Terrestrial Isopods (Crustacea) from the Hawaiian Islands

S. Taiti and F. Ferrara[1]

ABSTRACT

Information on 27 species of terrestrial isopods from O'ahu and Hawai'i islands is presented. Two species, *Olibrinus truncatus* and *Myrmecodillo pacificus*, are described as new. *Marinoniscus tomiokaensis* is transferred to the genus *Olibrinus*; *Haplophiloscia laevis* to *Papuaphiloscia*; *Setaphora okinawaensis* and *Chaetophiloscia meeusei* to *Burmoniscus*; *Philoscia societatis* to *Australophiloscia*; *Hybodillo pygmaeus* and *Lobodillo jacksoni* to *Myrmecodillo*. The following synonyms are proposed: *Australophiloscia nomukensis* and *Philoscia fasciata* = *Australophiloscia societatis*; *Venezillo evergladensis* = *V. parvus*; *Marinoniscus* = *Olibrinus*; *Haplophiloscia* = *Papuaphiloscia*; Marinoniscidae = Olibrinidae. All the species presently known from the Hawaiian Islands are listed, and the composition of the oniscidean fauna of the archipelago is briefly discussed.

INTRODUCTION

The terrestrial isopods from the Hawaiian Islands have received very little attention. With the exception of 2 papers (Dollfus 1900; Schultz 1973), no detailed studies exist on the oniscidean fauna of this archipelago. Despite the current increase in interest of the Hawaiian fauna, terrestrial isopods are certainly still one of the most poorly known.

This paper is the result of a field trip taken by S. Taiti to the islands of O'ahu and Hawai'i from December 1984 to January 1985. Altogether, 34 species were collected, of which 7 have already been considered in other papers (Taiti & Ferrara 1986, 1989; Manicastri & Taiti 1987; Ferrara & Taiti, 1990): *Littorophiloscia culebrae* (Moore), *L. bifasciata* Taiti & Ferrara, *L. hawaiiensis* Taiti & Ferrara, *Tropicana minuta* Manicastri & Taiti, *Armadilloniscus litoralis* Budde-Lund, *A. hawaiianus* Taiti & Ferrara, and *Reductoniscus costulatus* Kesselyak. The present contribution deals with the remaining 27 species collected, lists all the recorded species from the Hawaiian Islands, and briefly discusses the composition of the oniscidean fauna of this archipelago.

The material studied is deposited in the Bishop Museum, Honolulu (BPBM), and the Museo Zoologico dell'Università, Florence (MF).

Family Ligiidae

Genus ***Ligia*** Fabricius

Ligia hawaiensis Dana, 1853

Lygia hawaiensis Dana, 1853:740, pl. 49 fig. 4a–e.
Ligia Hawaiensis: Budde-Lund, 1885:271.
Ligia hawaiensis: Jackson, 1922:696, pl. II fig. 16; Jackson, 1933a:150; Jackson, 1941:7.
Ligyda kauaiensis: Edmondson, 1931:1, fig. 1; Arcangeli, 1954:149.
Ligia hawaiiensis: Schultz, 1973:162.

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Specimens examined. O'AHU: 1♀, 1 juv. (MF), Turtle Bay, 25.XII.1984; 4♂, 5♀ (MF), 1♂, 1♀ (BPBM), same locality, 1.I.1985; 1♂, 4 juvs (MF), Coconut Island, 5.I.1985.

Hawaiian records. O'ahu (Dana 1853; Edmondson 1931), Kaua'i (Dana 1853), Moloka'i (Jackson 1922).

Distribution. Hawai'i and Fiji.

Family Styloniscidae

Genus ***Styloniscus*** Dana

Styloniscus mauritiensis (Barnard, 1936)
Trichoniscus mauritiensis Barnard, 1936:3, fig. 1.
? *Trichoniscus pusillus:* Schultz, 1973:153, 154.

Specimens examined. O'AHU: 12♂, 20♀ (MF), 2♂, 2♀ (BPBM), Poamoho Ridge, rain forest, 22.XII.1984. HAWAI'I: many ♂ and ♀ (MF), Hawai'i Volcanoes National Park, near Kīlauea Iki, forest, 7.I.1985. 4♂, 3♀ (MF), Kaūmana, Kaūmana Cave, 9.I.1985.

Distribution. Previously known only from Mauritius and from hothouses in the Royal Botanic Gardens of Edinburgh, Scotland (Rawcliffe 1987).

Remarks. Schultz (1973) recorded *Trichoniscus pusillus* Brandt from Hawai'i Island (Kaūmana Cave and Hāmākua Forest Reserve Cave) and Kaua'i Island (Waikanaloa Cave). In Kaūmana Cave, visited by S. Taiti, specimens of *mauritiensis* were collected, but not *pusillus*. Schultz described the specimens as "white, not wine red the usual color. . . . 3 conspicuous, black ocelli . . . were present." These features are present in the juveniles of *mauritiensis*, thus it is probable that Schultz's records refer to this species.

Diagnostic characters of this species are given by Barnard (1936:3, Fig.1; 1958:71, Fig.1g) and Taiti and Ferrara (1983:200, Fig.1).

Styloniscus spinosus (Patience, 1907)
Trichoniscus spinosus Patience, 1907:85, pl. III.

Specimens examined. O'AHU: 1♂, 1♀ (MF), Poamoho Ridge, rain forest, 22.XII.1984. HAWAI'I: 1♂, 2♀ (MF), Hawai'i Volcanoes National Park, near Kīlauea Iki, forest, 7.I.1985.

Distribution. Originally described from hothouses in Glasgow. The species was previously recorded from Madagascar, Mauritius, and Réunion.

Genus ***Clavigeroniscus*** Arcangeli

Clavigeroniscus riquieri Arcangeli, 1930
Trichoniscus (Clavigeroniscus) riquieri Arcangeli, 1930:25, fig. 8.

Specimens examined. HAWAI'I: 1♂, 2♀ (MF), Kalapana, 8.I.1985.

Distribution. Pantropical.

Undetermined Family

Genus ***Buchnerillo*** Verhoeff

Buchnerillo sp.

Specimens examined. O'AHU: 1♀ (MF), Coconut I, 5.I.1985.

Remarks. *Buchnerillo* includes *B. litoralis* Verhoeff, found along the coast of the W Mediterranean Sea, Madeira Archipelago, and Florida, and *B. oceanicus* Ferrara, from Somalia. The

specimen examined here appears to be more like the latter species, but more material is needed for a correct identification.

Family Scyphacidae

Genus *Alloniscus* Dana

Alloniscus oahuensis Budde-Lund, 1885

Alloniscus oahuensis Budde-Lund, 1879:1 (nomen nudum); Budde-Lund, 1885: 225.
Alloniscus oahuensis: Jackson, 1941:13; Vandel, 1970a:140; Vandel, 1973a:30; Schultz, 1984:160, figs 6–8; Ferrara & Taiti, 1985:295.
Alloniscus (Metalloniscus) oahuensis: Arcangeli, 1960:72, fig. 22.
? *Alloniscus floresianus:* Dollfus, 1900:524; Roman, 1977:133.

Specimens examined. O'AHU: many ♂ and ♀ (MF), 2♂, 2♀ (BPBM), Turtle Bay, 25.XII.1984; 5♂, 3♀ (MF), Honolulu, Ala Moana Park, 27.XII.1984; 14♂, 12♀ (MF), Coconut I, 5.I.1985. HAWAI'I: 8♂, 1♀ (MF), Kalapana, 8.I.1985; 1♂, 8♀ (MF), Kukuihala, 8.I.1985.

Hawaiian records. O'ahu (Budde-Lund 1879; 1885; Schultz 1984), Hawai'i, Moloka'i, and Kaua'i (Schultz 1984), ? Lāna'i (Dollfus 1900).

Distribution. Littoral species widely distributed along the coasts of the Indian and Pacific oceans.

Remarks. Dollfus (1900) recorded *A. floresianus* Dollfus from Monts Koele, Lāna'i. According to Schultz (1984), Dollfus's record refers to *oahuensis*. If the locality quoted by Dollfus is correct (Monts Koele), it is improbable that this record refers to a species of *Alloniscus*, since all its species are strictly littoral. Re-examination of Dollfus's material is needed for a correct identification of these specimens.

Family Olibrinidae

Genus *Olibrinus* Budde-Lund

Olibrinus truncatus Taiti & Ferrara, **new species** Figs. 1–2

Description. Color brown (pale in alcohol). Body smooth; outline as in Fig. 1A. Dorsum with some scattered pointed scale-spines; gland pores and noduli laterales absent. Eye with 5 ommatidia. Cephalon with suprantennal line slightly bent down medially; no frontal line. Pereonites 1–3 with posterior margin almost straight; posterior corners rounded. Pereonites 4–7 with posterior corners progressively more acute. Pleonites 3–5 with small lateral points directed caudally. Telson more than 2× as long as wide, distal part trapezoidal, apex truncate. Antennule 3-articulated, with long spine on 2nd article, flattened aesthetascs at apex. Antenna ca. ⅔ length of body; 6 to 7 flagellar segments. Mandible molar penicil consisting of 4–5 plumose setae. Maxillule outer ramus with 11 teeth, all simple, a long seta, and 2 long spines; inner ramus pointed, with long setae apically. Maxilliped with palp 3-lobed apically, covered with long setae; endite triangular, pointed penicil at apex. Pereopods with typical bifid dactylar organ. Uropodal protopod stout, ca. ⅔ length of exopod; endopod inserted proximal to exopod.

MALE. Pereopods with no particular modifications. Pleopod 1 exopod ovoid; endopod stout, distal part covered with tiny scales and rounded apex. Pleopod 2 exopod with two plumose setae apically; endopod longer than exopod, apex sharply pointed.

Size. MALE. 3.2 x 1.2 mm. FEMALE. 3.5 x 1.4 mm.

Type data. Holotype ♂, O'AHU: Coconut I, 5.I.1985 (MF). Paratypes: 2♂, 2♀, 4 juvs (MF), 1♂, 1♀ (BPBM), topotypic.

