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THE PSOCOPTERA (INSECTA) OF NORFOLK ISLAND

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Figures 1–67.

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SUMMARY

Fourteen species of Psocoptera are listed from Norfolk Island, of which eleven are described as new. The material recorded was collected widely over the island between 1967 and 1972 as part of a study of the psocopteran fauna of the Melanesian Arc.

INTRODUCTION

Apart from brief mention by Hawkins (1943), who gives family or generic determinations only for a few specimens, nothing has been published on the Psocoptera of Norfolk Island. This paper deals with material collected at various times between 1967 and 1972, the work being part of a study of the psocopteran fauna of the islands of the Melanesian arc. Fourteen species are now known from the island, of which eleven are here described as new. Material was collected mainly by beating and it seems likely that a high proportion of the species obtainable by this method have been taken.

Zoogeographical discussion has been omitted from this paper as we have extensive material, which has not yet been critically examined, from relevant areas, such as Fiji, New Guinea, and New Caledonia, and any comments made at this stage of the study would be premature. Zoogeographical matters will be discussed when our field programme has taken in other areas, such as New Britain, and when the material from the other areas has been dealt with systematically.

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Species of which many specimens have been taken are fairly widely distributed over the island; the island is small and was originally covered with fairly uniform vegetation. Habitat preferences of Psocoptera have not been studied on Norfolk Island.

LIST OF SPECIES OF PSOCOPTERA FROM NORFOLK ISLAND

Lepidopsocidae

Pteroxanium ralstonae sp. n.
Pteroxanium evansi sp. n.
Pteroxanium insularum sp. n.
Lepolepis graemei sp. n.

Caeciliidae

Caecilius insulatus sp. n.
Caecilius pacificus sp. n.

Ectopsocidae

Ectopsocus briggsi McLachlan
Ectopsocus insularis sp. n.
Ectopsocus inornatus sp. n.

Peripsocidae

Peripsocus milleri (Tillyard)
Peripsocus norfolkensis sp. n.

Pseudocaeciliidae

Heterocaecilius variabilis sp. n.

Philotarsidae

Haplophallus emmus sp. n.

Psocidae

Blaste lignicola (Enderlein)

SYSTEMATIC ACCOUNT

LEPIDOPSOCIDAE

Pteroxanium ralstonae sp. n.

MALE

Coloration (in alcohol).—Median epicranial suture very dark brown; anterior arms paler. Vertex dark brown, fading anteriorly to the pale brown frons. Postclypeus dark posteriorly, pale in anterior half, the change in colour occurring over a narrow transverse zone. Anteclypeus pale. Labrum very dark brown. Genae dark brown. Antennae with about ten basal segments brown, becoming darker distally. Eyes black. A small black spot occurs in position usually occupied

by median ocellus. Maxillary palp brown, with dark brown distal segment. Pro- and mesothoracic nota shining, dark brown. Tibiae dark brown with three pale bands, that nearest the femur being narrowest, the middle and distal bands being wider and of equal width to the dark bands separating them. Basal tarsal segments dark brown basally, fading distally; middle and distal segments pale brown. Fore wings (fig. 1) very dark brown, pale near apex. Veins darker than membrane. Hind wing a small translucent flap. Abdomen colourless except for the sclerotized second tergite and the dark brown terminal structures; these are conspicuously darker than the rest of the abdomen. Abdominal scales dark, easily lost; in life these give a sheen to the abdomen.

Morphology.—Length of body: 2.8 mm. Median epicranial suture and its anterior arms distinct. Vertex fairly sharp, bearing strongly developed, dark brown setae; other parts of epicranial plates and frons with short, fine setae. Genae strongly pubescent ventrally. Antennae with at least forty segments. Eyes large, not quite reaching level of vertex. Ocelli absent. Lacinia (fig. 3). Prothoracic notum with a covering of very stout setae; mesonotum clothed with scales. Measurements of hind leg: F: 0.700 mm; T: 0.952 mm; t_1: 0.406 mm; t_2: 0.084 mm; t_3: 0.084 mm; rt: 4.8:1:1. Hind tibia with two large apical spines and one small one. Basal tarsal segment with three spines ventrally in addition to two larger and one small spine apically and one large, laterally placed spine preapically. Claw with preapical tooth and a few minute denticles basad of tooth. Fore wing length: 0.77 mm; fore wing width: 0.49 mm. Fore wing (fig. 1) reduced, elytriform, bearing spaced macrochaetae (represented by alveoli in figure) between which are sited numerous scales and scale-like setae. Venation hardly discernible, variable, but most frequently as in figure. Wings easily detached. Hind wing a minute, transparent, tapering, slightly upcurved rudiment. Abdomen membranous except for strongly sclerotized ninth tergite and terminal structures. Paraprocts with three setae arising from "rosette" bases in addition to other scattered setae. Hypandrium a large, broad plate, well sclerotized except for a small triangular membranous area at the middle of the hind margin, hind margin thus appearing notched. Phallosome (fig. 2) (distorted in preparation).

FEMALE

Coloration (in alcohol).—As male.

Morphology.—Length of body: 2.6 mm. General morphology as male. Measurements of hind legs and wings as male. Gonapophyses (fig. 4). Sclerification of spermapore plate (fig. 5).

