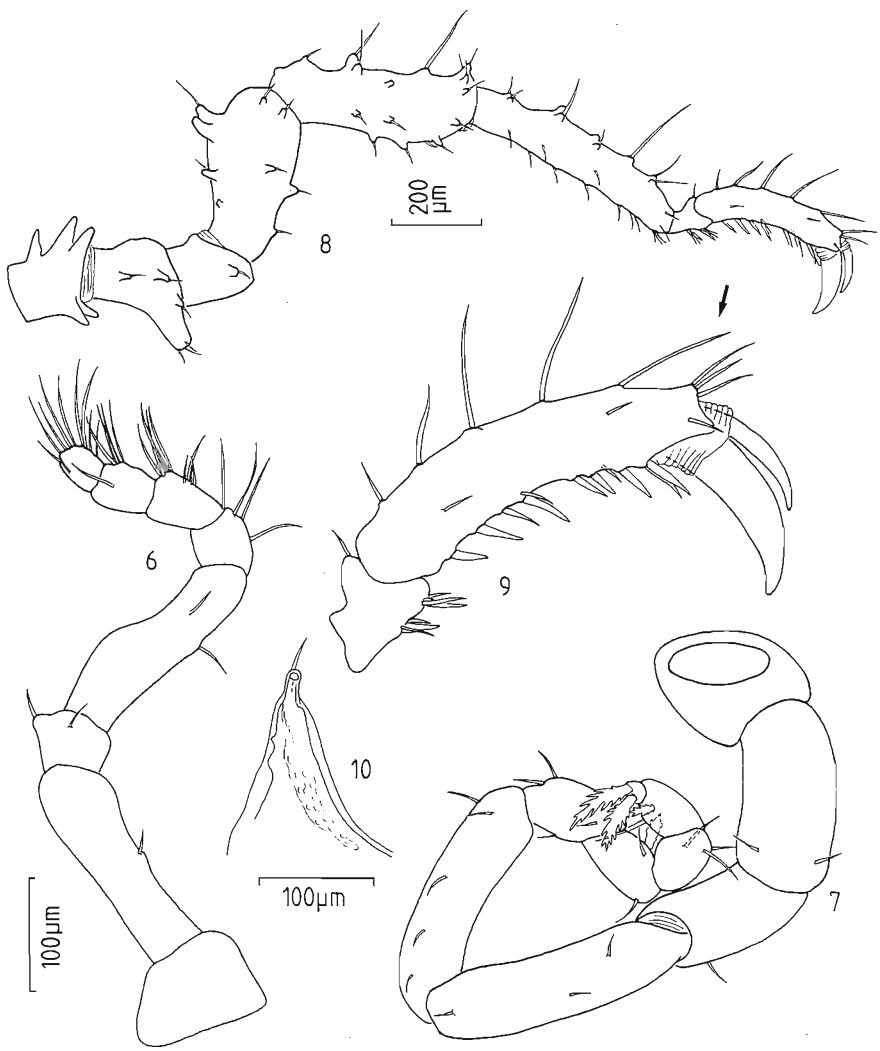
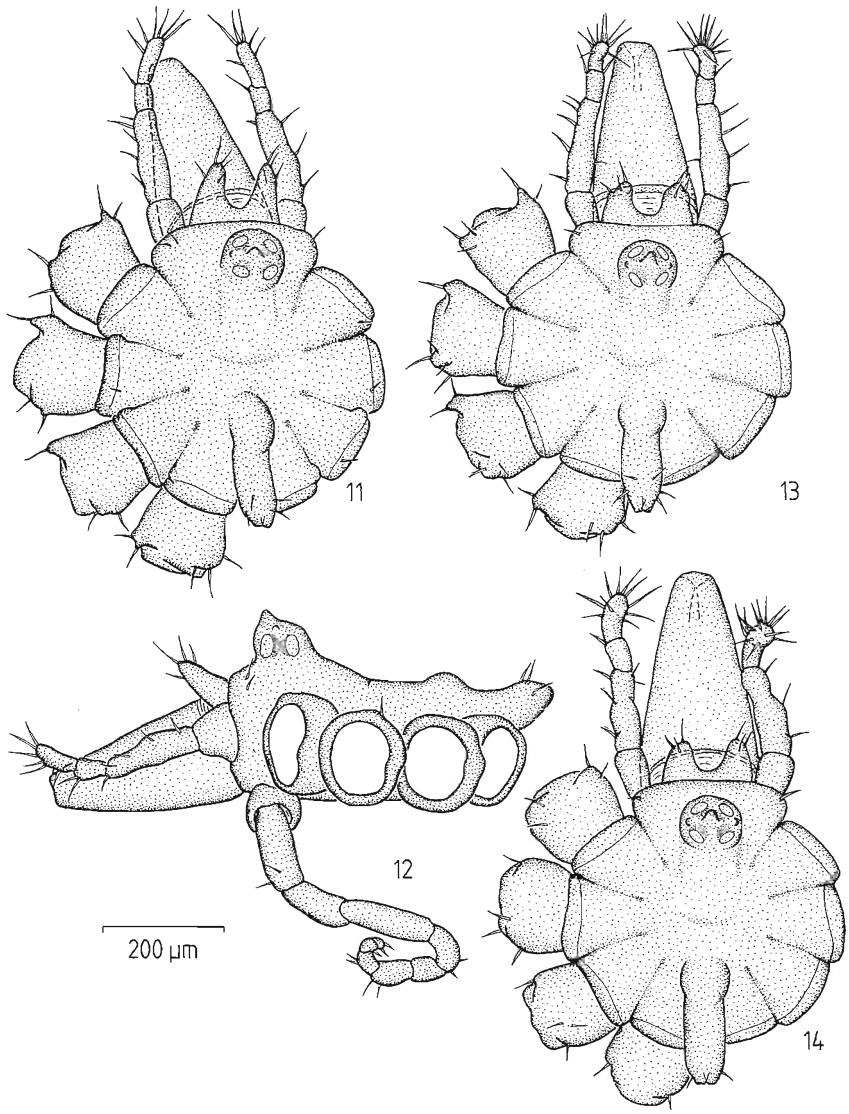
Hans-Georg Müller, Institut für Allgemeine und Spezielle Zoologie der Justus-Liebig-Universität, Heinrich-Buff-Ring 29, D-6300 Giessen.



