Pacific Insects Monograph 7: 238-252 July 15, 1964

# INSECTS OF CAMPBELL ISLAND.
# HOMOPTERA: COCCOIDEA[1]

By John W. Beardsley

UNIVERSITY OF HAWAII, HONOLULU

Apparently, there have been no prior records of Coccoidea from Campbell I. Recent collections by Gressitt and others, which form the basis for the present study, contained representatives of 4 species of this superfamily. Of these, 3 are mealybugs (family Pseudococcidae) which appear to fall within 2 well known and widely distributed genera; *Trionymus* Berg (1 species), and *Nipaecoccus* Sulc (2 species). The 4th Campbell I. coccoid is of particular interest in that it is clearly congeneric with *Phenacoleachia zealandica* (Maskell), a species sometimes considered to constitute a monotypic family, the Phenacoleachiidae (Balachowsky, 1942). For reasons which are discussed following the description of this new species, it appears that *Phenacoleachia* is definitely allied to the mealybugs, and probably should be treated as a primitive subfamily of the Pseudococcidae.

The zoogeographic affinities of the Campbell I. Coccoidea appear to lie with the New Zealand subregion. The Campbell I. *Trionymus* seems conspecific with one described from Stewart I.; 1 of the 2 new *Nipaecoccus* species and the new *Phenacoleachia* occur also in the Auckland I. group; and the genus *Phenacoleachia* is known elsewhere only from New Zealand. The possible relationship of the Campbell I. forms to the fauna of southern South America is unknown, as the Coccoidea of the latter area are virtually unstudied.

Males of 3 of the 4 Campbell I. coccoids have been available for study. Although the majority of ♂ coccoids are winged, it is of interest that the ♂♂ of the 3 Campbell I. species are completely apterous.

## KEY TO CAMPBELL ISLAND COCCOIDEA

1. Adult ♀♀ ..... 2
   Adult ♂♂ ..... 5
2. Antennae 9-segmented; without definite cerarii consisting of conical setae and associated trilocular pores ..... **Phenacoleachia australis***
   Antennae with 8 or fewer segments; definite cerarii present, at least on anal lobes ... 3
3. Circulus present; with 1 or 2 pairs of well defined marginal cerarii; oral rim tubular ducts absent ..... **Trionymus danthoniae**
   Circulus absent; with 3 or more pairs of cerarii; oral rim tubular ducts present ..... 4

1. Published with the approval of the Director of the Hawaii Agricultural Experiment Station as Technical Paper No. 678.

* New species

4. With 3 or 4 pairs of marginal cerarii; dorsal setae mostly in form of elongate slender spines, 15–50 $\mu$ long..... **Nipaecoccus longispinus***
With 7 or 8 pairs of marginal cerarii; dorsal setae 27 $\mu$ or less in length, some definitely conical or slightly lanceolate in form scattered over entire surface ... ..... **Nipaecoccus campbellensis***
5. Size relatively large, 3.5–4.0 mm long; head with a compact row of 5 simple eyes on each side; penial sheath bifid at apex..... **Phenacoleachia australis**
Size small, length 1.5 mm or less; head with 3 widely separated eyes on each side, 1 dorsal, 1 lateral and 1 ventral; penial sheath not bifid at apex..... 6
6. Dorsal setae elongate, mostly 40–75 $\mu$ in length; posterior extension of penial sheath relatively broad, about 13 $\mu$ wide at 9 $\mu$ before tip ..... **Nipaecoccus longispinus**
Dorsal setae relatively short, mostly 27 $\mu$ or less in length; posterior extension of penial sheath narrower, about 7 $\mu$ wide at 9 $\mu$ before tip ..... **Trionymus danthoniae**

## Genus **Phenacoleachia** Cockerell

*Phenacoleachia* Cckll, 1899, Canad. Ent. **31**: 274.—Morrison & Morrison, 1922, Proc. U. S. Nat. Mus. **60** (12): 14. Type of genus: *Leachia zealandica* Maskell.

Heretofore, the genus *Phenacoleachia* has been known only from the type species, *P. zealandica*, with distribution restricted to New Zealand. Adult ♀♀ of this coccid possess certain rather distinctive morphological facies (*e. g.* 11-segmented antennae and a setigerous anal ring; absence of abdominal spiracles or a ventral ovisac-forming pore band) which set the species apart from certain of the larger coccoid families; the Margarodidae, Ortheziidae and Pseudococcidae; to which it seems most closely allied.

The discovery of a 2nd species of *Phenacoleachia* from the Auckland and Campbell Is. is of considerable systematic and zoogeographic interest. The presence of dorsal ostioles, heretofore considered to be a typical pseudococcid feature, in the new species suggests that *Phenacoleachia* may be most closely allied to the true mealybugs, and perhaps should be treated as comprising a primitive subfamily of the Pseudococcidae.

**Phenacoleachia australis** Beardsley, n. sp. Figs. 1 & 2.

Adult ♀ (fig. 1): Length of slide-mounted specimen about 6 mm. Body fusiform, broadest across anterior abdominal segments, conspicuously narrower posteriorly. Antenna 9-segmented, about 0.86 mm long; scape relatively broad, about 18 $\mu$ wide by 150 $\mu$ long; pedicel 120 $\mu$ long by 96 $\mu$ maximum width, with a circular sensorium on dorsal surface near apex; flagellar segments relatively short and broad, the central seta-bearing portion of each segment sclerotized, the basal and distal portions membranous; segments 3–9 measuring approximately 60·45·75·60·75·75·125 $\mu$ in length respectively. Antenna clothed with slender setae about 75 $\mu$ maximum length; segment 8 with 1 and segment 9 with 2 or 3 thicker, recurved, finger-like setae on apical portion. Labium 3-segmented, about 330 $\mu$ long. Legs of moderate size, subequal; hind femur about 370 $\mu$ long; hind tibia about 320 $\mu$ long; tarsi 1-segmented, about 195 $\mu$ long, bearing a circular dome-like sensorium about 10 $\mu$ diameter on outer margin near base, and several small peg-like sensoria in a groove on lower surface near apex; hind tarsal claws about 60 $\mu$ long, with the character-