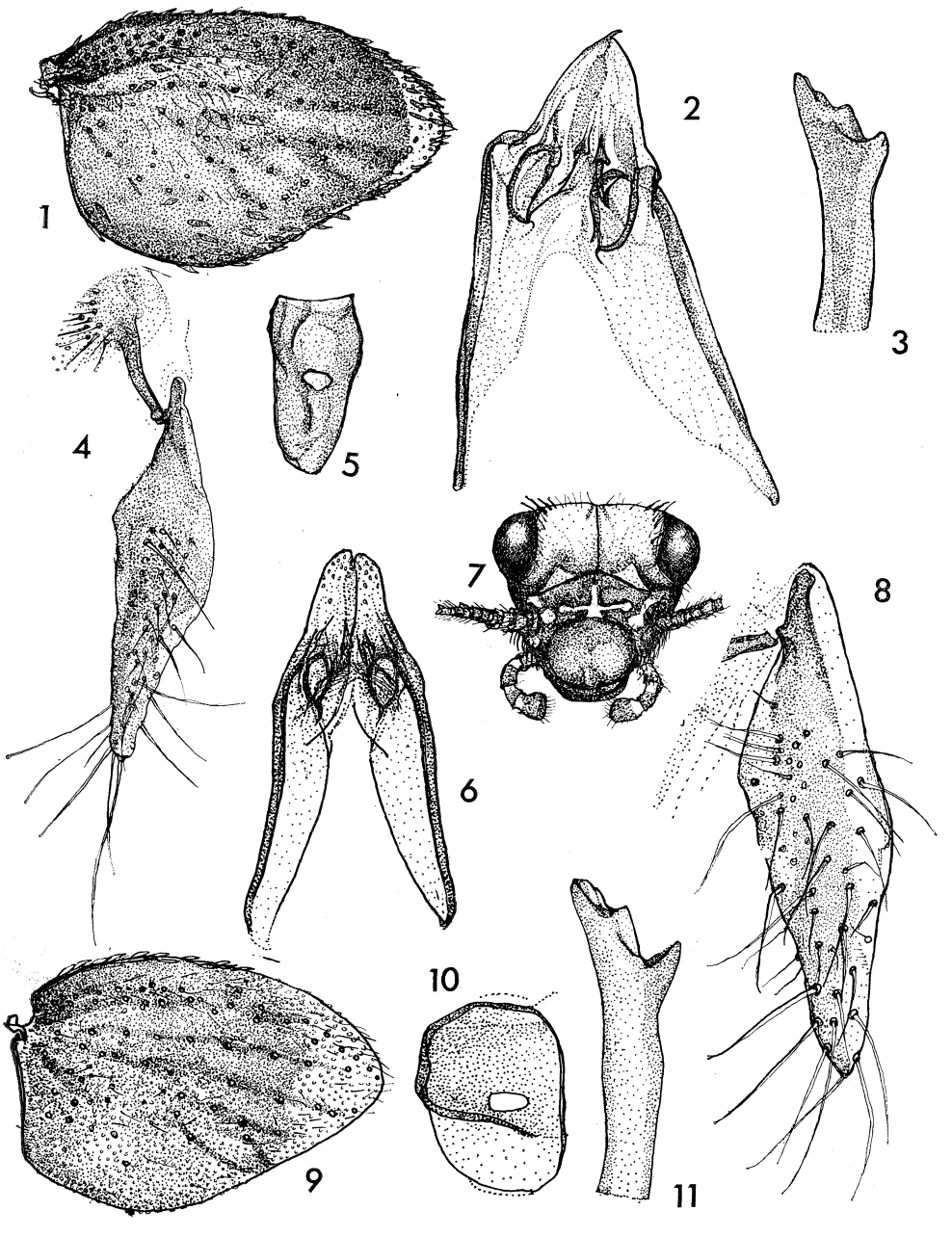
MATERIAL EXAMINED

Norfolk Island: 3 ♂ (including holotype), 5 ♀ (including allotype), Collin's Head, 30.viii.1971. (C. N. Smithers and I. W. B. Thornton.) Holotype, allotype, and paratypes in Australian Museum.

DISCUSSION

This species can be distinguished from both *Pteroxanium kelloggi* (Ribaga) and *P. funebris* Badonnel by the lack of a facial pattern and by differences of wing form and coloration. Both sexes are known in *P. funebris* and *P. ralstonae; P. kelloggi* is parthenogenetic.

This species is named in honour of the late Mrs P. Ralston, whose efforts in the cause of the conservation of Norfolk Island have been untiring and an inspiration to others.



Figs 1–5. *Pteroxanium ralstonae* sp. n. 1, ♂ fore wing; 2, ♂ phallosome; 3, ♂ lacinia; 4, ♀ gonapophyses; 5, ♀ sclerites of 9th sternite. Figs 6–11. *Pteroxanium evansi* sp. n. 6, ♂ phallosome; 7, ♂ head; 8, ♀ gonapophyses; 9, ♂ fore wing; 10, ♀ sclerites of 9th sternite; 11, ♂ lacinia.

Pteroxanium evansi sp. n.

MALE

Coloration (in alcohol).—Head varies in depth of colour, but characteristic pattern is apparent. In well-pigmented specimens (fig. 7) the vertex is pale brown with dark median epicranial suture. Front of head with characteristic pattern, postclypeus being similar in colour to epicranial plates. Genae dark brown with slightly paler stripe running from below compound eye towards antenna base. Antennae dark brown. Eyes black. Maxillary palp dark brown. Femora brown; tibiae dark brown except for a pale band at each end and a pale narrow band in the middle. Tarsi pale brown except darker base of basal segment. Fore wing (fig. 9) dark with pale apical area. Abdomen pale with dark terminal structures.

Morphology.—Length of body: 2.2 mm. Median epicranial suture and its anterior arms very distinct. Setae of head as in *P. ralstonae.* Eyes fairly large, not reaching level of vertex. Median ocellus rudiment present; lateral ocelli absent. Lacinia (fig. 11). Measurements of hind leg: F: 0.644 mm; T: 0.896 mm; t_1: 0.392 mm; t_2: 0.098 mm; t_3: 0.098 mm; rt: 4:1:1. Hind tibia with two large apical spines; basal tarsal segment with three or four spines along its ventral side and one large and one small spine apically. Fore wing length: 0.65 mm; fore wing width: 0.40 mm. Fore wing narrow distally, elytriform. Wing clothed with scales and scattered, strongly developed setae, all easily detached. Hind wing a vestige. Epiproct simple, semicircular, with a few strong, scattered setae. Paraproct with three setae arising from "rosette" bases in addition to other scattered setae, one of which is longer than width of paraproct. Hypandrium simple, well sclerotized. Phallosome (fig. 6).