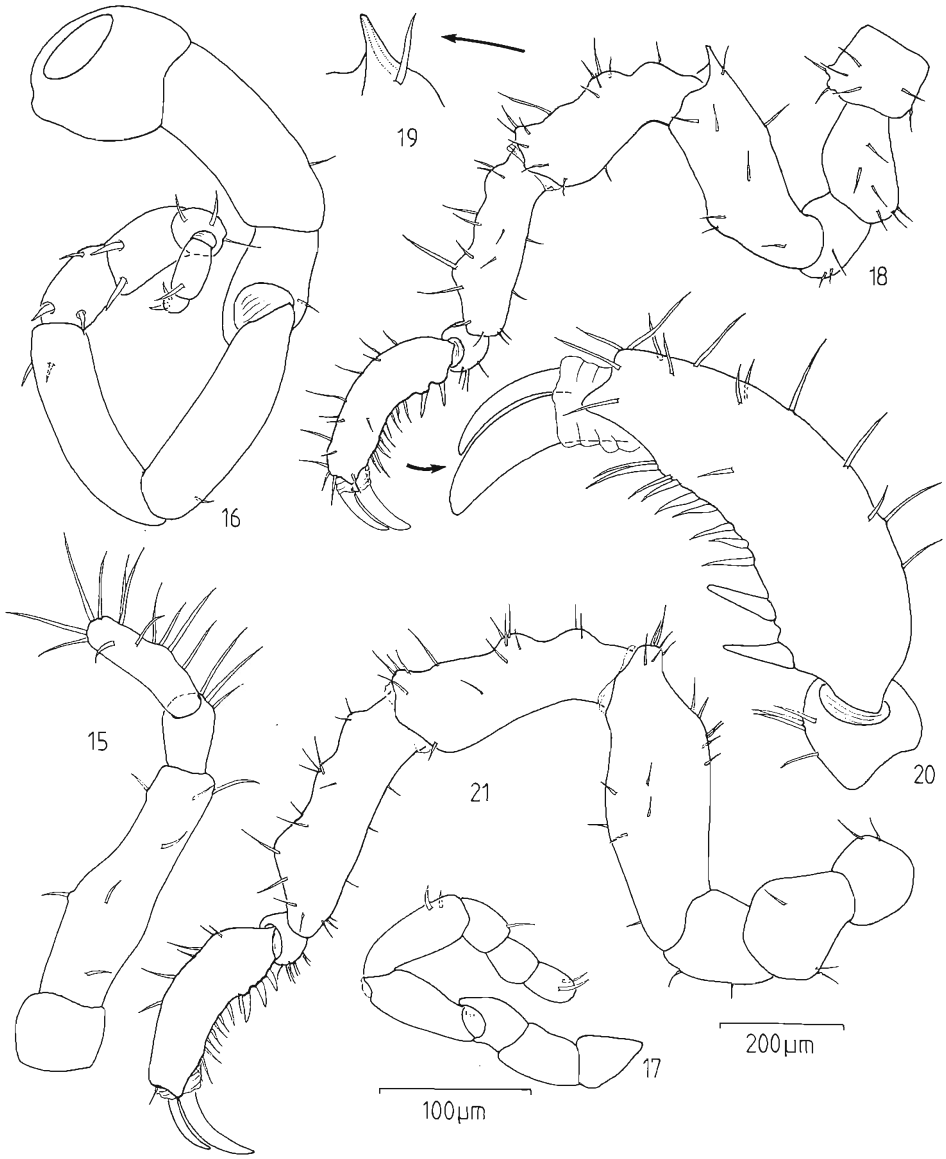
Figs. 1—5: *Achelia assimilis* Hodge, 1864: 1) ♂, dorsal view; 2) ♂, lateral view; 3) ♂, chelifore; 4) Juv., dorsal view; 5) Juv., chelifore.