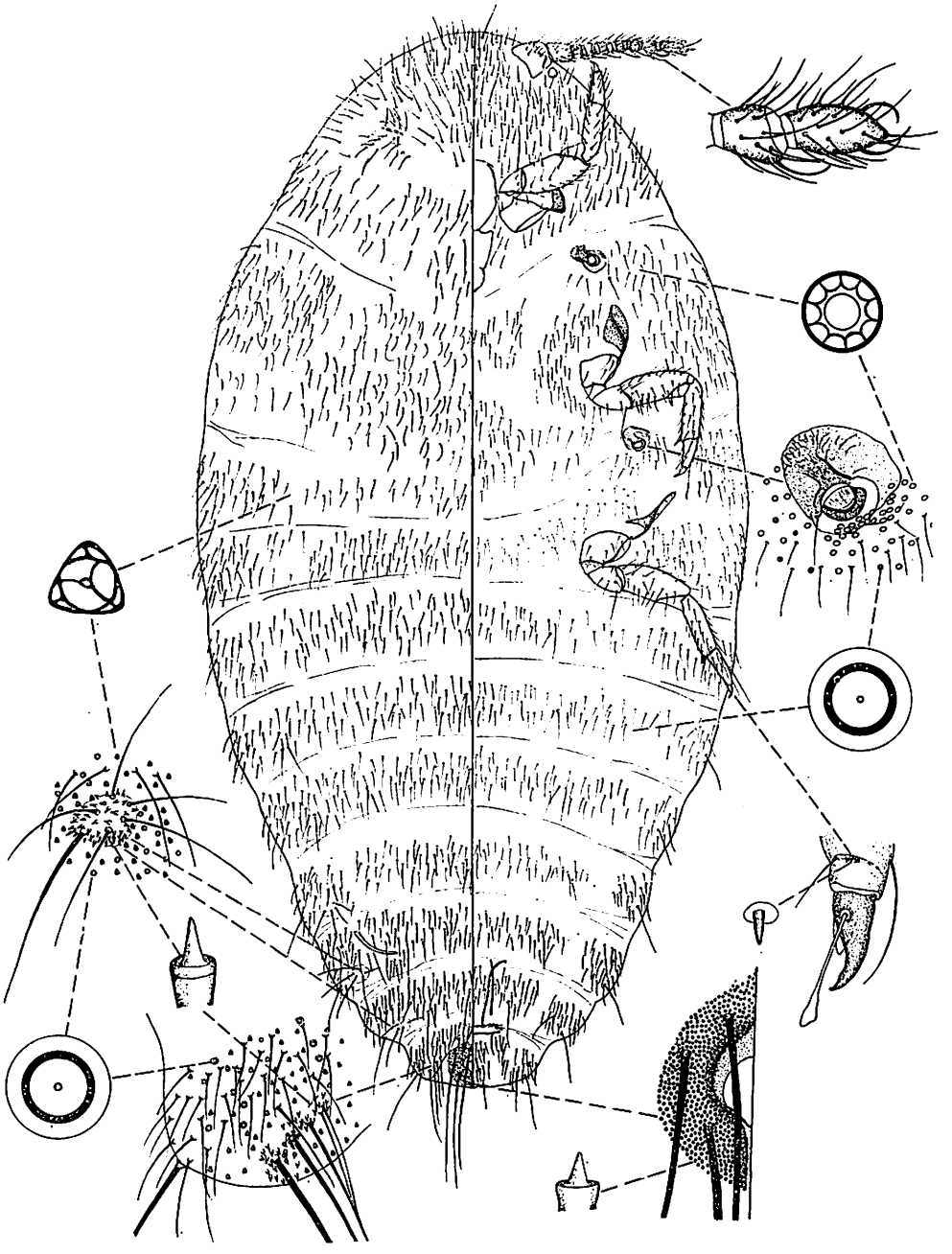

Fig. 1. *Phenacoleachia australis*, n. sp., adult ♀.

istic tooth-like projection on inner margin near apex reduced to a barely discernible bump; digitules of claws apparently dimorphic as in *P. zealandica*, one elongate with a flat ex-

panded apex, the other represented by a pointed membranous flap, or not discernible.

Anal ring at posterior apex of dorsum about 230 $\mu$ wide, inner portion composed of numerous small roughly circular pores, outer portion composed largely of small conical papilla-like structures each bearing a pointed apical process; derm between pores along inner margin somewhat sclerotized, outer margin not precisely defined; bearing 6 large elongate setae, about 450 $\mu$ maximum length. Vulva with 2 pairs of narrow, elongate, bar-like scleroses extending internally from opening.

Dorsum of abdominal segment 7 with a well-defined dorsal ostiole on each side near lateral margin; a smaller, less distinct pair of ostioles on posterior margin of dorsum of head. Thoracic spiracles well defined; a small sclerotized patch surrounding each spiracle, those around posterior spiracles larger and more clearly defined than those around anterior spiracles. Eyes small, barely discernible.

Derm moderately densely clothed with slender setae of various sizes; those of dorsum mostly 40–75 $\mu$ long; a few on dorsum of head and along lateral margins up to 150 $\mu$ long. Ventral setae mostly 40–75 $\mu$ long; a few on head, along lateral margins of abdominal segments, and in a submedian longitudinal row of 1 or a few on each side of each abdominal segment much longer, particularly on posterior portion of abdomen, up to 220 $\mu$ in length. Derm bearing 3 distinct types of pores; multilocular disc pores about 7–8 $\mu$ diameter, uniformly rather densely distributed over entire venter, much more sparsely scattered on dorsum; triangular pores about 6 $\mu$ wide, with a small central loculus and 3 large and 3 small lateral loculi, rather densely scattered over dorsum and along lateral margins of venter, apparently absent in mid-ventral region; circular ring pores each consisting of a narrow sclerotized ring 6.5–7 $\mu$ diameter, surrounded by a roughly circular hyaline area of slightly greater diameter than multilocular disc pores, scattered over both dorsum and venter, moderately numerous but noticeably fewer than triangular pores on dorsum or multilocular pores on venter. Dorsum of 5 posterior abdominal segments bearing small protruding papilliform structures, each consisting of a cylindrical base about 4 $\mu$ diameter and 5 $\mu$ high with a small pointed projection about 3–4 $\mu$ long protruding from the center of its outer end; dorsum of abdominal segment 9 with a group of about 30 such papillae on each side associated with a sublateral row of 4 or 5 long setae, up to 220 $\mu$ maximum length; dorsum of segments 7 and 8 each with a conspicuous sublateral hump on each side bearing 30–40 such papillae and several long setae up to 220 $\mu$ in length; segment 8 with a less strongly developed submedian hump bearing 20–25 papillae, on each side; dorsum of abdominal segment 6 with a smaller sublateral group of about 20–25 papillae on each side; dorsum of segment 5 with a few (2–5) such papillae on each side; papillae similar to but larger than those of outer portion of anal ring.

Penultimate instar ♀. Similar to adult but smaller; slide mounted specimens about 3 mm long. Antenna 7-segmented, about 450 $\mu$ long. Labium 2-segmented, about 200 $\mu$ long. Hind femur about 200 $\mu$ long by 100 $\mu$ maximum width; hind tibia about 200 $\mu$ long; hind tarsus about 135 $\mu$ long; hind tarsal claws about 45 $\mu$ long. Anal ring similar to that of adult but with fewer pores, about 100 $\mu$ across; anal ring setae about 320 $\mu$ maximum length. Posterior dorsal ostioles less strongly defined than in adult, but discernible; anterior ostioles sometimes not discernible.