FEMALE

Coloration (in alcohol).—As male.

Morphology.—Length of body: 2.4 mm. General morphology as male. Sclerification of spermapore plate (fig. 10). Gonapophyses (fig. 8).

MATERIAL EXAMINED

Norfolk Island: 4 ♂ (including holotype), 9 ♀ (including allotype), Bumbora, 26.viii.1971; 2 ♂, 5 ♀, Rocky Point Reserve, 28.viii.1971; 6 ♂, 6 ♀, Collin's Head, 30.viii.1971; 11 ♂, 6 ♀, Selwyn Reserve, 30.viii.1971; 5 ♂, 18 ♀, Point Blackbourne, 25.viii.1971, 2 ♀, Stockyard Creek, 25.viii.1971; 1 ♀, Mount Pitt, 29.viii.1971 (all collected by C. N. Smithers and I. W. B. Thornton); 2 ♂, 3 ♀, 21–29.x.1967; 2 ♂, 3 ♀, Rocky Point Reserve, 23.xii.1968 (C. N. Smithers).

Holotype, allotype, and paratypes in Australian Museum; paratypes in Australian National Insect Collection, British Museum and Bernice P. Bishop Museum.

DISCUSSION

The facial pattern of this species is distinctive.

The species is named in honour of Mr Owen Evans in appreciation of the help he has given to scientists and others interested in the conservation of Norfolk Island.

Pteroxanium insularum sp. n.

MALE

Coloration (in alcohol).—Depth of colour pattern very variable, but characteristic pattern apparent. In well-pigmented specimens (fig. 12) vertex creamy yellow with brown median epicranial suture. Front of head with characteristic pattern; postclypeus a little darker than vertex, antero-lateral edge bordered internally with brown. Labrum dark brown. Genae dark brown. Scape, pedicel and basal flagellar segments pale brown, flagellum darker distally. Eyes black. Maxillary palp pale brown, distal segment a little darker than others. Prothorax and mesothorax creamy yellow with a dorso-lateral dark-brown stripe; metathorax without stripe. Legs creamy yellow, banded with brown. Prothoracic and mesothoracic tibiae with two bands and basal half of basal tarsal segment brown; metathoracic legs similar but an additional dorsal brown mark on distal half of femur. Fore wing (fig. 13) marked in shades of brown; the extent of the colour varies but there are always pale areas in addition to that near the wing apex. Hind wings small colourless lobes. Abdomen pale creamy yellow; terminal structures brown.

Morphology.—Length of body: 2.5 mm. Epicranial suture very distinct. Setae of head as in *P. ralstonae.* Eyes large, almost reaching level of vertex. Ocelli absent. Measurements of hind leg: F: 0.756 mm; T: 1.120 mm; t_1: 0.476 mm; t_2: 0.098 mm; t_3: 0.098 mm; rt: 4.8:1:1. Hind tibia with two large and one small apical spine, basal tarsal segment with four spines along inner side and two large apical spines. Fore wing length: 0.92 mm; fore wing width: 0.50 mm. Fore wing (fig. 13) narrowing distally, elytriform, some veins hardly visible. Wing clothed with scales and scattered, strongly developed setae, all easily detached. Hind wing a small tapering lobe. Epiproct simple, semi-circular, with a few strong, scattered, easily detached setae, and a row of small, fine, marginal setae. Paraproct lacks setae with "rosette" bases but a few setae present. Hypandrium simple, well sclerotized. Phallosome (fig. 14).