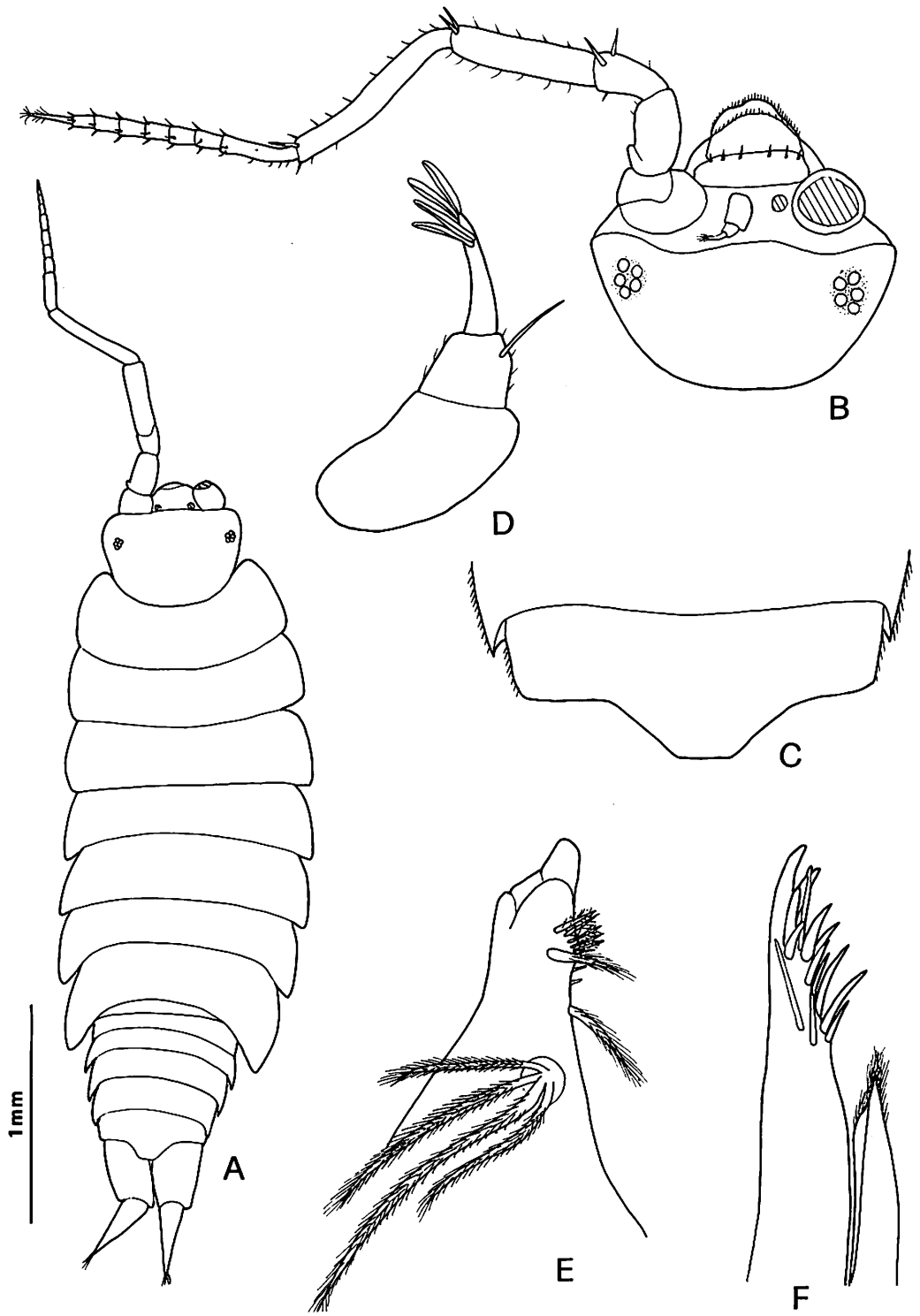

Fig. 1. *Olibrinus truncatus*, n. sp., ♂: **A,** adult specimen in dorsal view; **B,** cephalon; **C,** telson; **D,** antennule; **E,** mandible; **F,** maxillule.

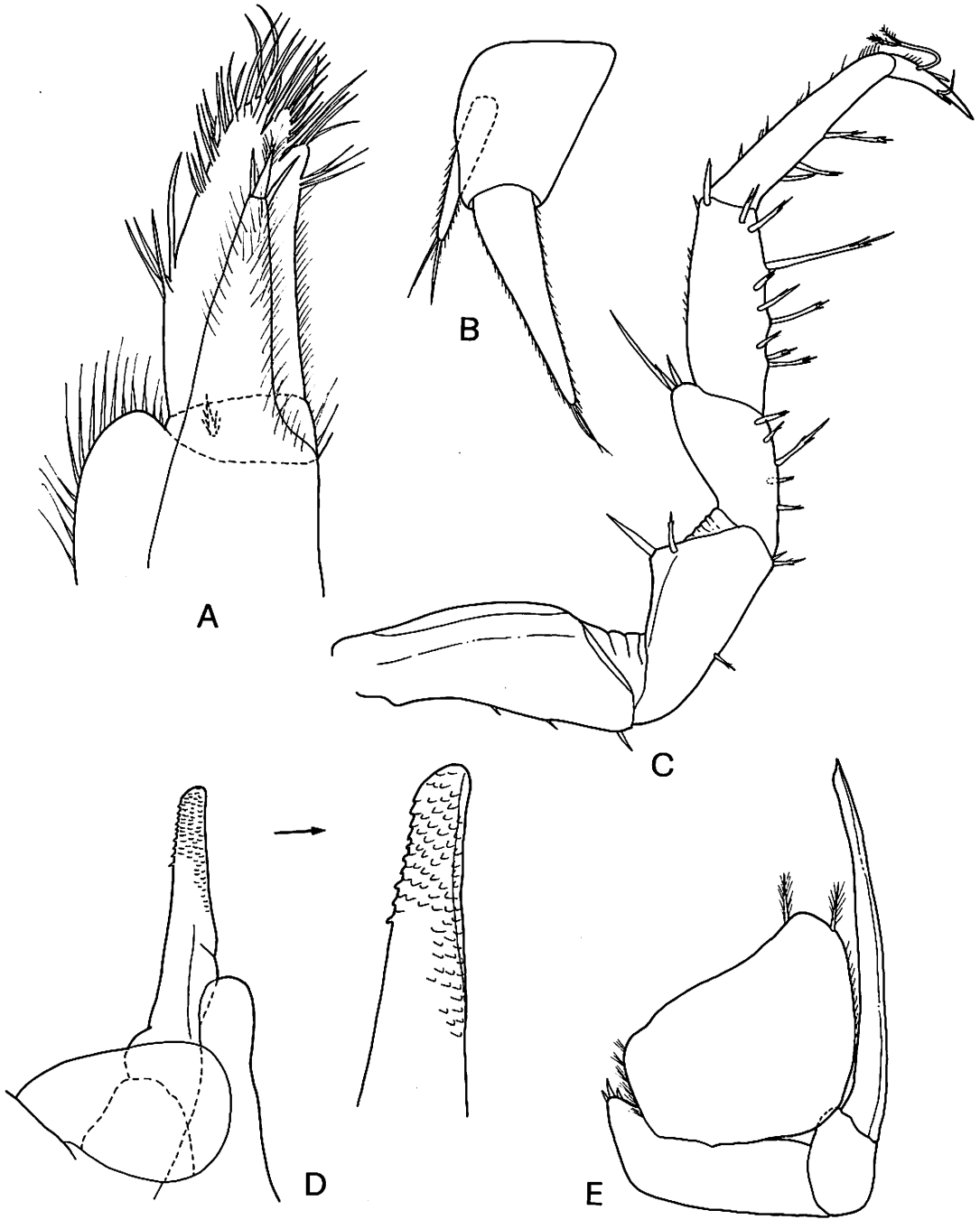

Fig. 2. *Olibrinus truncatus*, n. sp., ♂: **A,** maxilliped; **B,** uropod; **C,** pereopod 7; **D,** pleopod 1; **E,** pleopod 2.

Etymology. The name refers to the shape of telson with truncated apex. Latin, *truncatus* = truncated.

Remarks. *Olibrinus* includes 7 species: *antennatus* (Budde-Lund) from Malay Peninsula, *pigmentatus* Budde-Lund from Chagos Archipelago, *olivaceus* Budde-Lund from Djibouti and Senafir Island (Egypt), *nicobaricus* (Barnard) from Nicobar Islands and Mozambique, *mangroviarum* Ferrara from Somalia and Madagascar (of which *O. roseus* Roman is a synonym), *elongatus* Nunomura and *tomiokaensis* (Nunomura) from Japan. The latter species was included by Nunomura (1986) in the new genus *Marinoniscus* and new family Marinoniscidae. According to its description, this species obviously belongs to the genus *Olibrinus* of which *Marinoniscus* is a junior synonym. Consequently, the family Marinoniscidae is a junior synonym of Olibrinidae. As previously noted (Ferrara 1972; Ferrara & Taiti 1983), descriptions of most species in *Olibrinus* are inadequate and not all the species are valid.

O. truncatus appears morphologically close to *O. tomiokaensis*, from which it differs by the smaller number of ommatidia (5 vs. 12), truncated instead of rounded apex of telson, pleopod 2 exopod wider than long.

Family Philosciidae

Genus ***Papuaphiloscia*** Vandel

Papuaphiloscia laevis (Schultz, 1973), **new combination.** Figs. 3–4
Haplophiloscia laevis Schultz, 1973:159, figs. 34–52; Howarth, 1987:221.

Specimens examined. HAWAI'I: 10♂, 17♀ (MF), 2♂, 2♀ (BPBM), Kaūmana, Kaūmana Cave, 9.I.1985; 1♂ (MF), Kalapana, Cave of Refuge, 8.I.1985 (F. Stone).

Hawaiian records. Hawai'i (Schultz 1973).

Distribution. Known only from caves on Hawai'i Island.

Remarks. Schultz (1973) described *Haplophiloscia laevis* from Kaūmana Cave. Examination of topotypes shows the genus *Haplophiloscia* to be a junior synonym of *Papuaphiloscia*, established by Vandel (1970b) for *P. insulana* from a cave in the Ryukyus. Vandel (1973b:55) redefined the genus and included 6 new species from Melanesia. All the characters listed by Vandel in the redefinition of *Papuaphiloscia* are present also in *Haplophiloscia*: (1) molar penicil of mandible simple (Fig. 3C); (2) teeth of maxillular outer ramus simple (Fig. 3D); (3) maxillipedal endite with a penicil (Fig. 3E); (4) gland pores on pereonites absent; (5) pleon epimera reduced, adpressed, not visible in dorsal view; and (6) curve d/c of noduli laterales with a peak on pereionite 4 (Fig. 3A).

P. laevis was described from female specimens. The material examined here contains several males whose characters are illustrated in Fig. 4. *P. laevis* appears very close (if not identical) to *P. insulana* and a comparison with specimens of this species is necessary to confirm the validity of *P. laevis*.

Genus ***Burmoniscus*** Collinge

Burmoniscus mauritiensis (Taiti & Ferrara, 1983)
Rennelloscia mauritiensis Taiti & Ferrara, 1983:203, fig. 2.

Specimens examined. HAWAI'I: many ♂ and ♀ (MF), 2♂, 2♀ (BPBM), Hilo, 7.I.1985.

Distribution. Previously known only from Mauritius (Taiti & Ferrara 1983).

Burmoniscus okinawaensis (Nunomura, 1986), **new combination.** Figs. 5–6
Setaphora okinawaensis Nunomura, 1986:28, figs. 72–73.