Derm bearing triangular, multilocular, and ring pores, distributed as in adult although less numerous. Papilliform structures of dorsal derm present on abdominal segments 6–9,

less numerous than in adult, and not borne on hump-like projections. Body setae slightly shorter and somewhat less abundant than in adult.

Holotype, mature ♀, and 3 penultimate instar ♀♀ on 1 slide: Auckland I., Bivouac Hill, 300 m, on *Pleurophyllum*, 16. I. 1963, Gressitt.

In addition to the Auckland I. material, several lots of specimens from Campbell I. are at hand which appear to belong to the same species. Unfortunately, the Campbell I. material contains only a single, small, teneral, adult ♀. This specimen differs from the holotype in possessing slightly fewer of the small papilliform structures of the dorsal derm; and in having the appendages slightly smaller (antenna about 750 $\mu$ long; hind femur about 330 $\mu$ long). Penultimate instar ♀♀ from Campbell I. seem to agree well with those from Auckland. On the basis of the material available, the Campbell I. specimens have been tentatively assigned to *P. australis*.

The Campbell I. material includes 3 adult ♂♂. The adult ♂ is described below, but an allotype will not be designated as it is possible that the Campbell and Auckland forms eventually may prove to be distinct.

Adult ♂ (fig. 2): Completely apterous, without vestiges of wings. Thorax unsclerotized except for usual pleural remnants associated with bases of coxae. Length of slide-mounted specimens 3.5–4.0 mm; body elongate, roughly fusiform, widest across meso- and metathorax. Head broadly joined to thorax, without any appreciable constriction marking the cervical region. Antenna 10-segmented, about 1.05 mm long; scape broad, about 120 $\mu$ long by 140 $\mu$ wide; pedicel slightly longer than broad, about 105 $\mu$ long by 100 $\mu$ maximum width; segment 3 narrower, about 105 $\mu$ long; segments 4–8 subequal, each about 90 $\mu$ long; segment 9 about 105 $\mu$ long; segment 10 about 165 $\mu$ long. Segments 3–9 bearing 2 whorls of elongate slender setae 100–125 $\mu$ in length, plus a number of very small, fine setae 10–20 $\mu$ long, usually situated around bases of elongate setae; scape bearing a number of fine setae about 60 $\mu$ in length; pedicel with a group of similar setae on dorsal surface and a row of longer setae, up to 120 $\mu$ in length, and associated very small setae on ventral surface. Ocular sclerites present, 1 on each side of head behind base of antenna. Each ocular sclerite bearing a dorsoventral row of 5 simple eyes plus a single ocellus just behind middle member of row; simple eyes 15–24 $\mu$ diameter. A narrow bar-like preocular ridge present ventrally extending from base of antenna to ventral plate; ventral plate well developed, bearing vestigial mouth opening at its posterior apex; other cephalic sclerites not discernible. Legs well developed; tarsi 2-segmented, basal segment very small, apical segment bearing a small circular dome-shaped sensorium on outer margin near base, and a row of minute peg-like sensoria in groove on lower surface near apex as in ♀; hind femur about 390 $\mu$ long; hind tibia about 440 $\mu$ long; hind tarsus exclusive of claw about 200 $\mu$ long; hind tarsal claw about 55 $\mu$ long; tarsal claws each with a small poorly developed denticle on inner margin near apex; digitules of claws apparently dimorphic as in ♀. Legs clothed with moderately numerous slender setae mostly 50–75 $\mu$ long; inner apices of tarsi each with 3 spine-like setae 45–55 $\mu$ long; trochanters each with 5 dorsal and 5 ventral circular sensoria. Two pairs of dorsal ostioles present, the anterior pair small and poorly defined, the posterior pair larger; 7 pairs of small, unsclerotized, irregular or slit-like abdominal spiracles present, 1 situated intersegmentally near lateral margin of venter between each abdominal segment; those between posterior segments less well defined and difficult to locate.

Penial sheath well defined, about 360 $\mu$ total length, tapering posteriorly to a moderately broad distinctly bilobate tip. Sheath sclerotized dorsally and laterally, except tips of apical

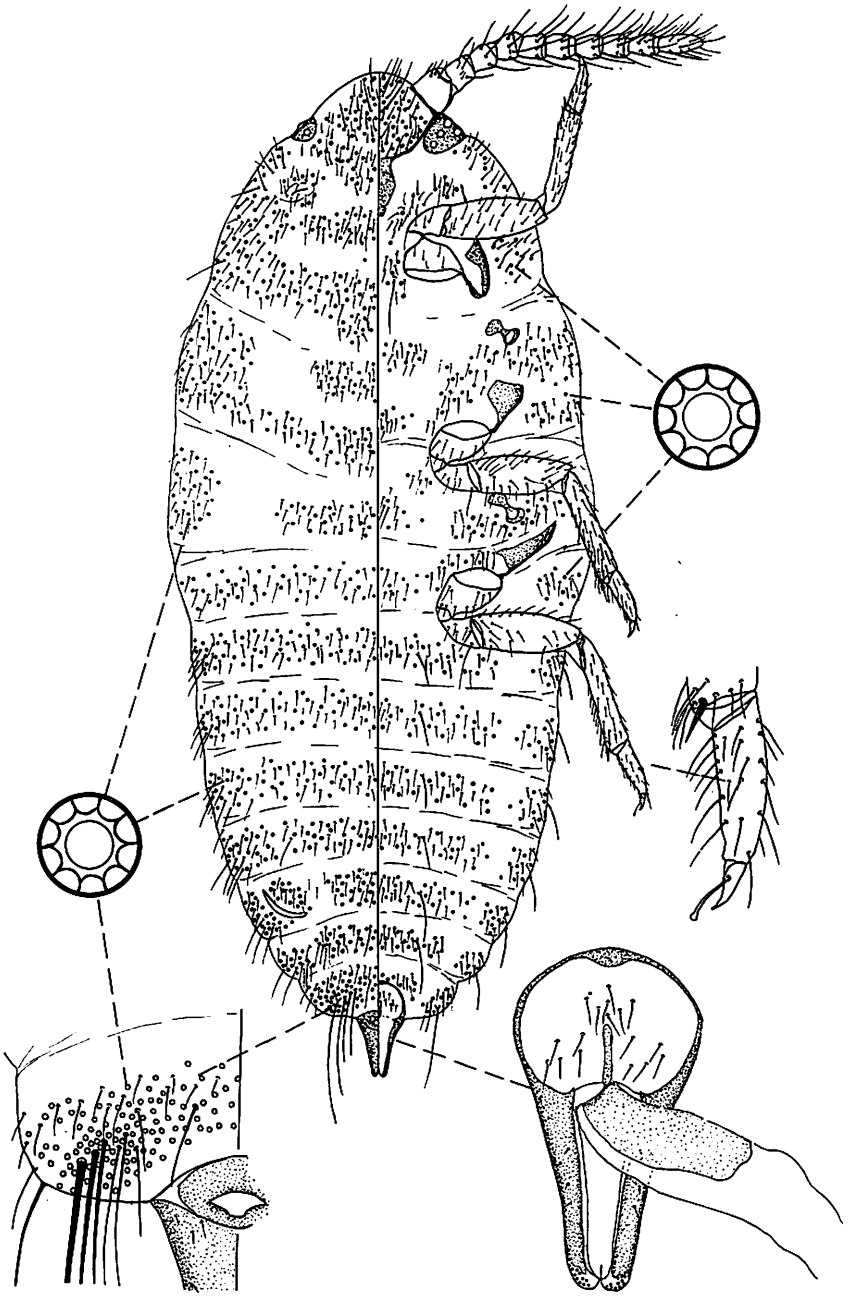

Fig. 2. *Phenacoleachia australis*, n. sp., adult ♂.