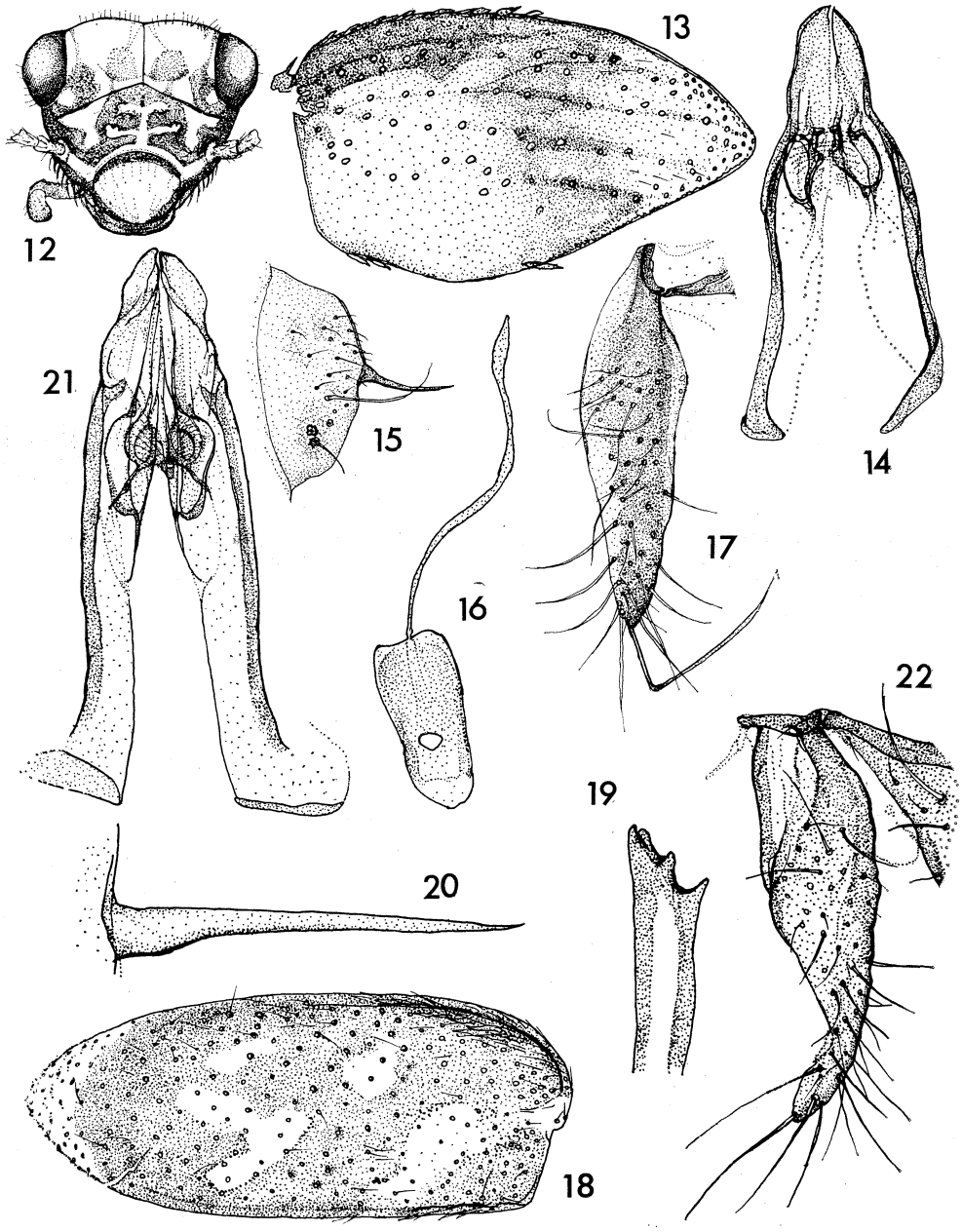
FEMALE

Coloration (in alcohol).—As male.

Morphology.—Length of body: 2.5 mm. General morphology as male. Paraproct (fig. 15). Sclerification of spermapore plate (fig. 16). Gonapophyses (fig. 17).

MATERIAL EXAMINED

Norfolk Island: 3 ♂ (including holotype), 8 ♀ (including allotype), 2 nymphs, Point Ross, 27.xi.1968; 1 ♀, Mount Pitt, 23.iii.1969; 4 ♂, 12 ♀, Captain Cook Monument, 22.xi.1968; 17 ♂, 17 ♀, 21–29.x.1967; 5 ♂, 4 ♀, Collin's Head, 24.iii.1969; 1 ♀, Jonneniggabunnit, 24.iii.1969 (C. N. Smithers); 8 ♂, 13 ♀, Melanesian Mission, 20.xi.1968; 11 ♂, 13 ♀, Mount Pitt, 19–21.xi.1968; 3 ♂, 6 ♀, Burnt Pine, 21.xi.1968; 3 ♂, 6 ♀, Palm Glen, 22.xi.1968 (A. S. Smithers); 2 ♀, Mount Pitt, 19.xi.1968 (G. F. Smithers); 11 ♂, 8 ♀, Mount Pitt, 28–29.viii.1971; 2 ♂, 3 ♀, Collin's Head, 30.viii.1971; 1 ♂, 1 ♀, 1 nymph, in garden, Aunt Em's Guesthouse, 3.ix.1971; 3 ♂, 7 ♀, 1 nymph, Mount Pitt-Mount Bates path, 2.ix.1971; 11 ♂, 13 ♀, Selwyn Pine Rd, 31.viii.1971; 7 ♂, 8 ♀, Point Ross, 31.viii.1971; 6 ♂, 12 ♀, Point Blackbourne, 25.viii.1971; 1 ♂, 2 ♀, Mount Bates Rd, 29.viii.1971; 1 ♂, 5 ♀, on Cypress trees, Mission Rd, 28.viii.1971; 4 ♀, Cascade-Red Rd, 28.viii.1971; 2 ♂, 6 ♀, Stockyard Creek, 25.viii.1971; 10 ♂, 15 ♀, Captain Cook Monument, 31.viii.1971 (C. N. Smithers and I. W. B. Thornton); 1 nymph, Mount Pitt slopes, 15.iv.1972 (A. L. Dyce, H. A. Standfast, and P. Ferrar).



Figs 12–17. *Pteroxanium insularum* sp. n. 12, ♂ head; 13, ♂ fore wing; 14, ♂ phallosome; 15, ♀ paraproct; 16, ♀ sclerite of 9th sternite; 17, ♀ gonapophyses. Figs 18–22. *Lepolepis graemei* sp. n. 18, ♂ fore wing; 19, ♂ lacinia; 20, ♂ paraproct spine; 21, ♂ phallosome; 22, ♀ gonapophyses.

Phillip Island: 1 ♀, 26.xi.1968 (C. N. Smithers).

Holotype, allotype, and paratypes in Australian Museum; paratypes in Australian National Insect Collection, British Museum and Bernice P. Bishop Museum.

DISCUSSION

The facial pattern of this species is distinctive; it is a larger species than *P. evansi.*

Lepolepis graemei sp. n.

MALE

Coloration (in alcohol).—Head and body brown, the postclypeus and labrum a little darker than the rest of the head. Genae dark brown. Antennae brown. Eyes black. Maxillary palp pale brown, a little darker in distal half of apical segment. Dorsum of meso- and metathorax brown. Legs brown. Fore wings (fig. 18) brown with hyaline areas; apical hyaline area always present, other areas vary considerably in extent, in some cases being more extensive than pigmented area. Abdomen brown ventrally; terminal structures brown; dorsally, median part of the seventh tergite and whole of eighth and ninth tergites of the abdomen thus brown; remaining tergites colourless (the dark areas correspond to the areas not covered by the reduced wings).