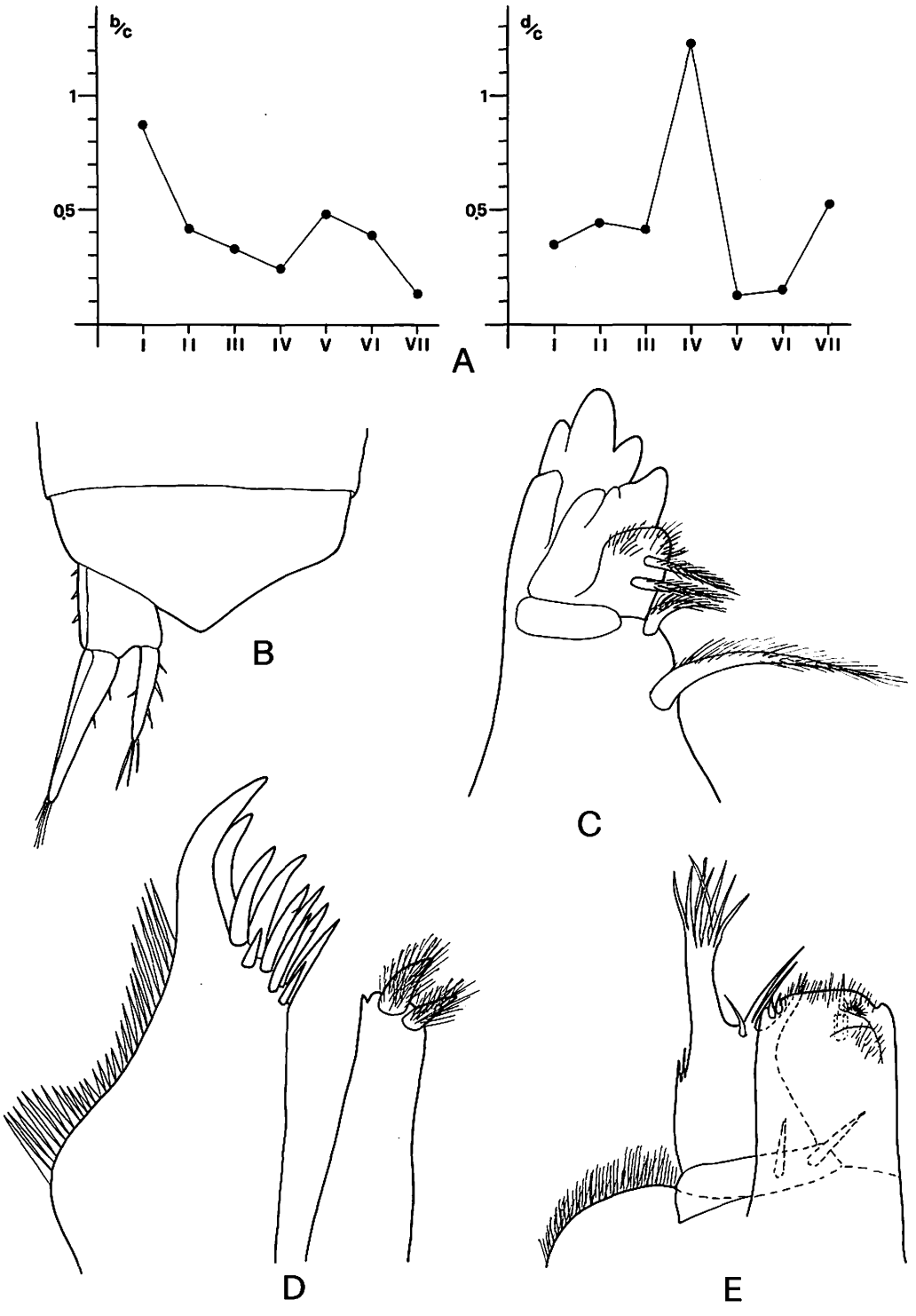

Fig. 3. *Papuaphiloscia laevis* (Schultz), ♂: **A,** coordinates of noduli laterales; **B,** telson and left uropod; **C,** mandible; **D,** maxillule; **E,** maxilliped.

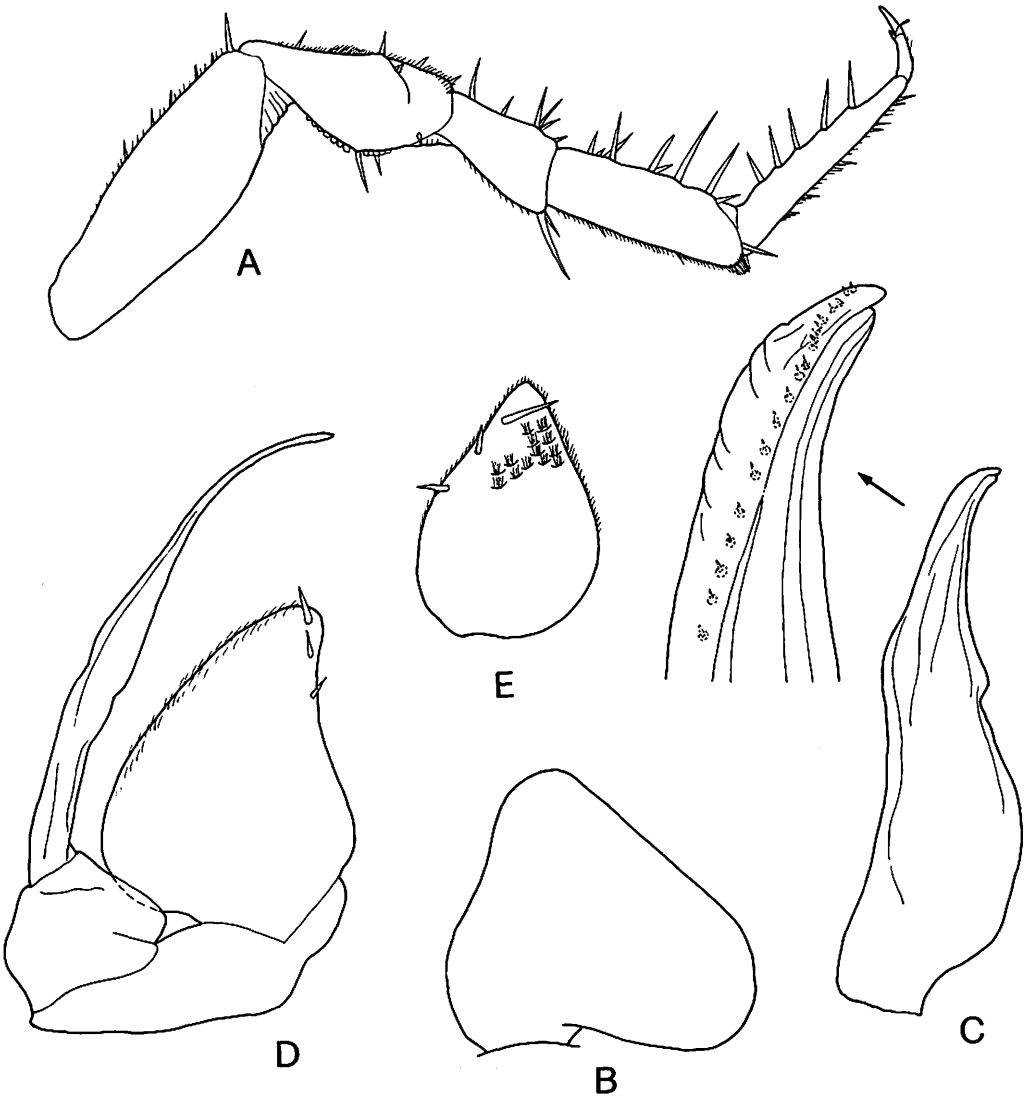

Fig. 4. *Papuaphiloscia laevis* (Schultz), ♂: **A,** pereopod 7; **B,** pleopod 1 exopod; **C,** pleopod 1 endopod; **D,** pleopod 2; **E,** pleopod 5 exopod.

Specimens examined. O'AHU: 13♂, 23♀ (MF), 2♂, 2♀ (BPBM), Poamoho Ridge, rain forest, 22.XII.1984; 6♂, 12♀ (MF), along Mānoa Stream, near Univ. of Hawai'i, 31.XII.1984. HAWAI'I: 1♂, 1♀ (MF), Kalapana, 8.I.1985; 2♂, 5♀ (MF), Kukuihala, 8.I.1985.

Distribution. Previously known only from Japan (Nunomura 1986).

Remarks. These specimens are identified as *okinawaensis* since they correspond quite well to the description given by Nunomura (1986) as *Setaphora okinawaensis*, especially in the shape of male pleopod 1. Only the coordinates of noduli laterales are different (cf. Nunomura 1986: Fig. 73H) but certainly the illustration by Nunomura is incorrect, since no philosciids are known to have d/c coordinates with a peak only on pereonite 2.

However, we must point out that other species described by Nunomura (1986) in *Setaphora*

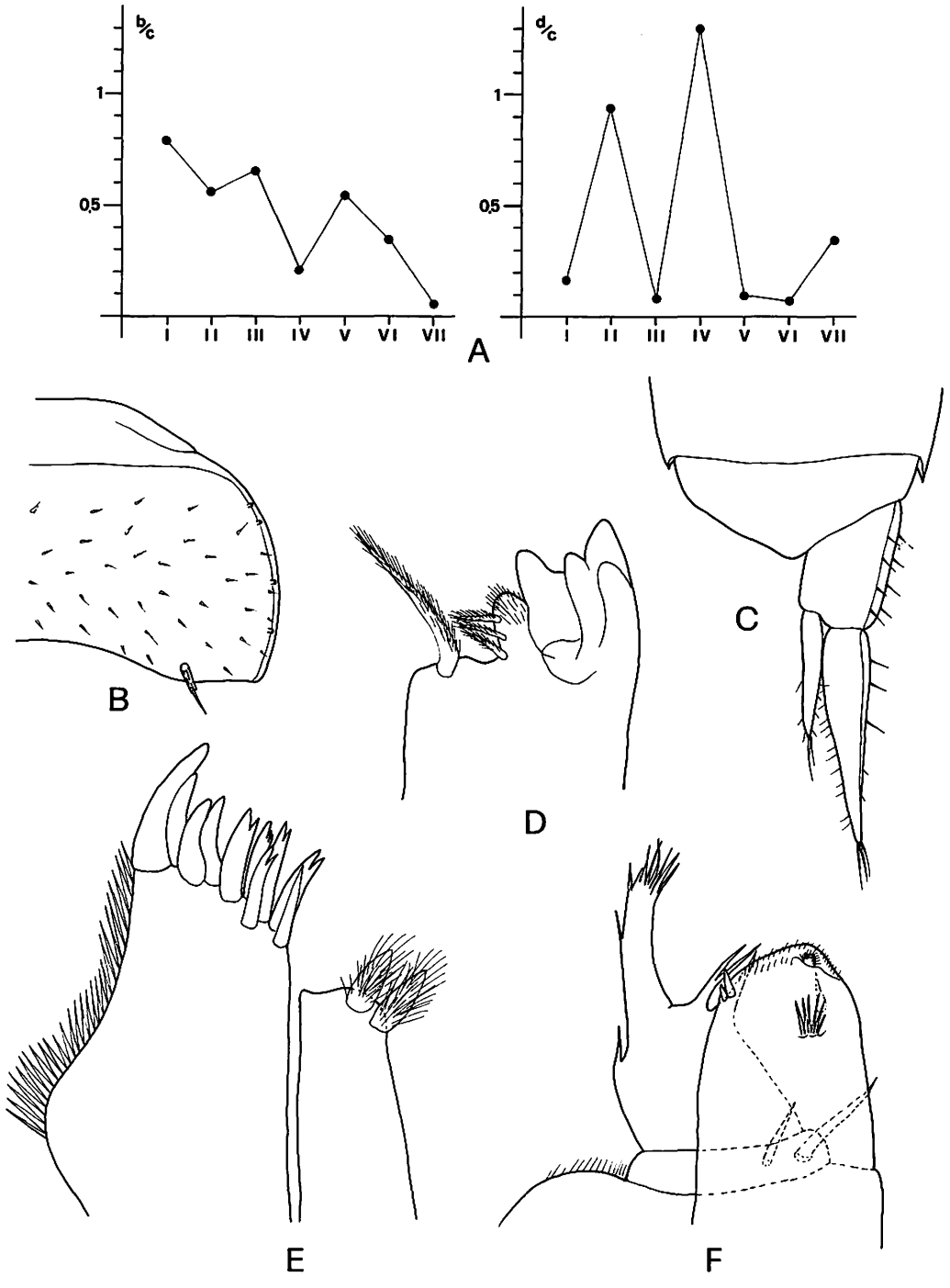

Fig. 5. *Burmoniscus okinawaensis* (Nunomura), ♂: **A,** coordinates of noduli laterales; **B,** right side of pereonite 7; **C,** telson and right uropod; **D,** mandible; **E,** maxillule; **F,** maxilliped.