lobes; sclerotized area extending ventrally to form ventrolateral margins, and recurved internally to form a ventral longitudinal groove; basal portion of venter of sheath less heavily sclerotized or largely membranous and bearing a number of setae 20–30 $\mu$ long; apical sclerotized parts of sheath with scattered very small setae 3–5 $\mu$ long; unsclerotized portion of apical lobes with numerous small circular pores or sensoria about 2–3 $\mu$ diameter. Aedeagus appearing as a broad, sclerotized structure resembling an apically rounded truncate cone, about 150 $\mu$ long, and about 95 $\mu$ wide at base. (In 1 specimen a long membranous tube, nearly as long as the abdomen, appears to have everted from the aedeagus). Anal opening simple, roughly semicircular, surrounded by a small sclerotized plate at base of penial sheath dorsally.

Body moderately densely clothed in slender setae mostly 40–60 $\mu$ long; venter of head and lateral margins of abdominal segments with conspicuously longer setae up to 150 $\mu$ or more in length; venter with a submedian longitudinal series of long setae on each side, composed of 1 seta 140 $\mu$ or less in length on each abdominal segment. Dorsolateral areas of penultimate abdominal segment with a row of 3 or 4 very long setae, up to 400 $\mu$ in length, on each side.

Multilocular disc pores similar to those of adult ♀, distributed over dorsum and venter, slightly more concentrated on lateral margins of abdominal segments, particularly around very long setae on dorsal margins of penultimate segment. Triangular and ring type pores absent. Papilliform structures of dorsal derm apparently absent on 2 specimens; about 4 discernible on antipenultimate segment of 3rd specimen.

Described from 3 specimens: CAMPBELL I.: 2, Mt. Honey, 550 m, low plants below summit, 24. II. 1963, K. A. J. Wise, ex Berlese funnel; 1, Mollymawk Colony, 230 m, 12. II. 1963, Wise, under stones.

♀♀ of *Phenacoleachia australis* differ from those of *P. zealandica*, as the latter has been described by Maskell (1890) and redescribed by Morrison & Morrison (1922), in the possession of 9-segmented antenna (vs. 11-segmented in *P. zealandica*); a less well developed denticle on the inner face of the tarsal claws; and in the possession of 2 pairs of what appear to be typical pseudococcid-type dorsal ostioles. The ♂♂ from Campbell I. differ from those of *P. zealandica* as the latter has been characterized by Theron (1962), in being completely apterous without development of the usually thoracic sclerites; in having the head broadly joined to the thorax, not distinctly separated; in having shorter antennae, and having a relatively small ocular sclerite bearing only 5 simple eyes, rather than 8 as in *P. zealandica* ♂♂. In addition, Theron makes no mention of the presence of dorsal ostioles in *P. zealandica* ♂♂, and mentions the presence of multilocular disc pores only in conjunction with the tail-forming setae of the penultimate abdominal segments.

Theron (1962) has reported the presence of 7 pairs of small, apparently unsclerotized abdominal spiracles in the ♂♂ of *P. zealandica*. Similar simple openings and associated tracheae were found in ♂♂ of *P. australis* when slide mounts were examined with a phase contrast microscope, but were difficult or impossible to locate with an ordinary bright field microscope. The presence of abdominal spiracles and certain other 'primitive' features of the anatomy of the ♂ of *P. zealandica* has prompted Theron to suggest that *Phenacoleachia* is most closely allied to the Margarodidae. As stated earlier, the presence of dorsal ostioles, a cellular anal ring, and certain other features of the ♀♀ suggest a closer relationship with the mealybugs, and *Phenacoleachia* might well be regarded as constituting a primitive subfamily of the Pseudococcidae.