Morphology.—Length of body: 2.5 mm. Vertex fairly sharp. Median epicranial suture and its anterior arms distinct, the latter strongly divergent. Frons large, postclypeus small. Head with strong pubescence, setae longer on vertex and lower parts of genae. Antennae long, of at least fifty segments in some specimens. Eyes almost reaching level of vertex. No ocelli. Lacinia (fig. 19). Maxillary palp second segment with short, stout, blunt spur on basal quarter, large external seta half way along, and two spurs near distal end; apical segment enlarged distally, obliquely truncate. Prothorax short, wider than the simple mesothorax. Measurements of hind leg: F: 0.70 mm; T: 0.88 mm; t_1: 0.37 mm; t_2: 0.07 mm; t_3: 0.07 mm; rt: 5.3:1:1. Hind femora somewhat enlarged, noticeably so in comparison with femora of other legs. Hind tibiae strongly spinose on dorsal side; apex of tibia with one small and two large spines. Claws with small preapical tooth basad of which are a few very small denticles. Fore wing length: 1.30 mm; fore wing width: 0.55 mm. Fore wing (fig. 18) convex, elytriform, reduced, narrowing to a bluntly rounded apex; coastal and anal margins thickened to form a marginal flange in basal two-thirds, distally the ridge is less obvious; coastal flange more strongly developed than anal flange. No trace of veins; wing surface with closely set, narrow scales based on small alveoli; at nearly equal intervals over the whole surface, more widely spaced, stout, erect setae, based on large alveoli, protrude through the mat of scales to give an array of spines; scales and setae easily detached; few remain on most of the preserved specimens. Hind wing a very small membranous flap. Abdomen well sclerotized ventrally, dorsally membranous except for those areas which are not covered by the short wings. Scales occur on limited areas of the body only, those of the legs are long and narrow, those of the abdomen are broader. Epiproct simple. Paraproct simple, sparsely setose, with two setae arising from "rosette" bases. Posterior spine of paraproct (fig. 20) broad-based, narrowing sharply basally, more distally the shaft tapers gradually to a fine point. Hypandrium simple. Phallosome (fig. 21).

FEMALE

Coloration (in alcohol).—As male.

Morphology.—Length of body: 2.5 mm. General morphology as male. Measurements of allotype female very close to those of holotype male. Epiproct simple, sparsely setose with two small convergent setae in middle of the hind margin. Paraproct simple, two setae with "rosette" bases; spine as male. Ninth tergite strongly sclerotized. Subgenital plate membranous except for a semicircular, sclerotized plate. Gonapophyses (fig. 22) with dorsal valve remnants and a distally tapering, setose, external valve.

MATERIAL EXAMINED

Norfolk Island: 5 ♂ (including holotype), 5 ♀ (including allotype), Rocky Point Reserve, 23.xi.1968 (G. F. Smithers). Holotype, allotype, and paratypes in Australian Museum.

DISCUSSION

This species is placed in *Lepolepis* Enderlein although the wings are not as reduced as in the type species, *L. ceylonica* Enderlein (from Ceylon) and *L. bicolor* Broadhead (from imported West African ground nuts in Britain). *L. occidentalis* Mockford (from North America) has wing veins and is polymorphic. *L. graemei* shares with the type species scale distribution and form, excessive number of antennal segments and reduced elytriform and veinless wings. It can be distinguished from the other species in the genus by the form and colour-pattern of the fore wings.

CAECILIIDAE

Caecilius insulatus sp. n.

MALE

Coloration (in alcohol).—Head testaceous with slightly darker clouding across vertex in well pigmented specimens. Ocellar tubercle pale brown. Antennae brown, darker than ocellar tubercle. Eyes black. Maxillary palp as head, pale brown in well pigmented specimens. Mesothoracic lobes brown, broad areas adjacent to sutures testaceous. Thorax otherwise as head. Legs uniformly pale greyish-brown. Fore wings (fig. 23) hyaline, very faintly and uniformly tinged with brown. Veins, except cu_2, brown. Hind wings hyaline, veins brown.

Morphology.—Length of body: 1.7–1.9 mm. Vertex smoothly rounded. Median epicranial suture distinct. Ocellar tubercle prominent. Postclypeus slightly bulging. Labrum with very well developed disto-lateral styli. Antennae with basal flagellar segments thickened; distal segments narrower, antennae thus strongly tapering. Lengths of flagellar segments: f_1: 0.336 mm; f_2: 0.266 mm. Basal flagellar segment slightly curved, second segment straight Eyes moderately large, not quite reaching level of vertex IO/D: 1.8; PO: 0.75. Lacinia (fig. 24).

Mesothoracic precoxal suture discernible as a faint groove. Fore and middle tibiae of even width along length. Measurements of hind leg: F: 0.294 mm; T: 0.784 mm; t_1: 0.238 mm; t_2: 0.112 mm; rt: 2.1:1; ct: 16, 0. Fore wing length: 2.00 mm; fore wing width: 0.72 mm. Position of fore wing radial fork (fig. 23) varies, but always well basad of origin of m_3; pterostigma and veins with strong setae, except cu_2 which is glabrous. Hind wing length: 1.52 mm; hind wing width: 0.52 mm. Setae on margin of hind wing from r_1 to wing apex denser than elsewhere. Epiproct (fig. 25). Paraproct with large circular trichobothrial field, the setae long and slender; field of papillae small, with small papillae. Phallosome (fig. 26). Hypandrium with marginal setae somewhat concentrated laterally leaving a median gap.

FEMALE

Coloration (in alcohol).—Similar to male.