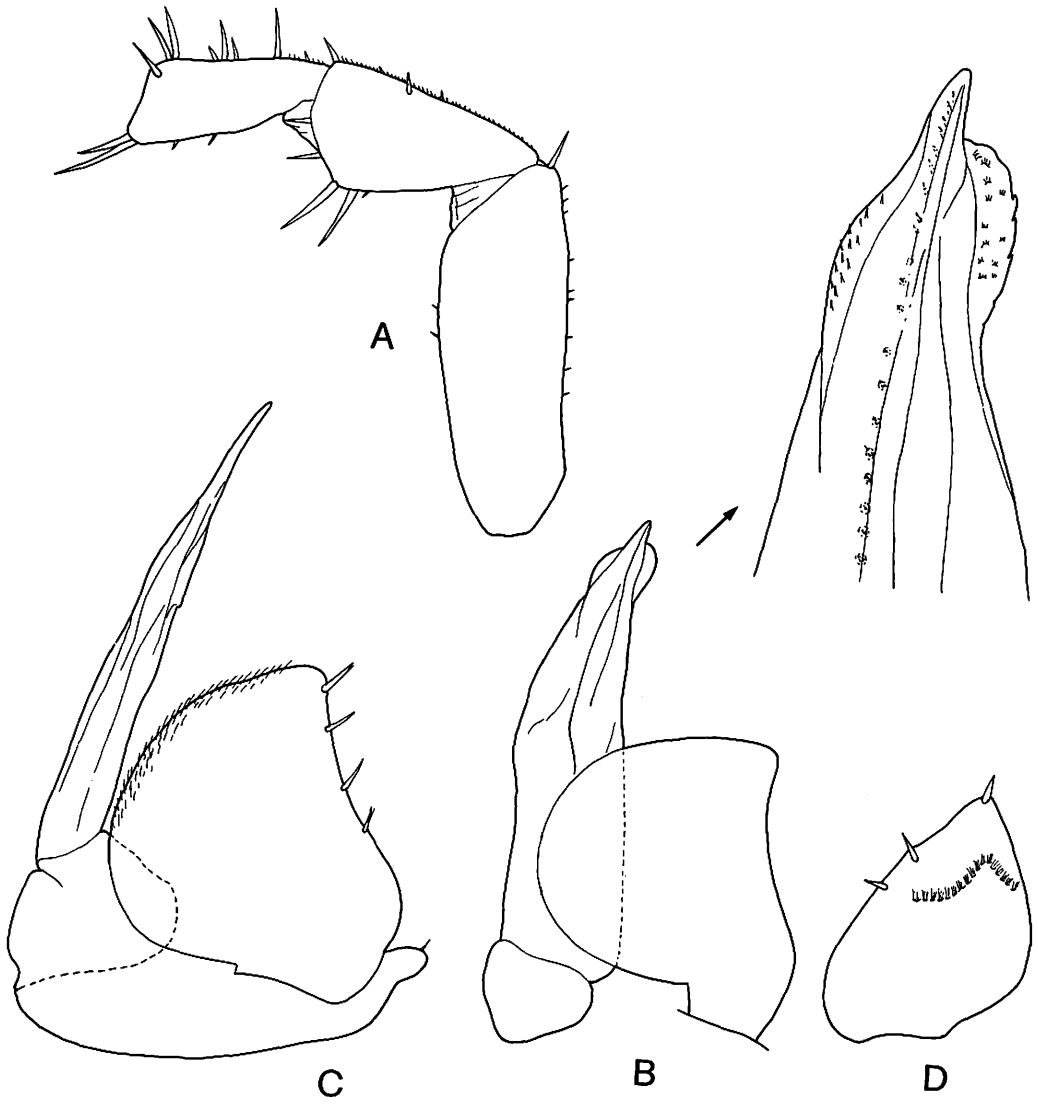

Fig. 6. *Burmoniscus okinawaensis* (Nunomura), ♂: **A,** pereopod 7; **B,** pleopod 1; **C,** pleopod 2; **D,** pleopod 5 exopod.

appear very similar (but we suspect identical) to *B. okinawaensis*. Unfortunately, Nunomura's descriptions, and especially his illustrations, are often vague, thus recognition of species is very difficult.

The species *okinawaensis* cannot be ascribed to *Setaphora* Budde-Lund nor its senior synonym, *Anchiphiloscia* Stebbing, since it has a distinct penicil on the maxillipedal endite. It instead fits all the characters of *Burmoniscus*, hence the new combination given here.

Diagnostic characters of this species are shown in Figs. 5–6.

Burmoniscus meeusei (Holthuis, 1947) **new combination.** Figs. 7–8
Chaetophiloscia meeusei Holthuis, 1947:124, figs. 1–2.

Specimens examined. HAWAI'I: 5♂, 5♀, 17 juvs (MF), 2♂, 2♀ (BPBM), Kalapana, 8.I.1985; 1♂, 2♀ (MF), Kukuihala, 8.I.1985.

Distribution. Previously known only from greenhouses of the Royal Botanic Garden at Kew, England (Holthuis 1947).

Remarks. This species was included in *Chaetophiloscia* Verhoeff by Holthuis (1947). Examination of topotypes and specimens from Hawai'i shows this species to belong to *Burmoniscus*.

Diagnostic characters of *B. meeusei* are shown in Figs. 7–8.

Genus ***Anchiphiloscia*** Stebbing

Anchiphiloscia pilosa (Budde-Lund, 1913)
Setaphora pilosa Budde-Lund, 1913:388, pl. 22, figs. 19–23.

Specimens examined. O'AHU: 5♂, 7♀ (MF), along Mānoa Stream, near Univ. of Hawai'i, 31.XII.1984. HAWAI'I: 5♂, 19♀ (MF), 2♂, 2♀ (BPBM), Kukuihala, 8.I.1985.

Distribution. Previously recorded from Chagos Archipelago (Budde-Lund 1913; Ferrara & Taiti 1986), Peninsular Malaysia, Java, Bali, and Krakatau (Green, Ferrara & Taiti, 1990).

Genus ***Australophiloscia*** Green

Australophiloscia societatis (Maccagno, 1932), **new combination.** Figs. 9–10
Philoscia societatis Maccagno, 1932:4, figs. 7–20.
Philoscia (Setaphora?) fasciata Jackson, 1933a:151, fig. 2; Jackson, 1933b:87.
Philoscia fasciata: Jackson, 1938:181.
Australophiloscia nomukensis Dalens, 1988:200, fig. 4.

Specimens examined. O'AHU: 5♂, 3♀ (MF), Poamoho Ridge, rain forest, 22.XII.1984; 2♂, 11♀ (MF), Mānoa, 21.XII.1984; 2♂, 1♀ (MF), Coconut I, 5.I.1985. HAWAI'I: 2♀ (MF), Hilo, 7.I.1985; 4♂, 4♀ (MF), 2♂, 2♀ (BPBM), Kukuihala, 8.I.1985; 1♂, 1♀ (MF), Kalapana, 8.I.1985.

Distribution. Polynesia.

Remarks. These specimens correspond to the description and illustrations given by Maccagno (1932) for *Philoscia societatis* from Moorea (Society Islands). From a comparison with type specimens of *Philoscia (Setaphora?) fasciata* described by Jackson (1933a) from the Marquesas Islands and recorded by Jackson (1933b; 1938) from the Tuamotu Islands, Pitcairn Island, Austral Islands and Society Islands, they were found to also be conspecific with *fasciata*. Comparing the description and illustrations of *Australophiloscia nomukensis* Dalens (1988) from Tonga Archipelago also shows these specimens to be conspecific.

The species cannot be placed in *Philoscia* Latreille because of the absence of frontal line and respiratory areas, molar penicil of mandible simple, different number and disposition of noduli laterales or in *Anchiphiloscia* particularly because of the different number and disposition of noduli laterales. This last character precludes it from placement in *Australophiloscia* as defined by Vandel (1973a). Examination of specimens of *Australophiloscia nichollsi* Vandel shows that the number and disposition of noduli laterales are not as described by Vandel (1973a:70, Table VII) but as observed in our specimens (i.e., one nodulus lateralis per side on pereonites 1–6 and 2 per side on pereonite 7, with d/c coordinates having a peak on pereonite 4 [see Fig. 9A]). All the other characters used to define *Australophiloscia* are present in *P. societatis*. In our opinion the correct placement of these specimens is in *Australophiloscia societatis* (Maccagno), of which *Philoscia (Setaphora) fasciata* and *Australophiloscia nomukensis* are new junior synonyms.

Diagnostic characters of this species are illustrated in Figs. 9–10.