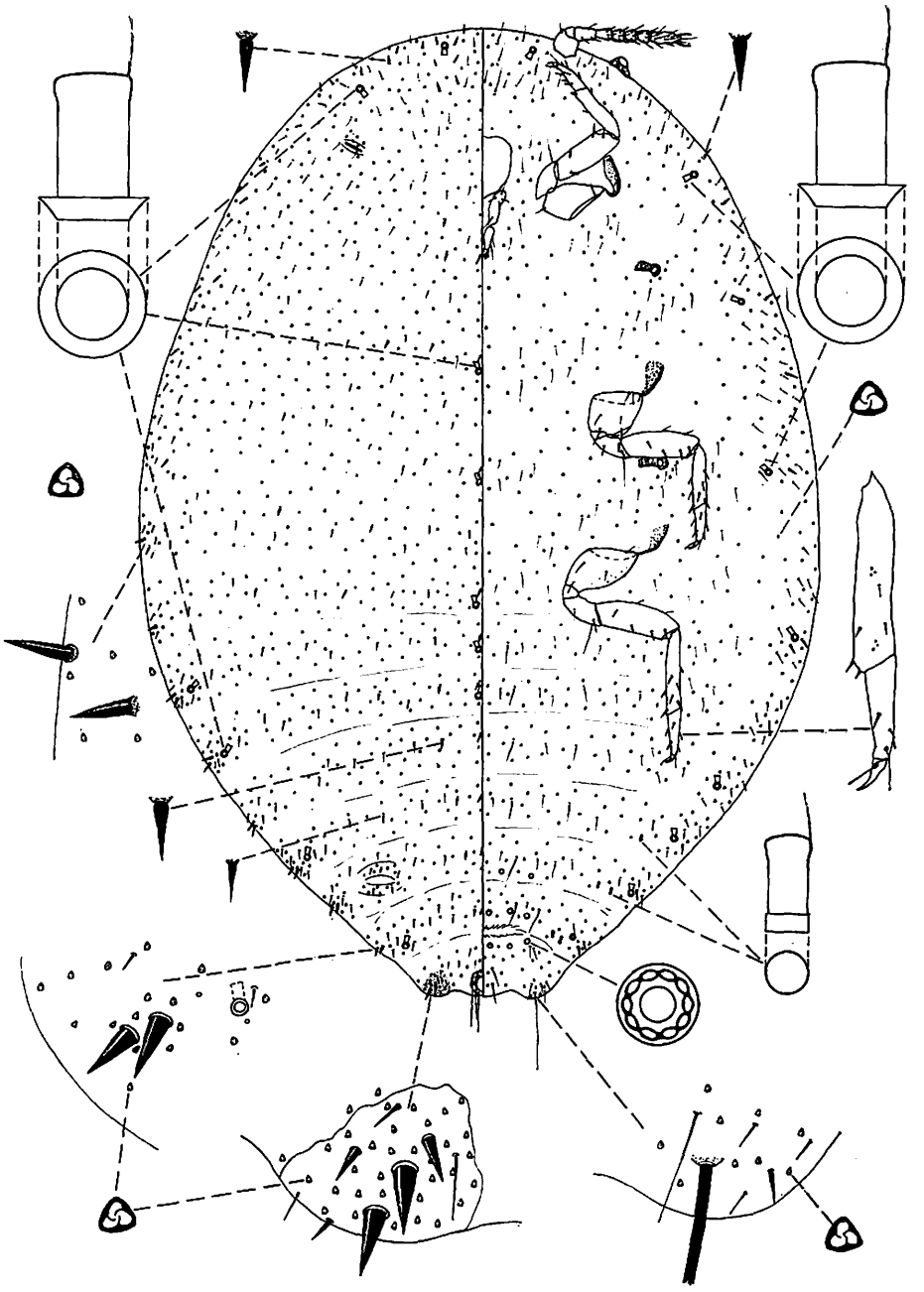

Fig. 3. *Nipaecoccus campbellensis*, n. sp., adult ♀.

## Genus **Nipaecoccus** Sulc

*Nipaecoccus* Sulc, 1945, Acta Soc. Sci. Nat. Moravia **17** (3). Type of genus: *Dactylopius nipae* Maskell.

**Nipaecoccus campbellensis** Beardsley, n. sp. Fig. 3.

Adult ♀: Body at maturity broadly oval; length of slide-mounted specimens 2.5–3.5 mm. Antenna 7-segmented, rather short, around 415 $\mu$ total length. Legs moderately small; hind femur about 230 $\mu$ long, hind tibia around 200 $\mu$ long, hind tarsus about 110 $\mu$ long; tarsal claws moderately elongate, those of hind legs about 45 $\mu$ in length, without a tooth-like projection on inner margin; digitules of tarsal claws slender, hair-like, slightly spatulate apically. Hind coxa with a few (around 30 or less) small translucent spots or micropores on outer face; hind tibia with a few such translucent spots on upper face as indicated in figure; translucent spots apparently absent on other segments of legs. Labium 3-segmented, about 165 $\mu$ long.

Anal ring cellular, about 70 $\mu$ wide, bearing setae about 110 $\mu$ maximum length. Two pairs dorsal ostioles present, anterior pair sometimes poorly defined and difficult to locate. Eye very prominent, situated on a well-developed, protruding, sclerotized ocular cone about 45 $\mu$ long and around 60 $\mu$ diameter at base; paraocular discoidal pores absent. Circulus absent.

With 7–8 discernible pairs of marginal cerarii. Anal lobe cerarii each with 2 large conical setae 30–36 $\mu$ long plus 2 or 3 smaller conical setae, 1–2 spine-like setae, and 20–30 scattered trilocular pores, borne on a roughly triangular sclerotized area. Penultimate cerarii each with 2 conical setae 27–30 $\mu$ long plus a few (7–10) associated trilocular pores; surrounding derm unsclerotized. Cerarii of abdominal segments 6–7 similar to penultimate pair; those of anterior abdominal segments usually with 2 more widely separated, more slender conical setae, sometimes with but a single such seta. Head and thorax lacking definite cerarii, although scattered slender conical setae present on margins of these areas. Venter of anal lobes unsclerotized; anal lobe seta about 180 $\mu$ long.

Dorsum with around 15–20 oral rim tubular ducts, each about 6 $\mu$ inside diameter and 10 $\mu$ across rim, 1 situated laterally near each penultimate cerarius, 1 near each of some cerarii on abdominal segments 2–6, 1–2 on each side of anterior margin of head, and a longitudinal row of 4–6 mid-dorsally, 1 duct on each of several of the thoracic and anterior abdominal segments; 16–20 such ducts situated on lateral margins of venter, 1 on each side of most abdominal and thoracic segments, and a pair on anterior margin of head between bases of antennae. A very few (around 8–12) small oral collar tubular ducts, around 4 $\mu$ diameter, on venter of posterior abdominal segments, 1–3 sublaterally on each side of segments 6–8. Multiocular disc pores confined to venter of posterior abdominal segments, 10–15 around margins of vulva on segments 8 and 9, plus 3–6 on posterior margin of segment 7. Trilocular pores evenly, moderately densely scattered on dorsum and venter.

Dorsal body setae short, 27 $\mu$ or less in length, spiniform to conical or slightly lanceolate in form; the larger more conspicuous conical or lanceolate setae sparsely scattered over dorsum, most numerous on anterior part of head. Similar conical or lanceolate setae scattered on lateral margins of venter. Setae on midregions of venter more elongate, slender; those of a submedian longitudinal series of setae on abdomen 45–60 $\mu$ long; others mostly 10–30 $\mu$ long; long setae on venter of head anterior to mouthparts up to 125 $\mu$ long.

Holotype (D. S. I. R.) and 3 paratypes: Campbell I., Beeman Camp beach, 2–5 m, ex moss and weeds, 12–17. XII. 1961, Gressitt, Berlese funnel. 21 paratypes on 8 slides; all Campbell I.: Beeman Hill, 2–50 m, on old trunk of *Dracophyllum*, 21–25. XI. 1961, Gressitt; Tucker Cove, 1–50 m, ex moss and lichen, 21–25. XI. 1961, Gressitt, Berlese funnel; Beeman Hill, 50–100 m, on *Poa* roots, 5. XII. 1961, Gressitt; Tucker Cove, old camp, 50 m, 6–11. XII.1961, Gressitt, under board; Beeman Camp beach, ex moss and weeds, 12–17.XII.1961, Gressitt, Berlese funnel; Courrejolles Peninsula, 200 m, ex *Diomedia* nest, 14. XII. 1961, Gressitt; Tucker Cove, 2. II. 1963, Wise, under debris.

*Nipaecoccus campbellensis* is allied to *N. longispinus* from Campbell and Auckland Is. *N. campbellensis* differs from the latter in possessing fewer tubular ducts of both oral rim and oral collar types, fewer multilocular disc pores, and in having 7-segmented rather than 6-segmented antenna. In addition, the dorsal setae of *N. campbellensis* are distinctly shorter than those of *N. longispinus*. The longer dorsal setae of the latter species are long slender conical spines up to 50 $\mu$ in length; while the larger dorsal conical or somewhat lanceolate setae of *N. campbellensis* range up to about 27 $\mu$ maximum length.