Morphology.—Length of body: 1.7–1.8 mm. General features as male, ocellar tubercle a little less prominent and antennae a little finer and shorter. Lengths of flagellar segments: f_1: 0.196 mm; f_2: 0.154 mm. Eyes only a little smaller than in male, not reaching level of vertex. IO/D: 2.4; PO: 0.9. Measurements of hind leg: F: 0.378 mm; T: 0.658 mm; t_1: 0.196 mm; t_2: 0.084 mm; rt: 2.3:1, ct: 12, 0. Fore wing length: 1.8 mm; fore wing width: 0.6 mm. Fore wings with *rs-m* confluence shorter than in male and radial fork about opposite to origin of m_3. Hind wing length: 1.36 mm; hind wing width: 0.44 mm. Epiproct and paraproct without papillar fields; trichobothrial field small, with a central seta lacking a "rosette" base. Subgenital plate simple. Gonapophyses (fig. 27). Spermathecal sac spherical, glandular area of duct long, almost reaching sac.

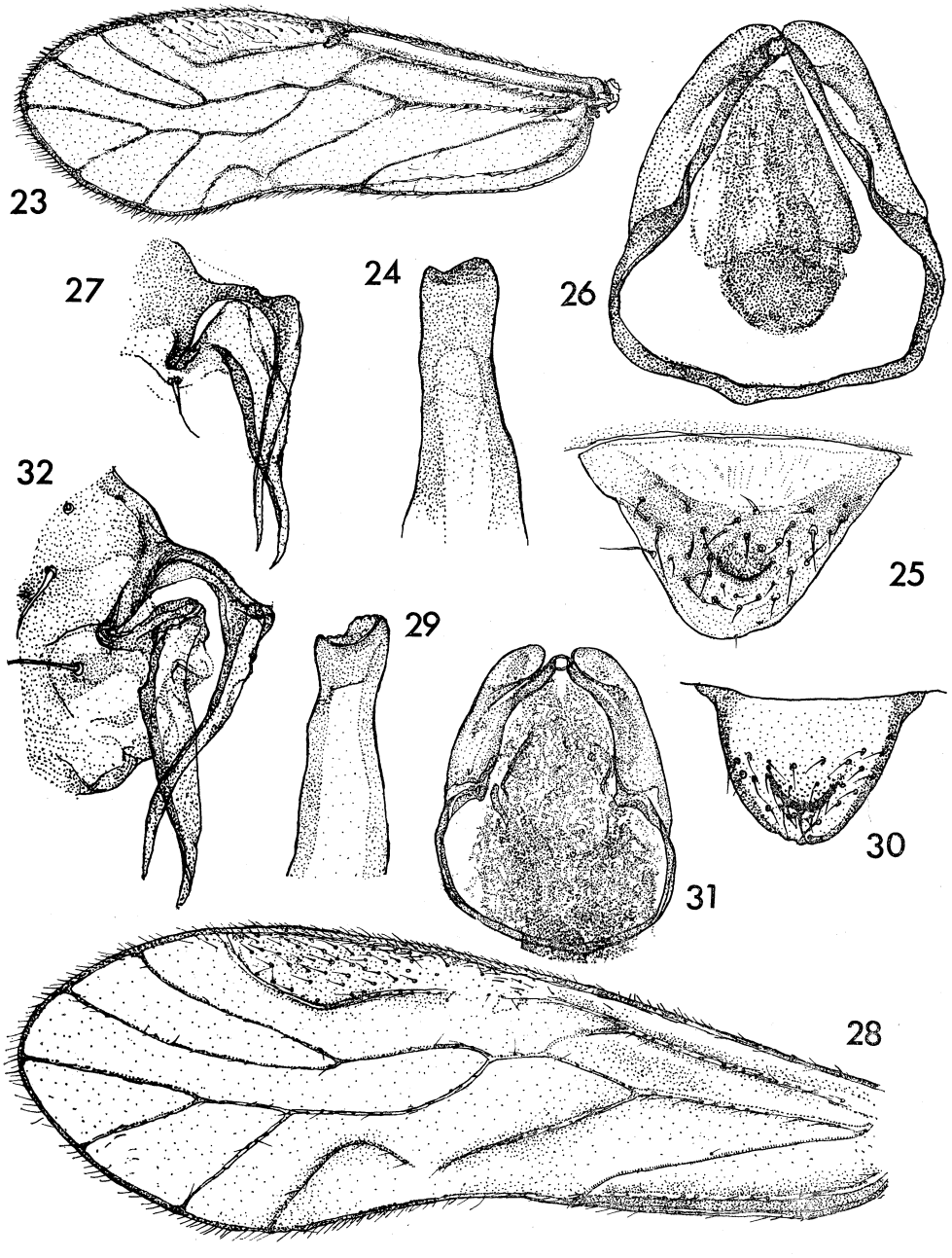
MATERIAL EXAMINED

Norfolk Island: 5 ♂ (including holotype), 3 ♀ (including allotype), Captain Cook Monument, 31.viii.1971; 6 ♂, 4 ♀, Selwyn Reserve, 30.viii.1971; 5 ♂, 5 ♀, Rocky Point Reserve, 28.viii.1971; 5 ♂, 3 ♀, Cascade-Red Rd, 28.viii.1971; 1 ♀, Mount Pitt to Mount Bates path, 2.ix.1971; 5 ♂, 5 ♀, Bumbora, 26.viii.1971; 2 ♂, 3 ♀, Point Blackbourne, 25.viii.1971; 6 ♂, 5 ♀, Mount Bates Rd, 29.viii.1971; 1 ♀, ex Cypress trees, Mission Rd, 28.viii.1971 (C. N. Smithers and I. W. B. Thornton); 2 ♀, Rocky Point Reserve, 23.xi.1968 (C. N. Smithers); 1 ♀, Burnt Pine, 21.xi.1968 (A. S. Smithers).

Holotype, allotype, and paratypes in Australian Museum, paratypes in Australian National Insect Collection, British Museum and Bernice P. Bishop Museum.