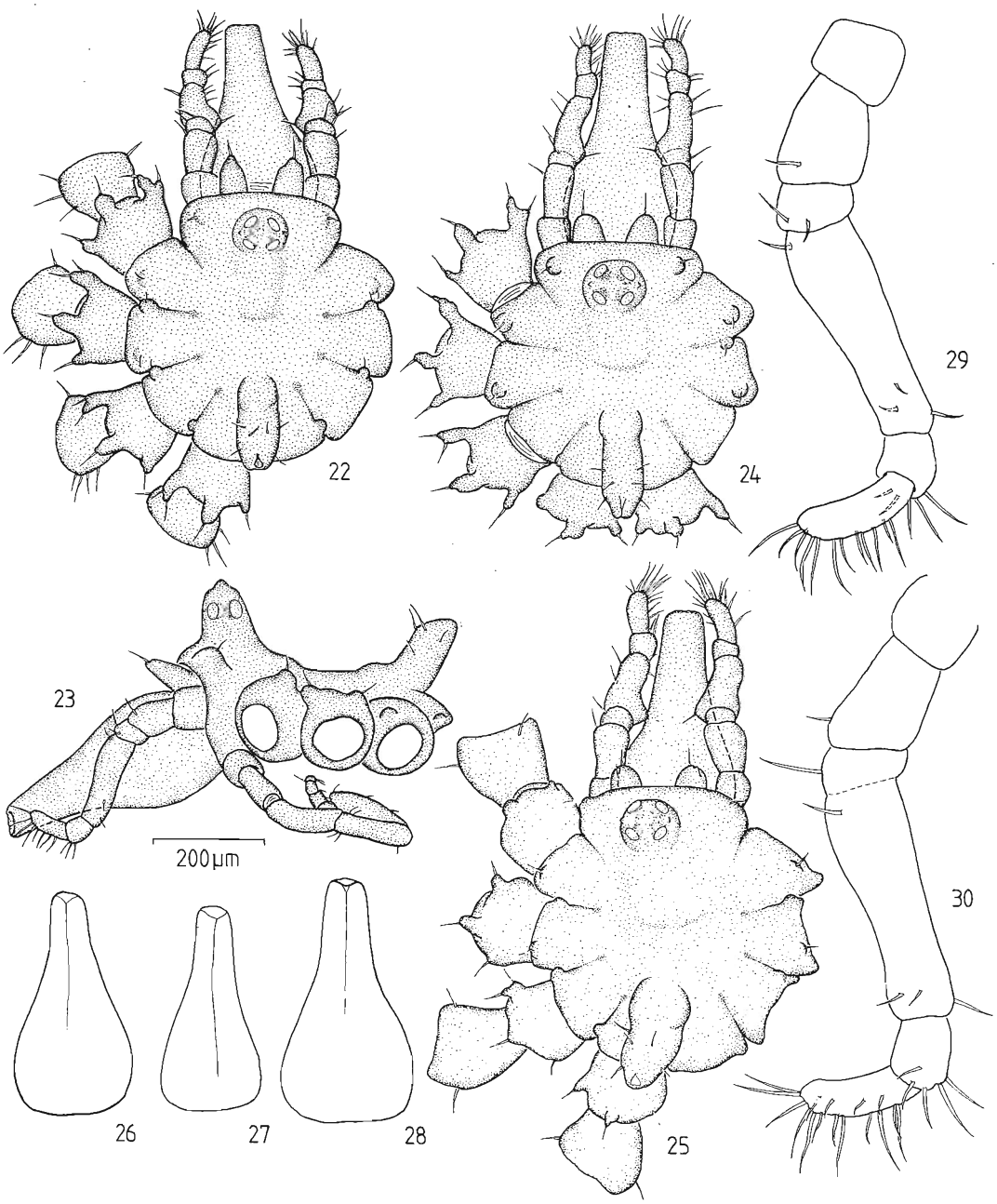
Figs. 6—10: *Achelia assimilis* Hodge, 1864, ♂: 6) palp; 7) oviger; 8) 3rd leg, without cement gland; 9) tarsus and propodus; 10) cement gland, 2nd leg.