Males of *N. campbellensis* are unknown.

**Nipaecoccus longispinus** Beardsley, n. sp. Fig. 4.

Adult ♀: Body at maturity broadly oval; length of slide-mounted specimens 2.5–3.5 mm. Antenna 6-segmented, relatively short, about 310 $\mu$ total length. Legs moderately small; hind femur about 195 $\mu$ long, hind tibia about 165 $\mu$ long, hind tarsus about 90 $\mu$ long; tarsal claws moderately elongate, those of hind legs about 45 $\mu$ in length, without a tooth-like projection on inner margin; digitules of tarsal claws slender, hair-like, slightly spatulate apically. Hind coxa with about 60–70 translucent spots or micropores scattered on both upper and lower surfaces along outer margin; hind tibia with about 5–10 such translucent spots discernible on upper surface, distributed as indicated in figure; translucent spots apparently absent on other segments of legs. Labium 3-segmented, about 165 $\mu$ long.

Anal ring cellular, about 90 $\mu$ wide bearing 6 setae about 140 $\mu$ maximum length. Two pairs of dorsal ostioles present; anterior pair sometimes poorly defined and difficult to locate. Eye prominent, with a well developed basal sclerotized cone about 35–40 $\mu$ diameter at base; paraocular discoidal pores absent. Circulus absent.

With 3 or 4 pairs of definite marginal cerarii. Anal lobe cerarii each with 2 large conical setae about 26 $\mu$ maximum length, and about 20 scattered trilocular pores borne on a roughly triangular, moderately well-defined sclerotized area; 2 or 3 spine-like setae, mostly 20–30 $\mu$ in length, sometimes longer, situated around margins of sclerotized area. Penultimate cerarii each with 2 conical setae about 25 $\mu$ maximum length, several slender spine-like setae, and a few scattered trilocular pores; the surrounding derm unsclerotized. Antepenultimate cerarii similar but with conical setae usually more slender; cerarii of abdominal segment 6 usually represented by 1 or 2 relatively elongate, slender, conical or spine-like setae, 30–35 $\mu$ long; sometimes wanting.

Venter of anal lobes unsclerotized; anal lobe seta about 125 $\mu$ long.

Dorsum with rather numerous oral rim tubular ducts, each about 6 $\mu$ inside diameter and about 10 $\mu$ across rim; these distributed in approximately transverse rows of 6–10 or more on anterior abdominal and thoracic segments; 1 such duct present on each side on

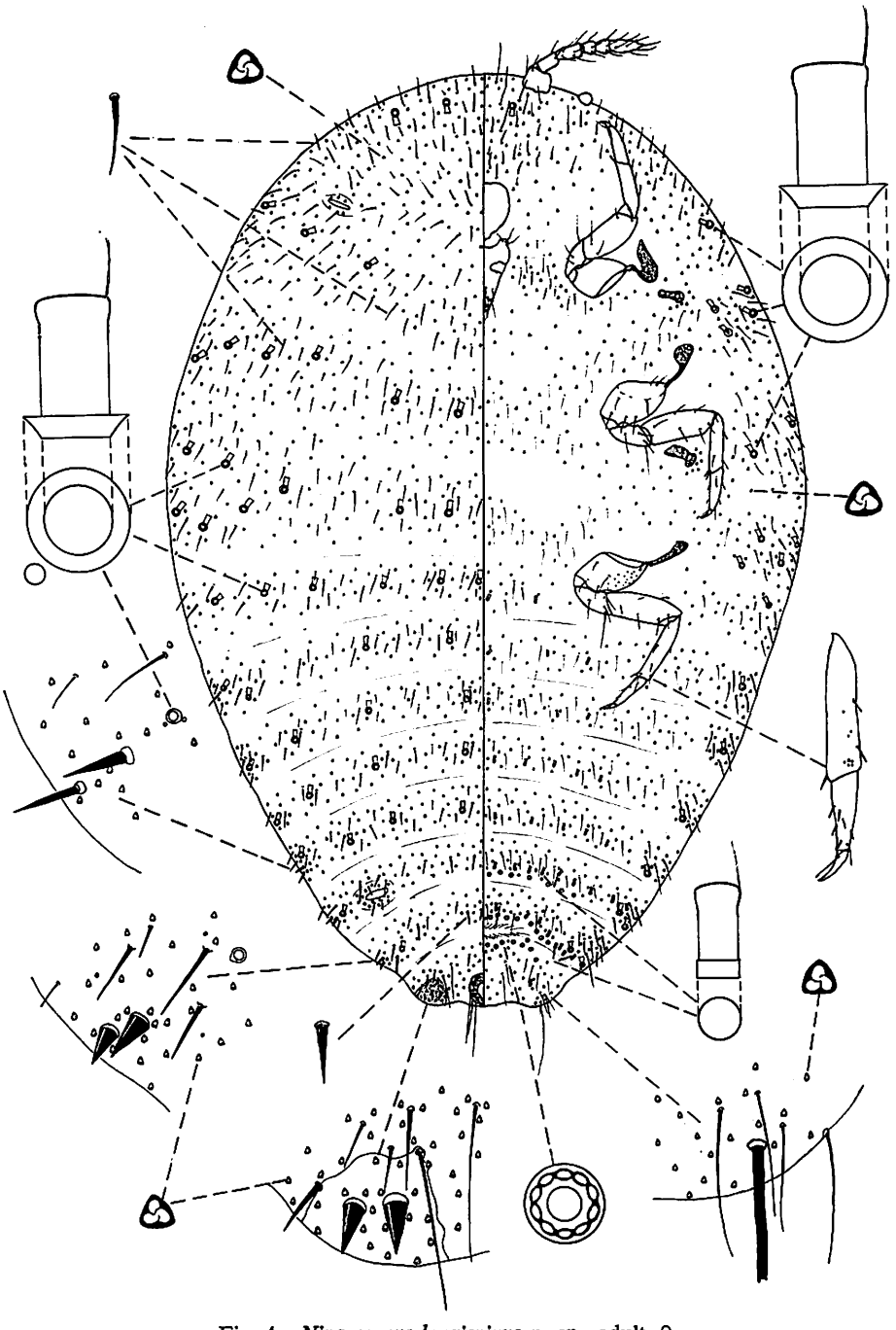

Fig. 4. *Nipaecoccus longispinus* n. sp., adult ♀.

abdominal segments 7 and 8; usually absent on segment 9; 2–4 such ducts on dorsum of head. Similar rim tubular ducts distributed along lateral margins of venter, 1–2 on each side of each abdominal segment except 9th; several on each side of each thoracic segment, and usually 1 on each side of venter of head. Small oral collar tubular ducts, about 3–4 $\mu$ diameter, scattered on posterior margins of abdominal segments; occasionally a few on venter of thorax; a few sometimes replaced by weakly to moderately well developed oral rim tubular ducts in some specimens. Multilocular disc pores confined to posterior portion of venter of abdomen; around 40–50 such pores distributed around vulva on segments 8 and 9, and in a row along posterior margin of segment 7. Trilocular pores moderately densely, evenly, scattered on dorsum and venter.