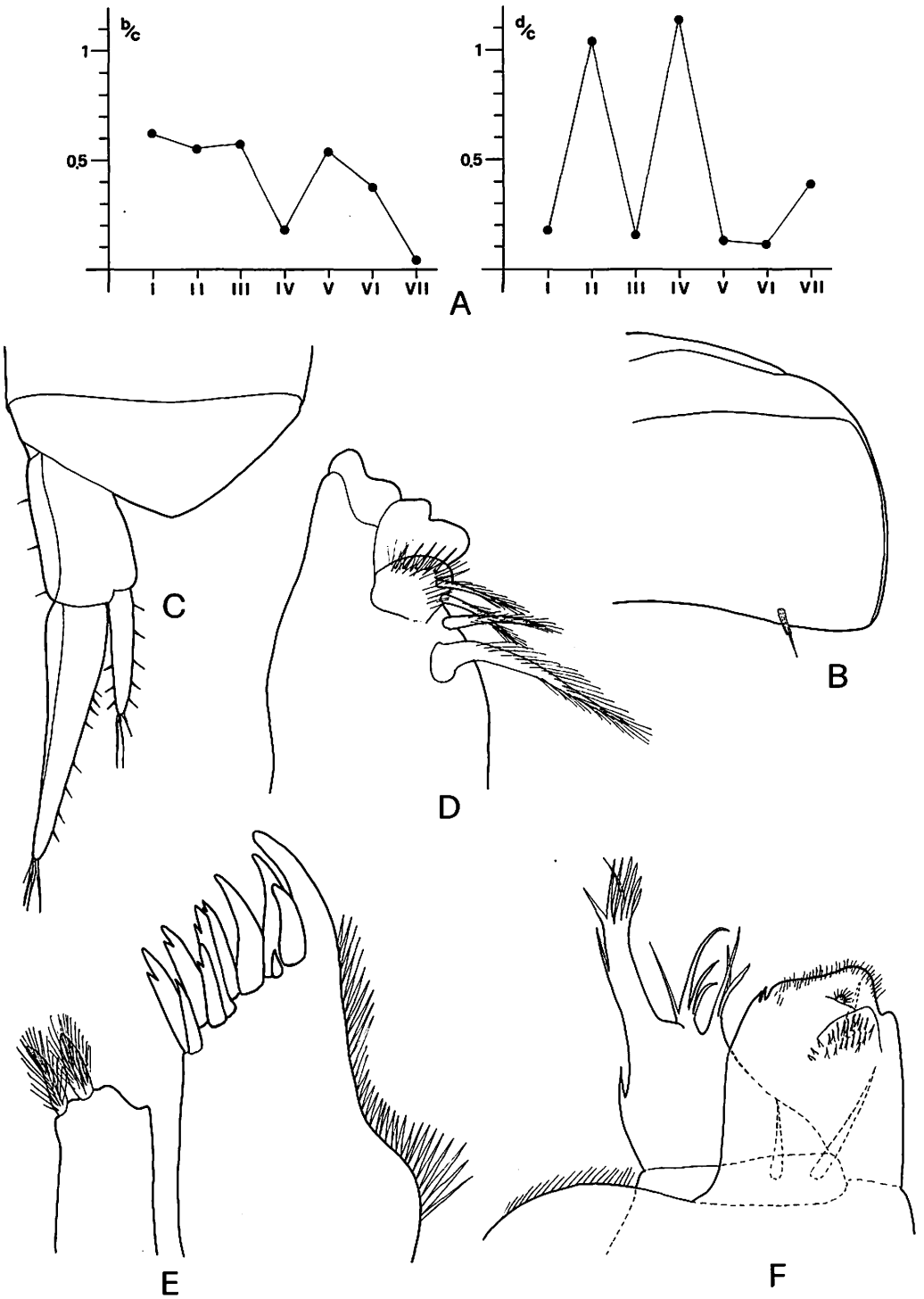

Fig. 7. *Burmoniscus meeusei* (Holthuis), ♂: **A,** coordinates of noduli laterales; **B,** right side of pereonite 7; **C,** telson and left uropod; **D,** mandible; **E,** maxillule; **F,** maxilliped.

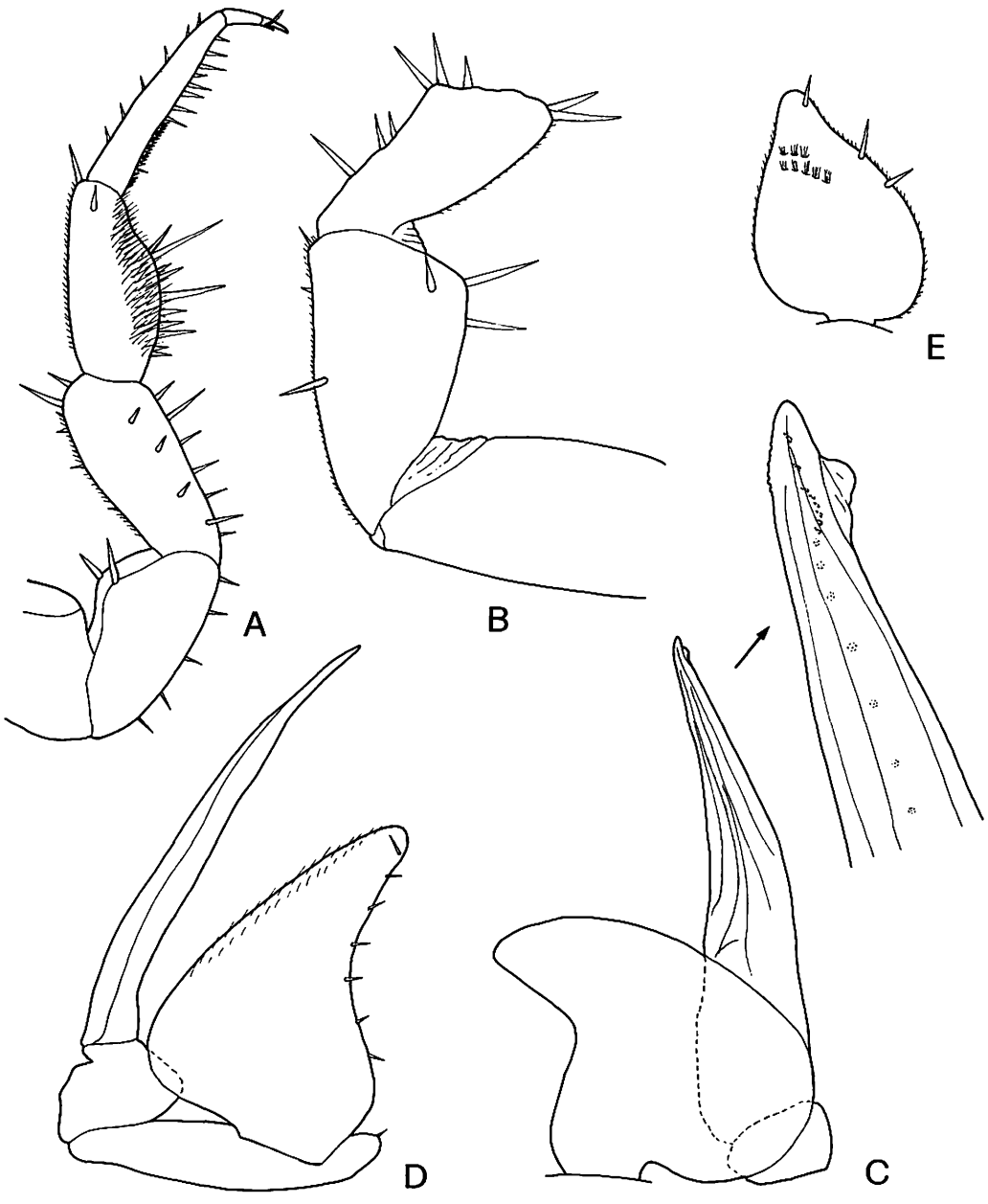

Fig. 8. *Burmoniscus meeusei* (Holthuis), ♂: **A,** pereopod 1; **B,** pereopod 2; **C,** pleopod 1; **D,** pleopod 2; **E,** pleopod 5 exopod.

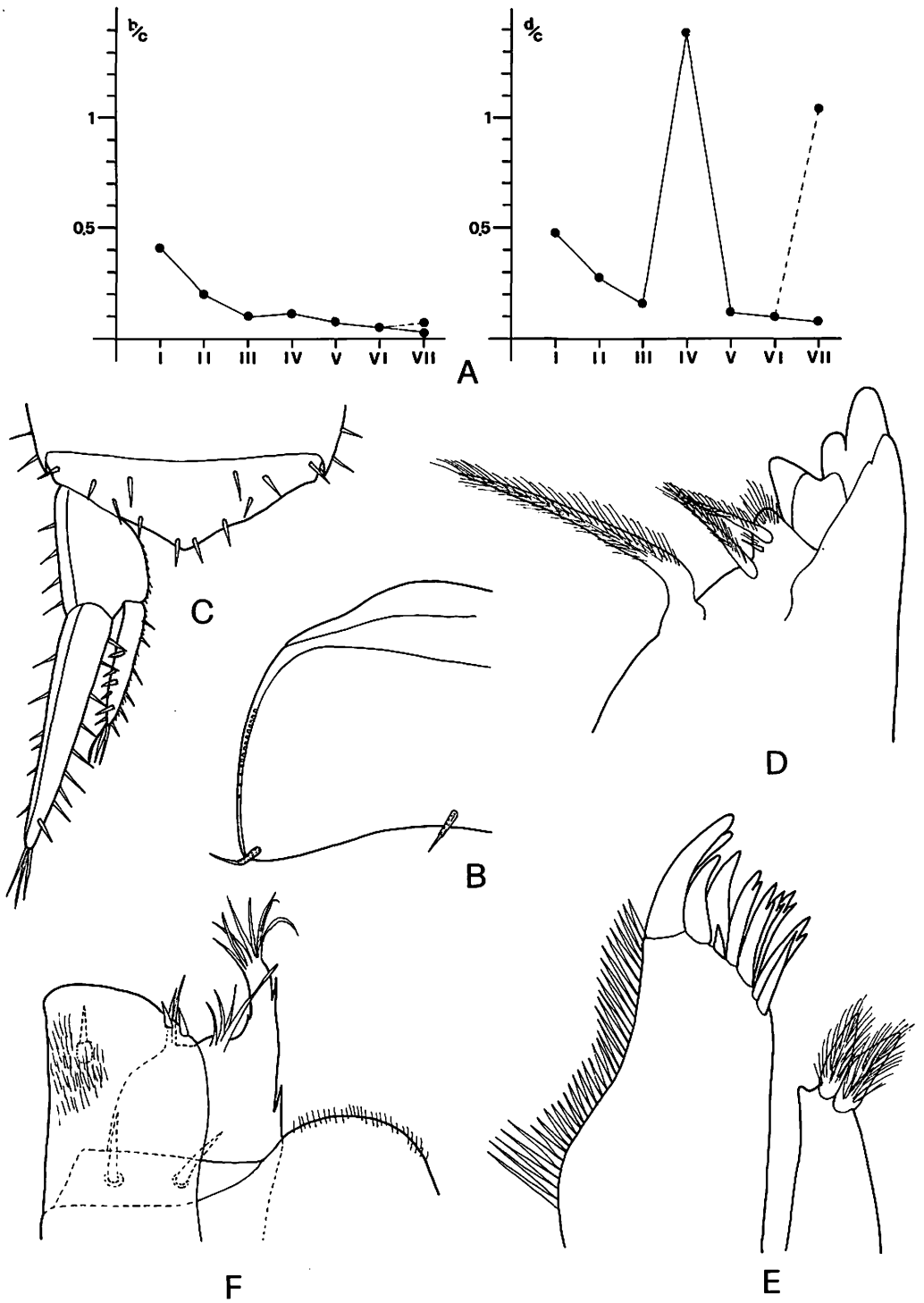

Fig. 9. *Australophiloscia societatis* (Maccagno), ♂: **A,** coordinates of noduli laterales; **B,** left side of pereonite 7; **C,** telson and left uropod; **D,** mandible; **E,** maxillule; **F,** maxilliped.