DISCUSSION

Caecilius is a large genus, but *Caecilius insulatus* differs from those species with which it might be confused as follows. It differs from the following in lacking a head pattern: *C. casarum* Badonnel, *C. dubius* Badonnel, *C. arotellus* Banks and *C. pallidobrunneus* Mockford. It is much smaller than *C. ademimensis* Badonnel, *C. castellus* Banks, *C. gilvus* Pearman, *C. luridus* Enderlein, *C. brevihirtus* Banks, *C. luteovenosus* Okamoto, *C. kamakurensis* Okamoto, *C. graminis* Mockford and *C. annulicornis* Enderlein. It differs in colour from *C. tamiami* Mockford, *C. incoloratus* Mockford and *C. imbecillus* McLachlan.



Figs 23–27. *Caecilius insulatus* sp. n. 23, ♂ fore wing; 24, ♂ lacinia; 25, ♂ epiproct; 26, ♂ phallosome; 27, ♀ gonapophyses. Figs 28–32. *Caecilius pacificus* sp. n. 28, ♂ fore wing; 29, ♂ lacinia; 30, ♂ epiproct; 31, ♂ phallosome; 32, ♀ gonapophyses.

Caecilius pacificus sp. n.

MALE

Coloration (in alcohol).—Head yellowish. Antennae dark brown. Eyes black. Ocellar tubercle pale, inner margins of ocelli brown. Maxillary palps yellowish, with faint brownish tinge near apex of fourth segment. Thorax yellowish with dark brown antedorsum and lateral lobes. Prothoracic legs with femur yellowish; tibia and tarsus faintly tinged with brown. Meso- and metathoracic legs yellowish, with only second tarsal segment tinged with brown. Fore wing (fig. 28) hyaline, tinged generally with very faint yellow, markings in various shades of brown, the darkest being cell Cu_2. Veins brownish. Abdomen yellowish.

Morphology.—Length of body: 2.4 mm. Median epicranial suture indistinct. Vertex somewhat flattened between eyes. Labrum without disto-lateral styli. Lengths of flagellar segments: f_1: 0.728 mm; f_2: 0.630 mm. Basal and second flagellar segments thickened, especially basal segment which is also noticeably curved; finely and densely pubescent. Eyes large, extending a little beyond level of vertex. IO/D: 0.58; PO: 0.83. Lacinia (fig. 29). Mesothoracic precoxal suture distinct. Tibiae of prothoracic legs not swollen. Measurements of hind leg: F: 0.616 mm; T: 1.100 mm; t_1: 0.350 mm; t_2: 0.112 mm; rt: 3.1:1; ct: 21, 0. Fore wing length: 3.0 mm; fore wing width: 1.0 mm. Fore wing with *rs* and *m* fused for a considerable length, *rs* fork well basad of origin of m_3; r_{2+3} curving a little forward in distal quarter; r_{4+5} smoothly but slightly curved throughout its length. Hind wing length: 2.2 mm; hind wing width: 0.68 mm. Veins *rs* and *m* in hind wing fused for a long length. Epiproct (fig. 30). Paraproct with small papillae occupying a circular area, bearing a well developed cone on hind margin. Hypandrium simple, sparsely setose, with slight lateral concentration of marginal setae. Phallosome (fig. 31).

FEMALE

Coloration (in alcohol).—As male, but in well pigmented specimens a very faint darkening across vertex adjacent to epicranial suture and on postclypeus. Antenna with f_1 and f_2 paler than more distal segments which are dark brown.

Morphology.—Length of body: 2.6 mm. Median epicranial suture distinct, more so than in male. Lengths of flagellar segments: f_1: 0.63 mm; f_2: 0.49 mm. Eyes smaller than male, just reaching level of vertex. IO/D: 1.4; PO: 0.77. Basal and second flagellar segments only a little thickened and hardly curved. Measurements of hind leg: F: 0.658 mm; T: 1.060 mm; t_1: 0.336 mm; t_2: 0.112 mm; rt: 3.0:1; ct: 18, 0. Fore wings as in male. Fore wing length: 3.20 mm; fore wing width: 1.04 mm. Hind wing length: 2.44 mm; hind wing width: 0.76 mm. Subgenital plate with small lateral apophyses and little pigmentation, even in well-pigmented specimens. Gonapophyses (fig. 32). Spermathecal sac spherical, glandular area of duct long and reaching almost to sac.

MATERIAL EXAMINED

Norfolk Island: 19 ♂ (including holotype), 27 ♀ (including allotype), Selwyn Pine Rd, 31.viii.1971; 2 ♂, 7 ♀, Captain Cook Monument, 31.viii.1971; 8 ♂, 10 ♀, Rocky Point Reserve, 28.viii.1971 and i.ix.1971; 6 ♂, 15 ♀, in garden, Aunt Em's Guesthouse, Burnt Pine, 3.ix.1971; 1 ♀, Selwyn Reserve, 30.viii.1971; 3 ♂, 2 ♀, Stockyard Creek, 25.viii.1971; 1 ♂, Collin's Head, 30.viii.1971; 2 ♂, 1 ♀, Mount

Bates Rd, 29.viii.1971; 1 ♂, 2 ♀, N. of Ball Bay, 3.ix.1971; 2 ♂, 2 ♀, Mount Pitt-Mount Bates path, 2.ix.1971; 2 ♂, 1 ♀, Mount Pitt, 29.viii.1971 (C. N. Smithers and I. W. B. Thornton); 8 ♂, 11 ♀, Palm Glen, 22–24.xi.1968; 1 ♂, 9 ♀, Rocky Point Reserve, 21–23.xi.1968 (C. N. and A. S. Smithers); 1 ♂, Bumbora, 18.xi.1968; 7 ♂, 5 ♀, 21–29.x.1967; 1 ♀, Mount Pitt, 23.iii.1969; 3 ♂, 6 ♀, Captain Cook Monument, 22.xi.1968; 4 ♂, 4 ♀, Point Ross, 27.xi.1968 (C. N. Smithers); 1 ♂, Mount Pitt, 19.xi.1968; 1 ♂, 6 ♀, Melanesian Mission, 20.xi.1968; 1 ♂, 1 ♀, Point Ross, 24.xi.1968; 2 ♂, 7 ♀, Bumbora, 18.xi.1968 (A. S. Smithers); 1 ♂, 1 ♀, Rocky Point Reserve, 23.xi.1968; 1 ♀, Mount Pitt, 19.xi.1968 (G. F. Smithers).