Dorsal body setae in form of elongate slender spines, 15–50 $\mu$ in length. Two or 3 in midregion of dorsum of abdominal segment 8 noticeably broader basally, in form of elongate conical setae. Setae on lateral margins of venter similar to those of dorsum; setae of midventral areas more slender, up to 75 $\mu$ in length on mid-region of abdomen; long hairs on venter of head between antennae about 90 $\mu$ maximum length. Setae of legs, particularly the tarsi, spiniform.

Holotype ♀ (D. S. I. R.): Campbell I., Lyall-Beeman Saddle, 70 m, on *Poa* roots, 3–12. XII. 1961, J. L. Gressitt. 58 paratypes on 13 slides, all Campbell I.: Beeman Beach, inside *Colobanthus* cushion, 2–6.XII.1961, Gressitt; Mt. Lyall, 200–400 m, ex moss, 3–12.XII. 1961, Gressitt; St. Col Ridge, 180–280 m, ex moss, 7.XII.1961, Gressitt; St. Col Ridge, 180–280 m, ex moss and rock, 24–30.XI.1962, Gressitt, Berlese funnel; Mt. Lyall, 300 m, 13.XII. 1962, Rennell, in (?) growing on Ko; St. Col Peak, 250 m, ex low plants on rocks, 23. II. 1963, Wise, Berlese funnel; Perseverance Harbor, Lookout Bay, ex leaf mold under tussock, 3.II.1963, Wise, Berlese funnel; Mt. Honey, 140 m, ex low plants on rock, 24. II. 1963, Wise, Berlese funnel; Smoothwater Bay, 5 m, under moss and rocks, 1. III. 1963, Rennell.

*Nipaecoccus longispinus* appears allied to *N. campbellensis* described earlier in the paper. The important differences between these 2 species are discussed following the description of the latter.

A single ♂ adult was found among ♀♀ of 1 lot of *N. longispinus* specimens, and is described below.

♂: Length of slide-mounted specimen 1.1 mm. Body elongate-oval, 0.43 mm maximum width. Antenna incompletely 7-segmented; relatively short, about 295 $\mu$ total length (fig. 5D); length of individual segments from scape outward 40·54·63·27·33·78 $\mu$ respectively; apical segment incompletely divided into 2 subsegments 36 and 42 $\mu$ long respectively. Antenna clothed with moderately slender digitiform setae about 25 $\mu$ maximum length, plus slender filamentous setae mostly 40–70 $\mu$ long. Larger specialized sensory setae of 2 apical segments about 40 $\mu$ maximum length. Dorsal midcranial ridge poorly defined; ventral postocular ridge moderately well developed. Three pairs eyes present, small; dorsal pair each about 22 $\mu$ diameter; ventral pair each about 20 $\mu$ diameter; lateral eyes about same size as dorsal. Head relatively broadly joined to thorax; separated by but a slight constriction.

Completely apterous; thoracic sclerotization vestigial except for pleural remnants. Fused propleural-cervical bar-like sclerite present, pronotal ridge apparently wanting.

Dermal disc pores, 5–6 $\mu$ diameter, each with 4 or 5 peripheral loculi, moderately numer-

ous on both dorsum and venter, in scattered rows or bands across abdominal segments, on thorax, and on dorsum of head. Tail-forming pore clusters restricted to pair on abdominal segment 9; each consisting of about 30 stellate pores 5–6 $\mu$ diameter, similar to dermal discs, plus 2 well separated long hairs about 175 $\mu$ in length. Minute simple circular pores, about 2 $\mu$ diameter, scattered among disc pores on dorsum and venter. Dorsal body setae filamentous, elongate, mostly 45–75 $\mu$ in length; those along lateral margins posterior abdominal segments up to 120 $\mu$ long; ventral body setae shorter, mostly 30–45 $\mu$ long. Digitiform setae absent on body.

Penial sheath (fig. 5C) about 120 $\mu$ long, with a pair of small, fairly well defined median lobes; posterior extension tapering to a rounded apex about 13 $\mu$ wide at 9 $\mu$ before tip. Dorsum of abdominal segments with weakly developed sclerotized areas extending across entire width. Similar weakly sclerotized area present on dorsum of head and thorax.

Legs of moderate size; hind femur about 135 $\mu$ long; hind tibia about 130 $\mu$ long; hind tarsus about 80 $\mu$ long; hind tarsal claws about 35 $\mu$ long; tarsus apparently all 1-segmented. Setae of legs filamentous, mostly 30–45 $\mu$ in length.

CAMPBELL I.: Mt. Honey, 140 m, ex low plants on rock, 24. II. 1963, Wise, Berlese funnel.

A single ♂ found associated with ♀♀ of *N. longispinus* from Auckland Is. differs from the Campbell I. ♂ in having 8-segmented antenna about 330 $\mu$ long, and in having 2-segmented tarsi, the basal segment being very narrow and ring-like. The specimen is otherwise very similar to the Campbell I. ♂.

## Genus **Trionymus** Berg

*Trionymus* Berg, 1899, Comun. Mus. Nac. Buenos Aires **1**: 78. Type of genus: *Westwoodia perisii* Signoret.

### **Trionymus danthoniae** Morrison

*Trionymus danthoniae* Morr., 1925, J. Agric. Res. **31** (5): 494, fig. 5.

This species was described from 2 specimens from the Maskell collection of coccids. The holotype was taken on a grass, *Danthonia*, on Stewart I., and was originally misidentified by Maskell as *Dactylopius calceolariae* Maskell. The 2nd specimen, which Morrison designated a paratype, was from a lot of specimens labeled as *D. calceolariae*, but without further data.

At my request, the late Dr. Morrison compared specimens from Campbell I. with the paratype specimen of *T. danthoniae*, and concluded that they were probably conspecific.

The majority of the Campbell I. specimens at hand agree well with Morrison's description of *T. danthoniae*, although some variation has been noted in certain structures. For example, among 17 slide-mounted adult specimens examined 6 have either 7-segmented or incompletely 8-segmented antennae, while the remaining specimens have the antennae 8-segmented as in the types. In 1 specimen there is, in addition to the small, oval, somewhat variable sized circulus between abdominal segments 4 and 5, a 2nd much smaller nearly round circulus about 30 $\mu$ diameter, on the fold between segments 5 and 6. On the basis of experience with other mealybugs the variations noted do not seem to be of any greater magnitude than what is normally encountered among individuals of other species.