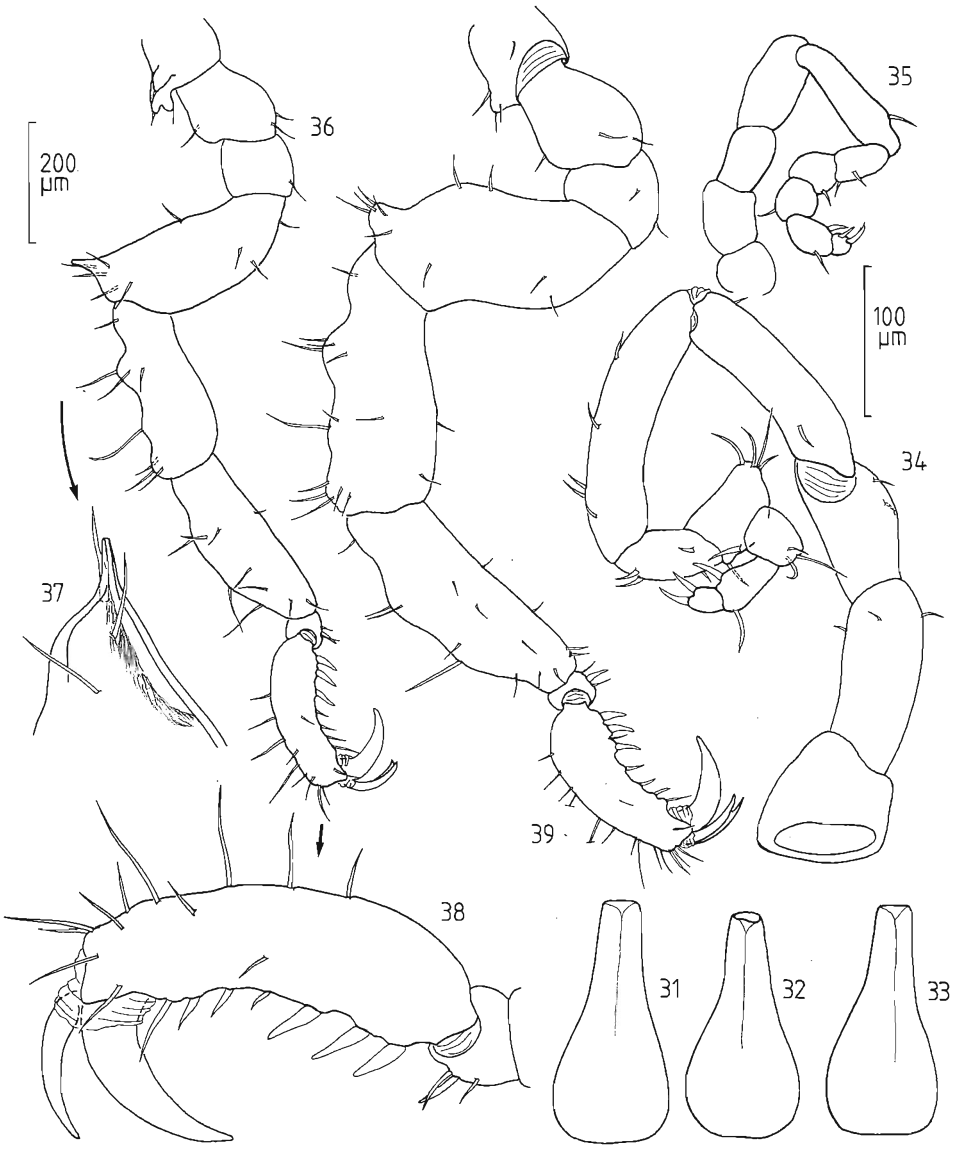
Figs. 11—14: *Tanystylum bredini* Child, 1970: 11) ♂, dorsal view; 12) ♂, lateral view; 13) other ♂, dorsal view; 14) ♀, dorsal view.