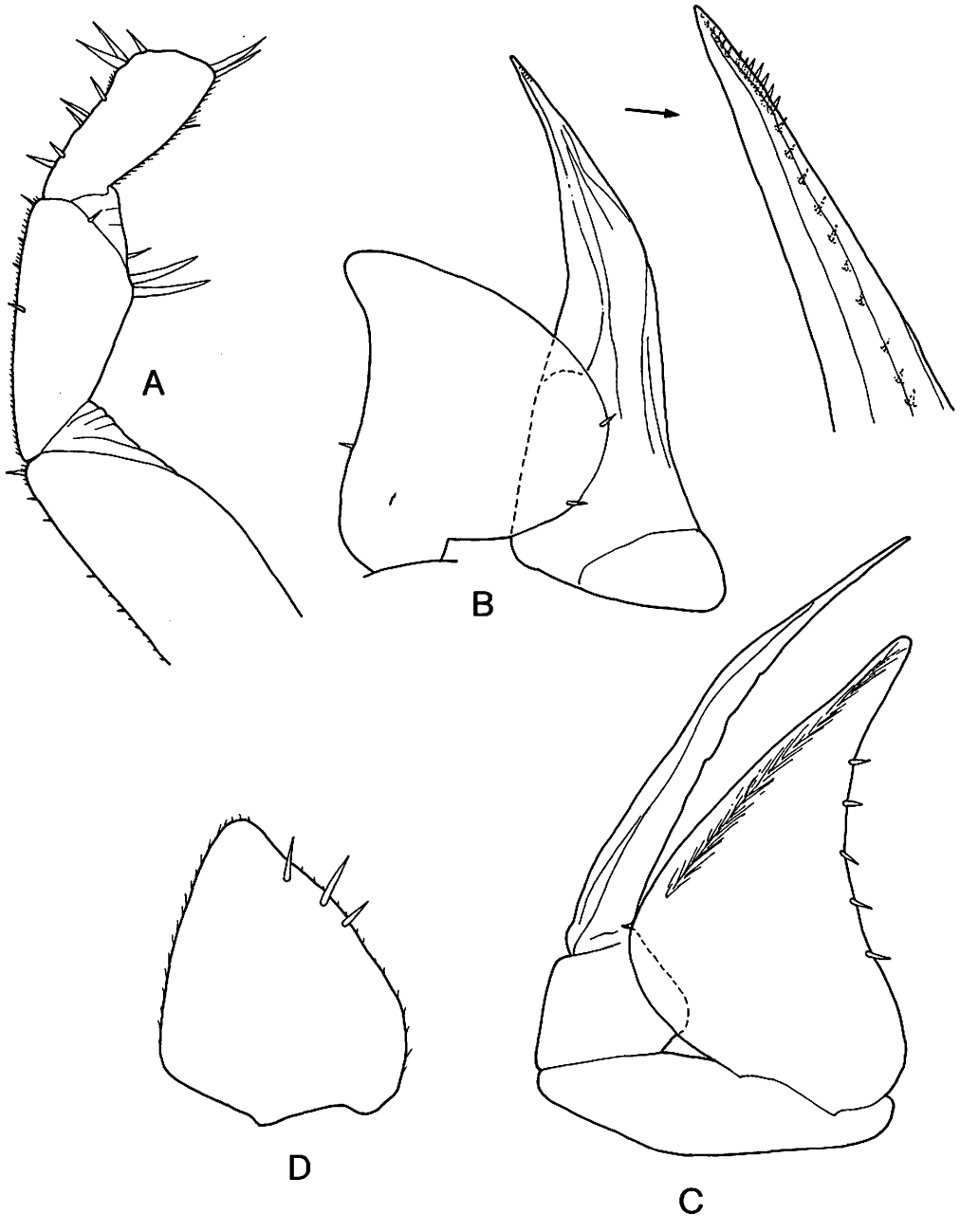

Fig. 10. *Australophiloscia societatis* (Maccagno), ♂: **A,** pereopod 7; **B,** pleopod 1; **C,** pleopod 2; **D,** pleopod 5 exopod.

Family Platyarthridae

Genus *Trichorhina* Budde-Lund

Trichorhina tomentosa (Budde-Lund, 1893)
Trichorhina tomentosa: Schultz, 1973:154.

Specimens examined. O'AHU: 3♀ (MF), Mākaha, 29.XII.1984; many ♀ (MF), 5♀ (BPBM), along Mānoa Stream, near the Univ. of Hawai'i, 31.XII.1984; 19♀ (MF), Coconut I, 5.I.1985. HAWAI'I: many ♀ (MF), South Point, 6.I.1985.

Hawaiian records. O'ahu and Kaua'i (Schultz 1973).

Distribution. Pantropical.

Trichorhina heterophthalma Lemos de Castro, 1964

Specimens examined. O'AHU: 25♀ (MF), 3♀ (BPBM), Coconut I, 5.I.1985.

Distribution. Pantropical.

Genus *Niambia* Budde-Lund

Niambia sp. Fig. 11

Specimens examined. O'AHU: 1♂ (MF), Mākaha, 29.XII.1984.

Remarks. This specimen is placed here in the genus *Niambia*, which has a southern African distribution with a few species introduced into the New World [*N. capensis* (Dollfus) in California and St. Helena Island; *N. squamata* (Budde-Lund) in Brazil].

The specimen examined here appears close to *N. pallida* Budde-Lund and *N. flavescens* Barnard from Namibia and South Africa, but more material is needed for correct specific identification.

Family Trachelipidae

Genus *Nagurus* Holthuis

Nagurus cristatus (Dollfus, 1889)
Porcellio cristatus Dollfus, 1889:91, pl. 5, figs. 2a–d.

Specimens examined. HAWAI'I: 2♀ (MF), Hilo, 7.I.1985; 19♀ (MF), Kalapana, 8.I.1985; 6♀ (MF), 3♀ (BPBM), Kukuihala, 8.I.1985.

Distribution. Pantropical.

Nagurus nanus (Budde-Lund, 1908)
Nagara nana Budde-Lund, 1908:285, pl. 14, figs. 40–47.

Specimens examined. O'AHU: 6♂, 12♀ (MF), 2♂, 2♀ (BPBM), Mānoa, 21.XII.1984; 1♂, 1♀ (MF), Turtle Bay, 25.XII.1984; 4♂, 7♀ (MF), Coconut I, 5.I.1985. HAWAI'I: 6♂, 7♀ (MF), Hilo, 7.I.1985; 4♂, 1♀ (MF), Kalapana, 8.I.1985.

Distribution. Pantropical.

Family Porcellionidae

Genus *Porcellionides* Miers

Porcellionides pruinosus (Brandt, 1833)
Porcellio pruinosus Brandt, 1833:181.
Porcellionides pruinosus: Butler & Usinger, 1963a:239; Schultz, 1973:153.

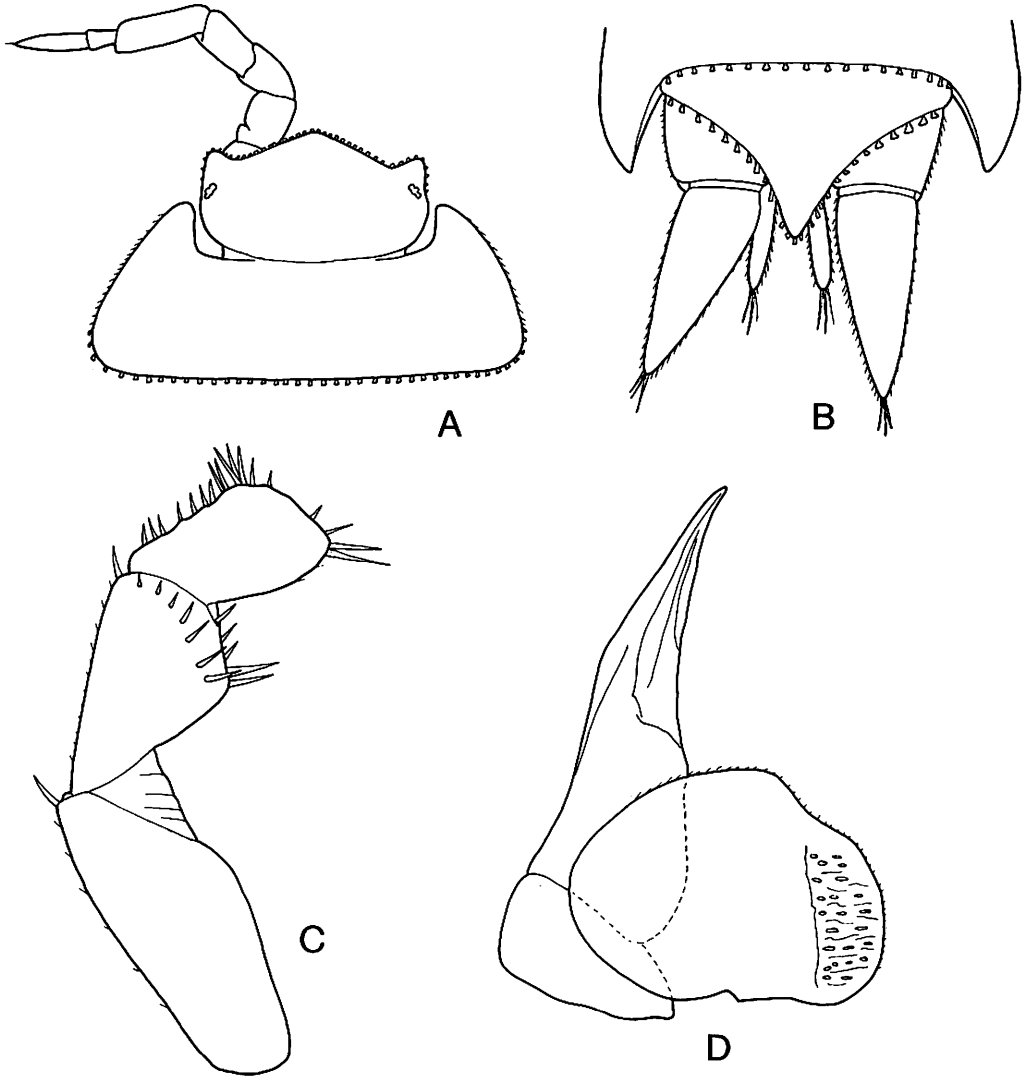

Fig. 11. *Niambia* sp., ♂: **A,** left antenna, cephalon and pereonite 1; **B,** pleonite 5, telson and uropods; **C,** pereopod 7; **D,** pleopod 1.

Porcellionides sp.: Butler & Usinger, 1963b:4.
Metoponorthus pruinosus: Schultz, 1973:154.

Specimens examined. O'AHU: 2 juvs (MF), Mānoa, 21.XII.1984; 1♂, 3♀ (MF), 1♂, 1♀ (BPBM), Turtle Bay, 25.XII.1984; 2♀, 2 juvs (MF), Honolulu, Ala Moana Park, 27.XII.1984; 2♂, 1♀ (MF), Honolulu, Bishop Museum garden, 28.XII.1984; 1♀ (MF), Mākaha, 29.XII.1984; 1♂, 1♀ (MF), Coconut I, 5.I.1985. HAWAI'I: 5 juvs (MF), South Point, 6.I.1985.

Hawaiian records. Kure (Butler & Usinger 1963a), Laysan (Butler & Usinger 1963b), O'ahu (Schultz 1973).

Distribution. Cosmopolitan.

Genus ***Agabiformius*** Verhoeff

Agabiformius lentus (Budde-Lund, 1885)
Lyprobius lentus Budde-Lund, 1885:230.

Specimens examined. O'AHU: 1♂, 6♀ (MF), Mānoa, 21.XII.1984; 5♂, 4♀ (MF), Turtle Bay, 25.XII.1984; 2♂, 8♀ (MF), 2♂, 2♀ (BPBM), Honolulu, Ala Moana Park, 27.XII.1984; 1♀ (MF), Honolulu, Bishop Museum garden, 28.XII.1984; 3♂, 7♀ (MF), Mākaha, 29.XII.1984; 3♂, 9♀ (MF), Coconut I, 5.I.1985.