The 17 adult ♀♀ studied are from the following Campbell I. collections: Beeman Hill, 50–100 m, on *Poa* roots, 2. XII. 1961, Gressitt; Lyall-Beeman Saddle, 70 m, on *Poa* roots 3–12. XII. 1961, Gressitt; Beeman Camp, 2–50 m, on *Poa* roots, 6–14.XII.1961, Gressitt; Courrejolles Pen., 200 m, ex *Diomedia* (Mollymawk) nests, 14.XII.1961, Gressitt; Courrejolles, ex moss and leaf mold, 3. X. 1962, Rennell; Venus Cove, on tussock grass, 2. II. 1963, Wise; Shoal Pt., 6–10 m, 7.II.1963, Wise; Courrejolles Pen., 200 m, on rock cliff, Mollymawk Colony, 14. II. 1963, Wise; Rocky Bay, penguin colony, south Mt. Dumas, ex cushion plant, 18. II. 1963, Wise, Berlese funnel; Mt. Lyall, 390 m, on low plants, below summit, 19 II. 1963, Wise, Berlese funnel.

Several adult ♂♂ were present in collections containing ♀♀ determined as *T. danthoniae*, and the ♂ of this species is described below.

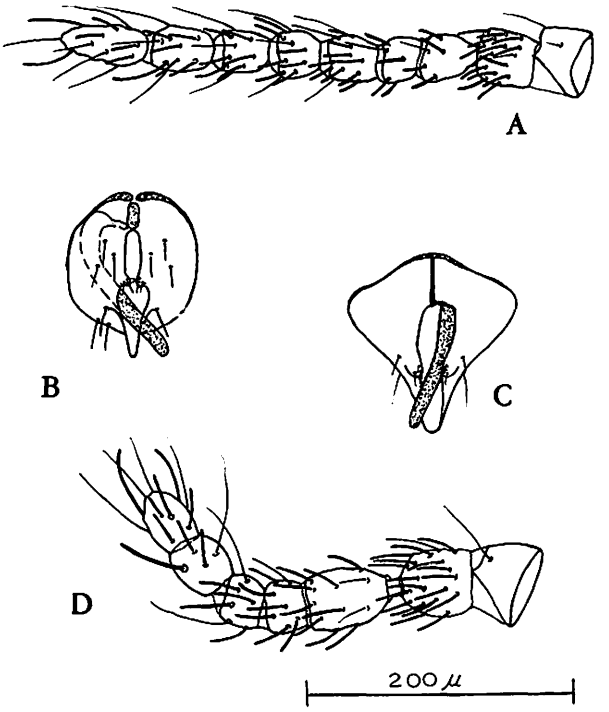


Fig. 5. A, *Trionymus danthoniae* Morrison, adult ♂ antenna, dorsal aspect; B, *T. danthoniae*, adult ♂ penial sheath, ventral aspect; C, *Nipaecoccus longispinus*, adult ♂ penial sheath, ventral aspect; D, *N. longispinus*, adult ♂ antenna, dorsal aspect.

♂: Length of slide-mounted specimen about 1.3 mm; body elongate, about 0.41 mm maximum width. Antenna (fig. 5A) 9-segmented, about 450 μ long; lengths of individual segments from scape outward 40·60·50·42·48·45·45·55·65 μ respectively. Antenna clothed with moderately slender digitiform setae mostly 18–20 μ long, plus a few slender filamentous setae about 45 μ maximum length; segments 7 and 8 each with 1, and segment 9 with 3 longer digitiform setae, up to 42 μ in length, near apex. Midcranial suture poorly defined dorsally; ventral postocular ridge well defined; ocular sclerites weakly sclerotized except around margins of eyes. Three pairs of eyes present, moderately small, dorsal pair each about 24 μ diameter, ventral pair each about 25 μ diameter; lateral eyes slightly smaller.

Completely apterous, without wing vestiges, thoracic sclerotization vestigial, absent except for pleural remnants associated with bases of coxae, a very weakly sclerotized mesosternum, a well defined pronotal ridge, and fused bar-like propleural-cervical sclerite on each side.

Dermal disc pores, 5–6 μ diameter, with 3–5 peripheral loculi, fairly numerous on dorsum; distributed in transverse rows of 6–10 across abdominal segments 2–7; 2 or 3 on each side of abdominal segment 8; scattered bands or double rows of 10–15 on dorsum of thoracic segments; and 4–8 on each side of dorsum of head between dorsal eye and base of an-

tenna. Relatively few discs on venter; 2–4 on venter of each thoracic segment; absent on venter of abdomen in most specimens, sometimes 1–3 on 1 or more of basal abdominal segments. Tail forming pore clusters limited to pair on abdominal segment 9, each composed of around 45–60 stellate pores of about 4 $\mu$ diameter; 2 elongate setae, about 190 $\mu$ in length, set close together in center of pore cluster, plus 4 or 5 shorter hairs along anterior margin of cluster. Dorsal dermal discs interspersed with minute circular pores about 2 $\mu$ diameter. Body clothed with moderately elongate filamentous setae; a transverse row across dorsum and venter of each abdominal segment; scattered on dorsum and venter of head and thorax. Dorsal setae mostly 27 $\mu$ or less in length; ventral setae longer, up to about 40 $\mu$ maximum length; digitiform setae wanting on body.

Penial sheath (fig. 5B) around 110 $\mu$ long; median lobes represented by small setigerous humps; posterior extension relatively narrow, tapering to a rounded apex about 7 $\mu$ wide at 9 $\mu$ before tip. Aedeagus relatively narrow, curved, sclerotized.

Legs of moderate length; hind femur about 144 $\mu$ long, hind tibia about 190 $\mu$, hind tarsus about 90 $\mu$ long, hind tarsal claws about 30 $\mu$ long. Tarsi 2-segmented; basal segment small, triangular. Setae of legs mostly filamentous, up to about 45 $\mu$ maximum length; a few small digitiform setae sometimes discernible on tibiae and tarsi.

Abdominal sclerotized patches absent; posterior dorsal ostioles present but very poorly defined.

Described from 6 specimens, all Campbell I.: 4, Beeman Camp, 2–50 m, on *Poa* roots, 6–11. XII. 1961, Gressitt; 1, Courrejolles Pen., 200 m, ex Mollymawk nest, Gressitt.

## REFERENCES

Balachowsky, A. 1942. Essai sur la classification des cochenilles (Homoptera-Coccoidea). Grignon Ecole Natl. d'Agr. Ann. (Ser. 3) **3**: 34–48, illus.

Beardsley, J. W. 1960. A preliminary study of the males of some Hawaiian mealybugs (Homoptera: Pseudococcidae). Proc. Haw. Ent. Soc. **17** (2): 199–243, illus.

Theron, J. G. 1962. Structure and relationships of the male of *Phenacoleachia zealandica* (Maskell) (Hemiptera: Coccoidea). Proc. R. Ent. Soc. Lond. (A) **37**: 145–53, illus.