Figs. 15—21: *Tanystylum bredini* Child, 1970: 15) ♂, palp; 16) ♂, oviger; 17) ♀, oviger; 18) ♂, 3rd leg; 19) cement gland; 20) tarsus and propodus; 21) ♀, 3rd leg.



Figs. 22—30: *Tanystylum rehderi* Child, 1970: 22) ♂, dorsal view; 23) ♂, lateral view; 24) other ♂, dorsal view; 25) ♀, dorsal view; 26) ♂, proboscis; ♂ from Palau, Caroline Islands, proboscis (Smithsonian Institution, Washington, USNM 195385); 28) ♀, proboscis; 29) ♂, palp with distinct suture line between 3rd and 4th segment; 30) other ♂, palp with indistinct suture line between 3 rd and 4th segment.



Figs. 31—39: *Tanystylum rehderi* Child, 1970: 31)—33), proboscis of different ♂; 34) ♂, oviger; 35) ♀, oviger; 36) ♂, 3rd leg; 37) cement gland; 38) tarsus and propodus; 39) ♀, 3rd leg.

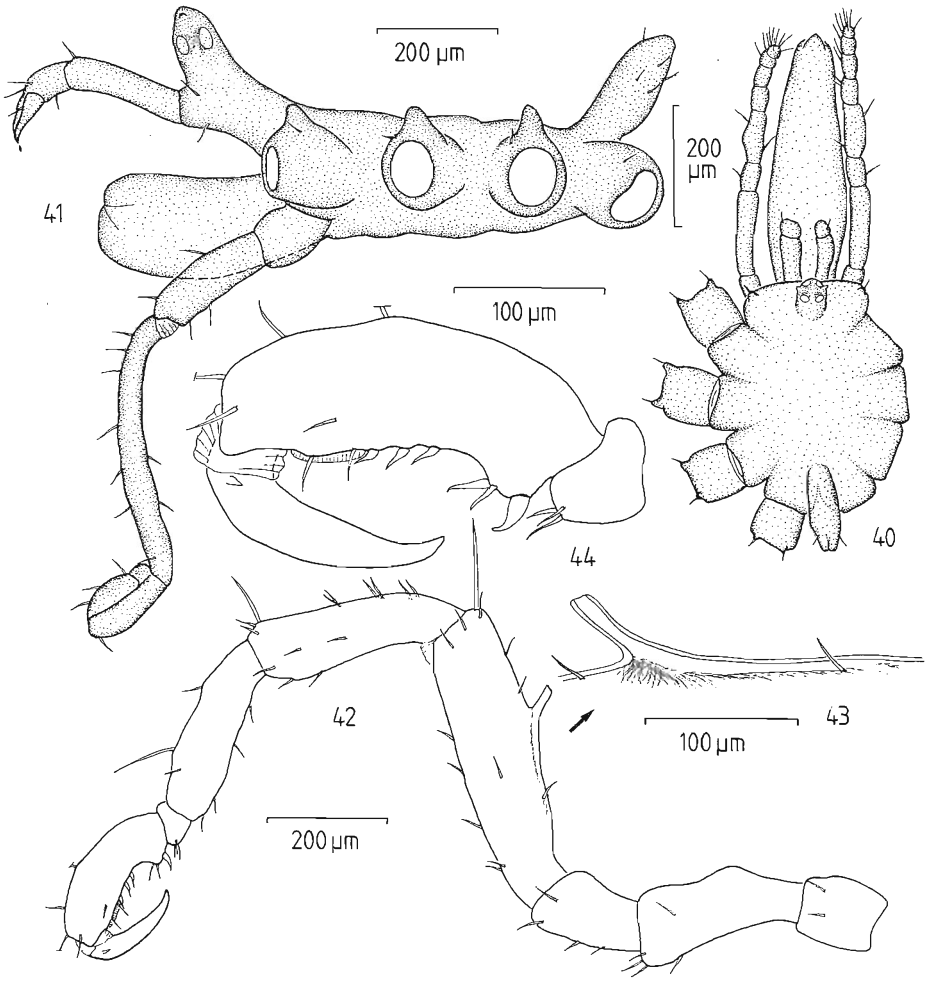
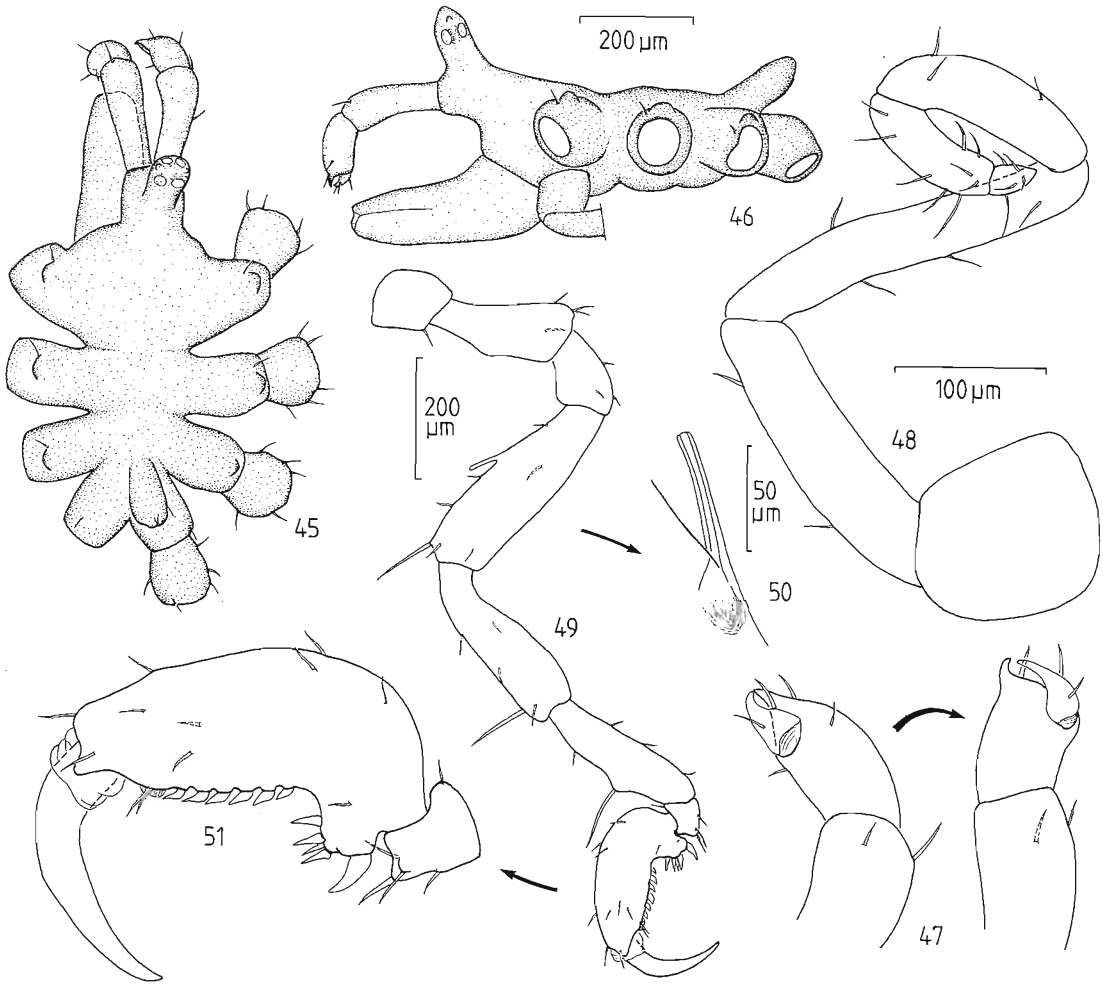
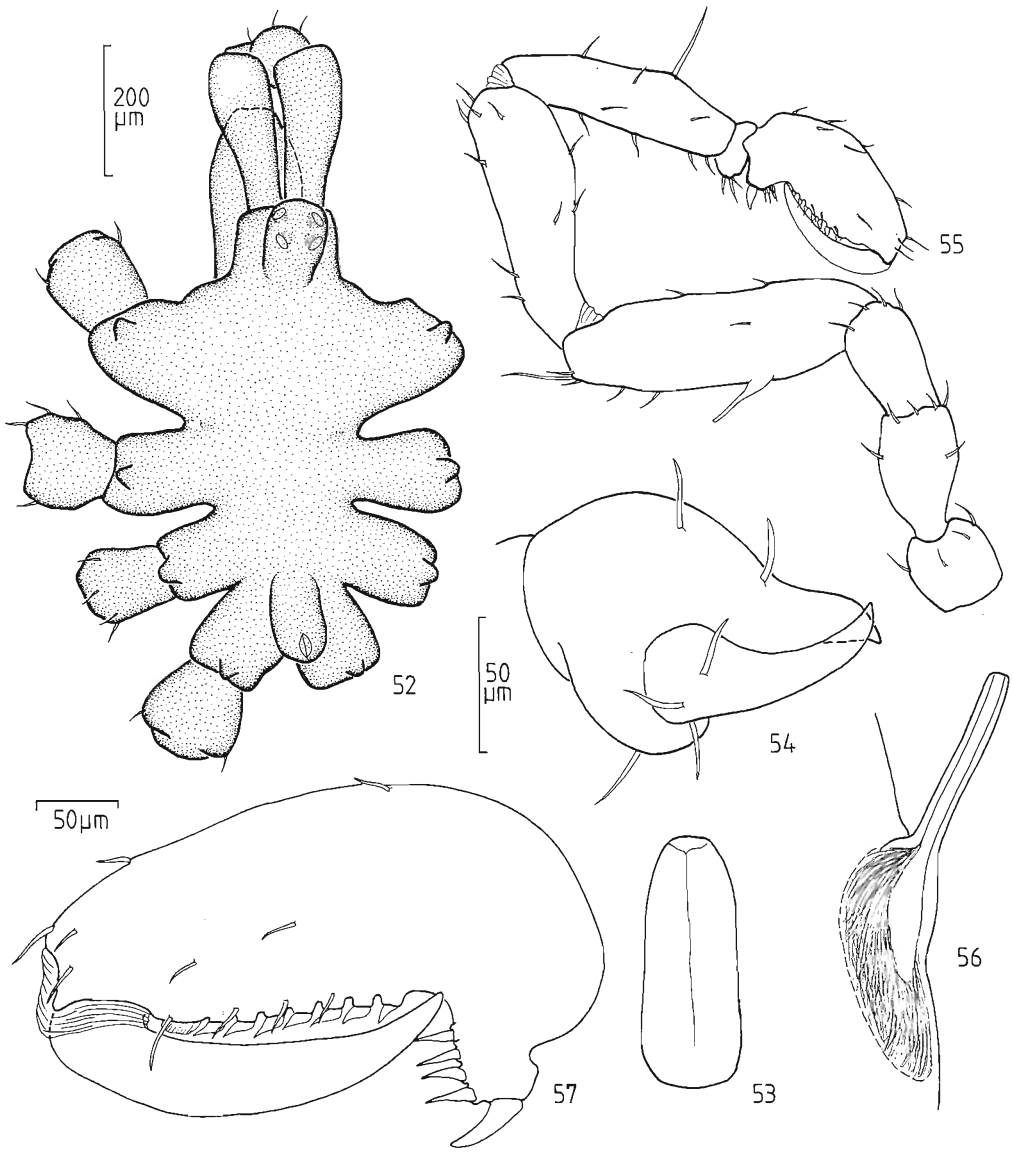


Fig. 40: *Achelia sawayai* Marcus, 1940: ♀, dorsal view.