Distribution. This species is of Mediterranean origin and has been introduced in many parts of the world.

Genus ***Porcellio*** Latreille

Porcellio scaber Latreille, 1804
Porcellio scaber Latreille, 1804:45; Dollfus, 1900:524; Jackson, 1941:14; Schultz, 1973:154.

Specimens examined. HAWAI'I: 6♂, 4♀, 15 juvs (MF), 2♂, 2♀ (BPBM), Hawaii Volcanoes National Park, near Kīlauea Iki, forest, 7.I.1985.

Hawaiian records. Hawai'i (Dollfus 1900), Kaua'i (Schultz 1973).

Distribution. Cosmopolitan.

Porcellio laevis Latreille, 1804
Porcellio laevis Latreille, 1804:46; Dollfus, 1890:66; Dollfus, 1900:524; Illingworth, 1928:42; Van Name, 1936:229; Jackson, 1941:14; Schultz, 1973:154; Goff et al., 1986:57.
Porcelleo laevis: Howarth, 1979:140.
Porcello laevis: Early & Goff, 1986:522.

Specimens examined. O'AHU: 1♂, 4♀, 1 juv. (MF), Hanauma Bay, 19.XII.1984; 4♀ (MF), Turtle Bay, 25.XII.1984; 1♂, 2♀ (MF), Honolulu, Bishop Museum garden, 28.XII.1984; 3 juvs (MF), Mākaha, 29.XII.1984. HAWAI'I: 2♂ (MF), 2♂ (BPBM), South Point, 6.I.1985.

Hawaiian records. O'ahu (Dollfus 1890; Schultz 1973; Early & Goff 1986; Goff et al. 1986), Lāna'i (Dollfus 1900; Illingworth 1928), Kaua'i (Schultz 1973), Hawai'i (Howarth 1979).

Distribution. Cosmopolitan.

Porcellio lamellatus lamellatus Budde-Lund, 1885
Porcellio lamellatus Budde-Lund, 1885:127.

Specimens examined. O'AHU: 21♂, 17♀ (MF), 2♂, 2♀ (BPBM), Turtle Bay, 25.XII.1984.

Distribution. *P. lamellatus* is a littoral species, widely distributed along the shores and coasts of the Mediterranean Sea, Spain, Portugal, Morocco, and some North Atlantic islands. As in many littoral forms, it has been introduced in many parts of the world (see Bunn & Green 1982). The O'ahu specimens belong to the nominate subspecies.

FAMILY EUBELIDAE

Genus ***Elumoides*** Taiti & Ferrara

Elumoides monocellatus Taiti & Ferrara, 1983
Elumoides monocellatus Taiti & Ferrara, 1983:218, figs. 8–9.

Specimens examined. O'AHU: many specimens (MF), Mānoa, 21.XII.1984; 7 specimens (MF), along Mānoa Stream, near Univ. of Hawai'i, 31.XII.1984; 18 specimens (MF), 4 specimens (BPBM), Coconut I, 5.I.1984.

Distribution. Previously known from Réunion, Mauritius and Seychelles (Taiti & Ferrara 1983).

Family Armadillidae

Genus *Cubaris* Brandt

Cubaris murina Brandt, 1833
Cubaris murina Brandt, 1833:190; Van Name, 1936:387; Jackson, 1941:16.
Armadillo murinus: Budde-Lund, 1885:27; Budde-Lund, 1904:119.
Armadillo Javanensis: Dollfus, 1890:65.

Specimens examined. O'AHU: 9 juvs (MF), Honolulu, Ala Moana Park, 27.XII.1984; 4♀ (MF), Mākaha, 29.XII.1984; 5♂, 5♀ (MF), 2♂, 2♀ (BPBM), Coconut I, 5.I.1985. HAWAI'I: 2♂, 8♀, 9 juvs (MF), Kalapana, 8.I.1985.

Hawaiian records. O'ahu (Budde-Lund 1885).

Distribution. Pantropical.

Genus *Venezillo* Verhoeff

Venezillo parvus (Budde-Lund, 1885)
Armadillo parvus Budde-Lund, 1885:25.

Specimens examined. O'AHU: 1♂, 7♀, 2 juvs (MF), Mānoa, 21.XII.1984; 1♂, 7♀ (MF), Turtle Bay, 25.XII.1984; 5♂, 6♀, 6 juvs (MF), 2♂, 2♀ (BPBM), Honolulu, Ala Moana Park, 27.XII.1984; 2♂, 2♀ (MF), Honolulu, Bishop Museum garden, 28.XII.1984; many ♂ and ♀ (MF), Coconut I, 5.I.1985. HAWAI'I: 5♀, 1 juv. (MF), Kalapana, 8.I.1985.

Distribution. Pantropical.

Remarks. This species, originally described from the Seychelles, is very common in the tropics and subtropics encompassed by the Indian and Pacific oceans. In the Atlantic Ocean it has been recorded only from Ascension Island, but it is present also in Florida and Georgia because *evergladensis* Schultz is a junior synonym of *parvus* (cf. Schultz 1963:210, Figs. 1–26). Specimens collected in Florida [4♂, 13♀ (MF), Everglades, Miccosukee Indian Reservation, 17.XII.1984, (S. Taiti); 1♀ (MF), Key West, 15.XII.1984 (S. Taiti)] were also examined.

Genus *Myrmecodillo* Arcangeli

Myrmecodillo pacificus Taiti & Ferrara, **new species.** Figs. 12–13

Description. Colorless body. Eye absent. Tergal cuticle covered by verrucalike prominences and tiny scale-spines (Fig. 12A). Dorsal ornamentation with rounded tubercles arranged as in Fig. 12C. Able to roll into perfect ball. Cephalon with frontal shield grooved along entire length; frontal margin with clear depression in middle holding tip of telson when enrolled. Pereonite 1 with posterior margin sinuous; schisma formed by 2 large rounded lobes distant from each other. Epimera of pereonites 2 and 3 triangular, each with ventral tooth; epimera of pereonites 4–7 quadrangular. Telson much wider than long, with short quadrangular distal part. Antenna short with stout peduncular segments; 2nd flagellar article ca. 2× length of 1st. Uropod roughly rectangular, notch on posteromedial corner containing small exopod.

MALE. Pereopods without particular modifications. Pleopod 1 exopod short, ovoid; endopod with pointed apex slightly bent outwards. Pleopod 2 endopod much longer than exopod.

Size. 2.3 x 1 mm.

Type data. Holotype ♂, HAWAI'I: Kalapana, 8.I.1985 (MF). Paratypes: 23♂ and ♀ (MF), 1♂, 2♀ (BPBM), topotypic.

Etymology. The name refers to the Pacific Ocean.

Remarks. The genus *Myrmecodillo* has been discussed and redefined by Taiti & Ferrara

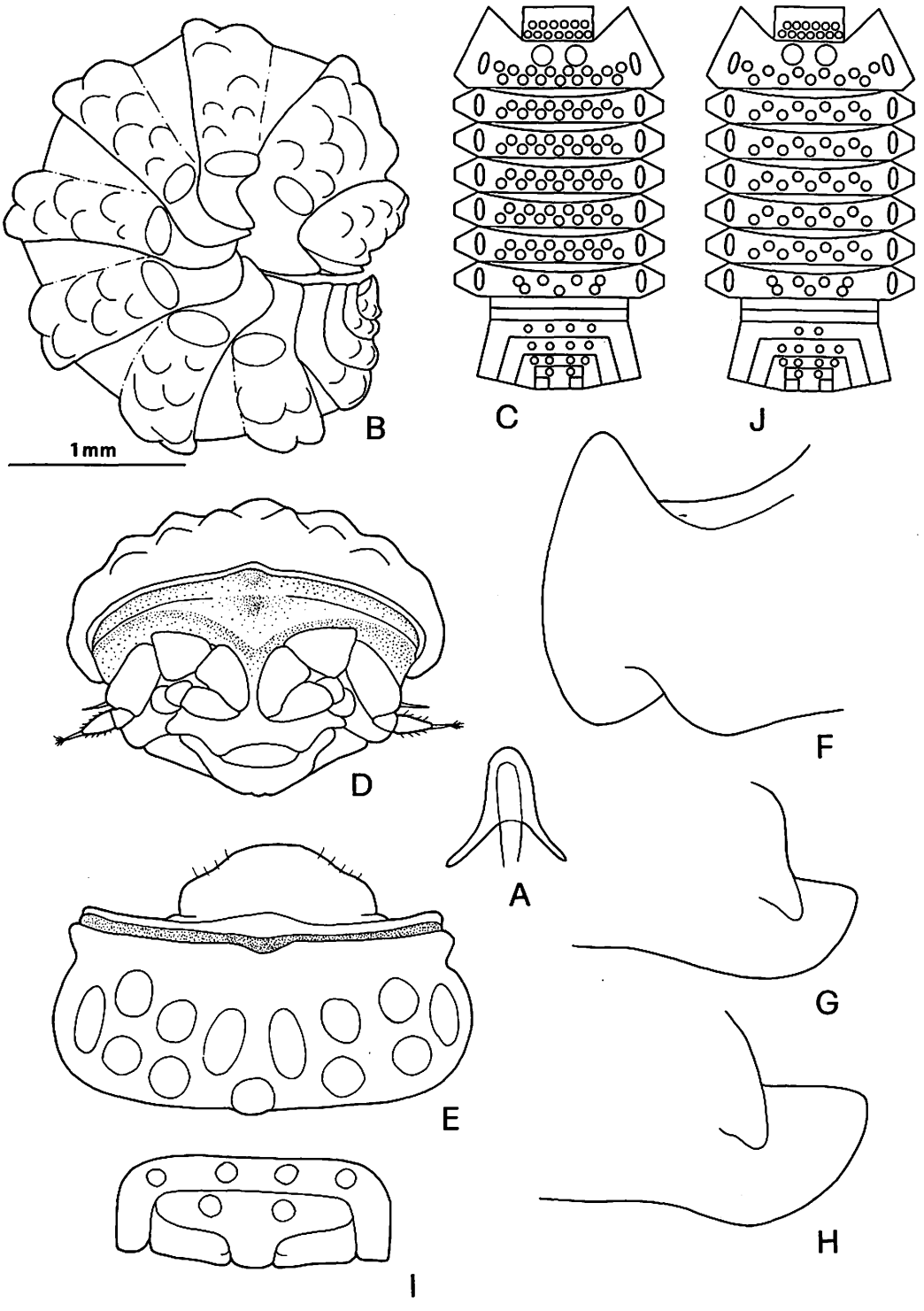

Fig. 12. *Myrmecodillo pacificus*, n. sp.: **A,** scale-spine; **B,** adult female in lateral view; **C,** disposition of dorsal tubercles; **D,** cephalon in frontal view; **E,** cephalon in dorsal view; **F,** left side of pereonite 1 in dorsal view; **G,** left side of pereonite 2 in ventral view; **H,** left side of pereonite 3 in ventral view; **I,** pleonite 5, telson and uropods. *Myrmecodillo hypselos* (Barnard): **J,** disposition of dorsal tubercles.