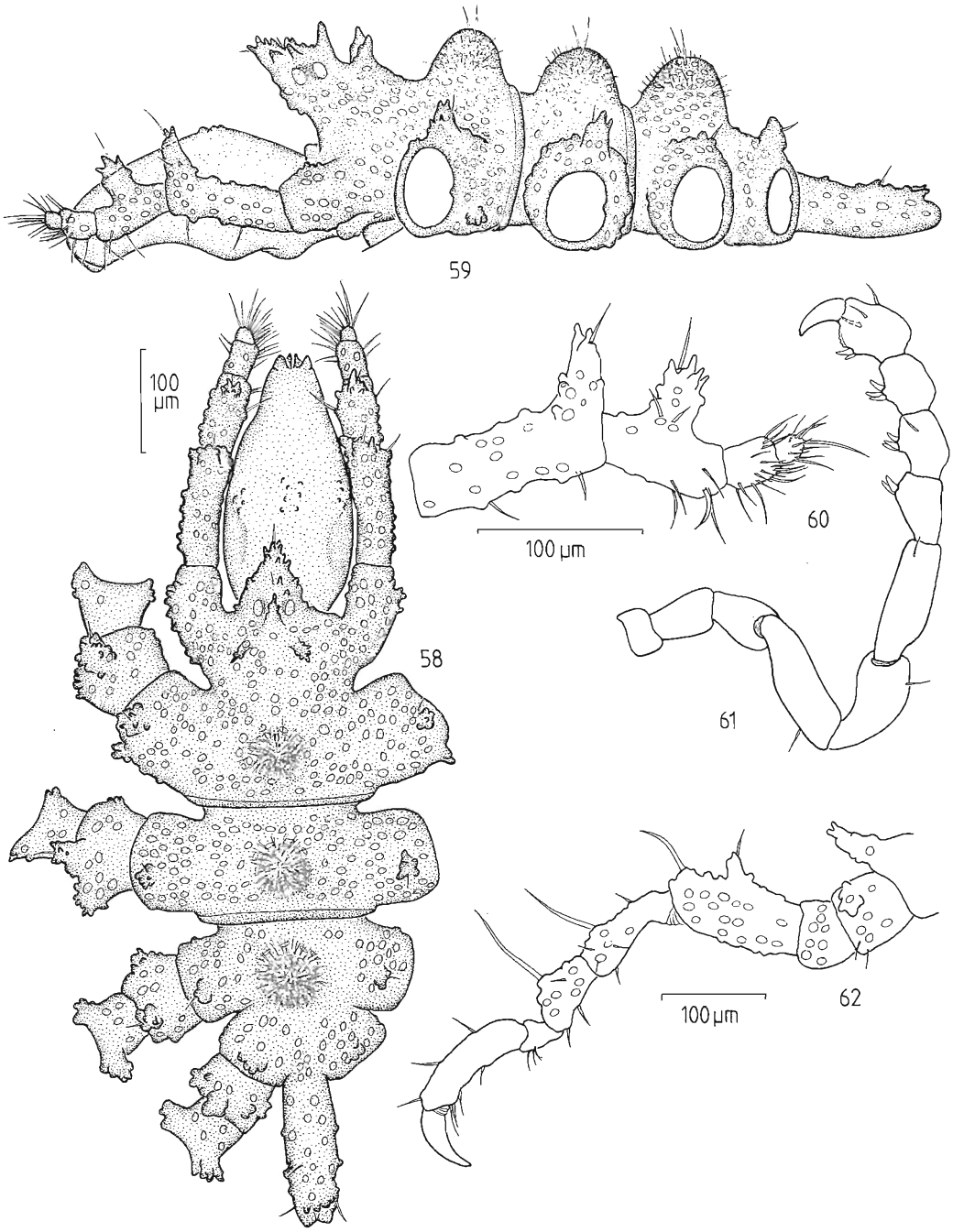
Figs. 41—44: *Anoplodactylus erectus* Cole, 1904, ♂: 41) lateral view; 42) 3rd leg; 43) cement gland; 44) tarsus and propodus.



Figs. 45—51: *Anoplodactylus squalidus* Clark, 1973; ♂ from Moorea: 45) dorsal view; 46) lateral view; 47) chelifore, viewed from different angles; 48) oviger; 49) 3rd leg; 50) cement gland; 51) tarsus and propodus.



Figs. 52—57: *Anoplodactylus squalidus* Clark, 1973; ♂ holotype from Nivani, New Britain (British Museum, registration-number 1971: 260); 52) dorsal view; 53) proboscis, ventral view; 54) chela; 55) 2nd leg; 56) cement gland; 57) propodus.



Figs. 58—62: *Rhynchothorax tiahurensis* n. sp., ♂ holotype: 58) dorsal view; 59) lateral view; 60) palp; 61) oviger; 62) 3rd leg.