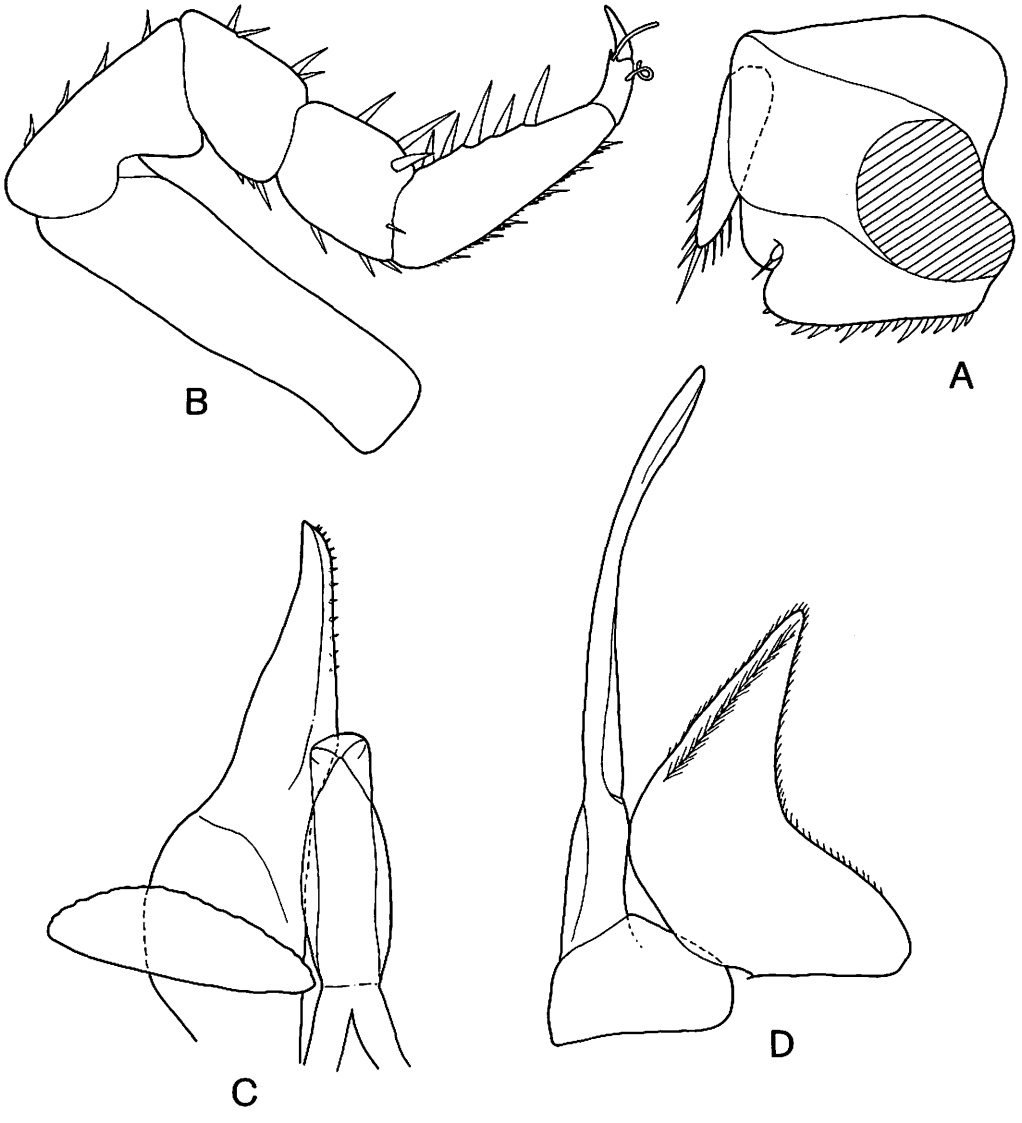

Fig. 13. *Myrmecodillo pacificus*, n. sp., ♂: **A,** uropod; **B,** pereopod 7; **C,** pleopod 1; **D,** pleopod 2.

(1983). It currently includes only 3 species, *M. hypselos* (Barnard) from South Africa, *M. pollex* (Barnard) from Mauritius and Réunion and *M. otion* (Barnard) from Madagascar. Other species, however, should be transferred to this genus, viz. *Hybodillo pygmaeus* Vandel from New Britain I. (according to an examination of specimens) and *Lobodillo jacksoni* Dalens from Tonga Archipelago (according to description and illustration). Most probably *Armadillo fenerivei* Barnard from Madagascar belongs here.

All species are extremely similar in the structure of the cephalon, pereon, pleon, telson, and appendages. They can be distinguished by the different development and disposition of the tergal ornamentation. *M. pacificus* is very close to *hypselos* and is distinguished by having 2 tubercles more per side on pereonites 1–6 and 4 tubercles instead of 2 on pleonite 3 (cf. Figs. 12C, J).

Table 1. List of terrestrial isopods recorded from the Hawaiian Islands.

	Kure	Laysan	Kaua'i	O'ahu	Moloka'i	Lāna'i	Maui	Hawai'i
LIGIIDAE								
1. *Ligia hawaiensis* Dana			x	x	x			
2. *Ligia exotica* Roux*				x				
3. *Ligia perkinsi* Dollfus*			x					x
STYLONISCIDAE								
4. *Styloniscus mauritiensis* (Barnard)				x				x
5. *Styloniscus spinosus* (Patience)				x				x
6. *Clavigeroniscus riquieri* Arcangeli								x
UNDETERMINED FAMILY								
7. *Buchnerillo* sp.				x				
SCYPHACIDAE								
8. *Armadilloniscus litoralis* Budde-Lund				x				
9. *Armadilloniscus hawaiianus* Taiti & Ferrara				x				
10. *Alloniscus oahuensis* Budde-Lund			x	x	x	?x		x
OLIBRINIDAE								
11. *Olibrinus truncatus* Taiti & Ferrara, n. sp.				x				
PHILOSCIIDAE								
12. *Littorophiloscia culebrae* (Moore)				x				
13. *Littorophiloscia bifasciata* Taiti & Ferrara				x				x
14. *Littorophiloscia hawaiiensis* Taiti & Ferrara								x
15. *Tropicana minuta* Manicastri & Taiti				x				x
16. *Papuaphiloscia laevis* (Schultz)								x
17. *Hawaiioscia parvituberculata* Schultz			?x				x	
18. *Burmoniscus mauritiensis* (Taiti & Ferrara)								x
19. *Burmoniscus okinawaensis* (Nunomura)				x				x
20. *Burmoniscus meeusei* (Holthuis)								x
21. *Anchiphiloscia pilosa* (Budde-Lund)				x				x
22. *Australophiloscia societatis* (Maccagno)				x				x
PLATYARTHRIDAE								
23. *Trichorhina tomentosa* (Budde-Lund)			x	x				x
24. *Trichorhina heterophthalma* Lemos de Castro				x				
25. *Niambia* sp.				x				

Table 1 (continued)	Kure	Laysan	Kaua'i	O'ahu	Moloka'i	Lāna'i	Maui	Hawai'i
TRACHELIPIDAE								
26. *Nagurus cristatus* (Dollfus)								x
27. *Nagurus nanus* (Budde-Lund)				x				x
PORCELLIONIDAE								
28. *Porcellionides pruinosus* (Brandt)	x	x		x				x
29. *Agabiformius lentus* (Budde-Lund)				x				
30. *Porcellio scaber* Latreille			x					x
31. *Porcellio laevis* Latreille			x	x		x		x
32. *Porcellio lamellatus lamellatus* Budde-Lund				x				
EUBELIDAE								
33. *Elumoides monocellatus* Taiti & Ferrara				x				
ARMADILLIDAE								
34. *Hawaiodillo danae* (Dollfus)*			x					
35. *Hawaiodillo perkinsi* (Dollfus)*							x	
36. *Hawaiodillo sharpi* (Dollfus)*			x					
37. *Cubaris murina* Brandt				x				x
38. *Venezillo parvus* (Budde-Lund)				x				x
39. *Spherillo albospinosus* (Dollfus)*				x				
40. *Spherillo carinulatus* Budde-Lund*			x					
41. *Spherillo hawaiensis* Dana*			x	x	x	x		
42. *Reductoniscus costulatus* Kesselyak				x				x
43. *Myrmecodillo pacificus* Taiti & Ferrara, n. sp.								x
	1	1	11	29	3	3	2	24

*Need to be reexamined to clarify their taxonomic status.

DISCUSSION

Presently, a total of 43 species of terrestrial isopods have been recorded from the Hawaiian Islands (Table 1), a number that probably represents only a fraction of the actual oniscidean fauna of the archipelago, since most of the islands have been investigated only superficially.

Excluding *Buchnerillo* sp. and *Niambia* sp. because of their taxonomic uncertainties, the species recorded from the Hawaiian Islands can be placed in the following 5 distributional categories:

(a) Endemic species (13): *Armadilloniscus hawaiianus*, *Olibrinus truncatus*, *Littorophiloscia bifasciata*, *L. hawaiiensis*, *Papuaphiloscia laevis*, *Hawaioscia parvituberculata*, *Hawaiiodillo danae*, *H. perkinsi*, *H. sharpi*, *Spherillo albospinosus*, *S. carinulatus*, *S. hawaiensis*, and *Myrmecodillo pacificus*. These endemics represent 30% of the total number of Hawaiian species. We must, however,

point out that knowledge of the oniscid fauna of the Oriental and Australian regions is scattered and that the first 4 species are halophilic forms with a great facility for dispersal and most probably also occur elsewhere. Two genera, *Hawaiioscia* and *Hawaiiodillo*, appear to be exclusive to the archipelago. Their species were found on Kaua'i, Moloka'i and Maui, but not on O'ahu and Hawai'i where endemism is weak and represented by species belonging to cosmopolitan (*Armadilloniscus*), pantropical (*Littorophiloscia*), Indo-Pacific (*Olibrinus* and *Myrmecodillo*), and Australian genera (*Papuaphiloscia* and *Spherillo*).

(b) Pacific species (5): *Ligia hawaiensis*, *L. perkinsi*, *Burmoniscus okinawaensis*, *B. meeusei*, and *Australophiloscia societatis*.

(c) Indo-Pacific species (7): *Styloniscus mauritiensis*, *S. spinosus*, *Alloniscus oahuensis*, *Burmoniscus mauritiensis*, *Anchiphiloscia pilosa*, *Elumoides monocellatus*, and *Reductoniscus costulatus*.

(d) Pantropical species (10): *Ligia exotica*, *Clavigeroniscus riquieri*, *Littorophiloscia culebrae*, *Tropicana minuta*, *Trichorhina tomentosa*, *T. heterophthalma*, *Nagurus cristatus*, *N. nanus*, *Cubaris murina*, and *Venezillo parvus*.

(e) Cosmopolitan species (5): *Armadilloniscus litoralis*, *Porcellionides pruinosus*, *Agabiformius lentus*, *Porcellio scaber*, and *Porcellio laevis*. All these species are European or Mediterranean in origin and have been introduced to the Hawaiian Islands, as was *Porcellio lamellatus lamellatus*.

Considered as a whole, the oniscidean fauna of the Hawaiian Islands is mainly comprised of forms with a wide distribution in the tropics or the Indo-Pacific area, most of which are certainly introduced, and by 30% endemics, a number that will undoubtedly decrease as more knowledge becomes available on the terrestrial isopods of Oriental and Australian regions.

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