Holotype, allotype, and paratypes in Australian Museum, paratypes in Australian National Insect Collection, British Museum and Bernice P. Bishop Museum.

DISCUSSION

Caecilius pacificus is similar to *C. flavistigma* (Tillyard) in general appearance, but differs in lacking the bold median longitudinal brown stripe on the head.

ECTOPSOCIDAE

Ectopsocus briggsi McLachlan

MATERIAL EXAMINED

Norfolk Island: 5 ♂, 8 ♀, Ross Point, 24.xi.1968, 1 ♂, 1 ♀, Rocky Point Reserve, 21.xi.1968; 4 ♂, 3 ♀, Burnt Pine, 21.xi.1968; 1 ♂, 2 ♀, Palm Glen, 22.xi.1968; 1 ♀, Melanesian Mission, 20.xi.1968; 1 ♀ Anson Bay, 23.xi.1968; 3 ♂, 2 ♀, Mount Pitt, 21.xi.1968 (A. S. Smithers); 24 ♂, 51 ♀, Rocky Point Reserve, 23.xi.1968; 4 ♀, Captain Cook Monument, 22.xi.1968; 1 ♂, 2 ♀, Ross Point, 27.xi.1968 (C. N. Smithers); 1 ♂, 1 ♀, Mount Pitt, 19.xi.1968; 1 ♂, 3 ♀, Rocky Point Reserve, 23.xi.1968 (G. F. Smithers); 35 ♂, 63 ♀, Rocky Point Reserve, 1.ix.1971; 5 ♀, in garden, Aunt Em's Guest House, Burnt Pine, 3.xi.1971; 1 ♂, Captain Cook Monument, 31.viii.1968; 3 ♀, Selwyn Pine Road, 31.viii.1971; 1 ♂, Mount Pitt, 29.viii.1971; 1 ♂, 2 ♀, Mt Bates Road, 29.viii.1971; 8 ♂, 5 ♀, Mount Pitt-Mt Bates path, 2.ix.1971 (C. N. Smithers and I. W. B. Thornton).

E. briggsi is a widespread species known from Africa, Europe, North and South America, Australia, India, Micronesia, and New Zealand.

Ectopsocus insularis sp. n.

MALE

Coloration (in alcohol).—Head pale buff with pale brown area either side of epicranial suture, adjacent to compound eyes and across back of vertex. Frons very pale buff. Postclypeus very pale brown. Labrum very pale brown. Genae coloured as frons. Antennae brown. Eyes black. Ocelli colourless, on pale brown tubercle. Maxillary palps pale brown with colourless tip. Legs very pale brown. Fore wings (fig. 33) hyaline, tinged with very pale grey which is palest in median and cubital cells near wing margin and darkest at proximal end of pterostigma, *rs-m* meeting point and adjacent to veins distally. Hind wings hyaline, veins brown. Abdomen very pale, the phallosome sclerifications visible through the brown hypandrium and the tubercles and comb of the ninth tergite visible as black marks under low power (x8).

Morphology.—Length of body: 1.5 mm. Lengths of flagellar segments: f_1: 0.275 mm; f_2: 0.190 mm. Eyes moderately large, just reaching level of vertex, almost circular when seen from above. IO/D: 1.66; PO: 0.75. Measurements of hind leg: F: 0.325 mm; T: 0.590 mm; t_1: 0.212 mm; t_2: 0.075 mm; rt: 2.9:1; ct: 16, 1. Fore wing length: 1.6 mm; fore wing width: 0.6 mm; pterostigma broadening slightly in distal part; veins *rs* and *m* fused for a short length, *rs* fork opposite a point between origins of m_2 and m_3; wing margin glabrous, a few short setae on all veins except cu_2. Hind wing length: 1.2 mm; hind wing width: 0.4 mm; margin and veins glabrous. Ninth tergite (fig. 34) trapezoid with a proximal group of tubercles and a strong comb along hind border. Epiproct simple, with rounded hind margin, lightly sclerotized, sparsely setose. Phallosome (fig. 35) with external parameres sinuous, tapering, sharply pointed; sclerifications of penial bulb complex.

FEMALE

Coloration (in alcohol).—As male, but at apex of abdomen the remarkably strong, asymmetrical sclerifications of the inner part of the subgenital plate show through as strong brown markings on the right side, being easily visible even in otherwise pale individuals.

Morphology.—Length of body: 1.7 mm. Antennae finer than in male. Lengths of flagellar segments: f_1: 0.25 mm; f_2: 0.18 mm. Eyes smaller than in male, not quite reaching level of vertex. IO/D: 2.4; PO: 0.6. Measurements of hind leg: F: 0.325 mm; T: 0.600 mm; t_1: 0.190 mm; t_2: 0.060 mm; rt: 3.1:1; ct: 15, 0. Fore wing length: 1.7 mm; fore wing width: 0.6 mm. Wing form, setae and venation as in male but *rs* and *m* fused for a very short length. Hind wing length: 1.4 mm; hind wing width: 0.5 mm. Epiproct simple, rounded behind, lightly sclerotized, with ovoid, very lightly sclerotized area in distal third, posterior margin of ovoid area reaching hind margin; two strong posterior marginal setae flank a small median seta; four long setae occur on either side near lateral margins of epiproct. Paraproct with few trichobothria and a row of six strong setae; hind margin bears one strong seta, a very small, double cone adjacent to a much reduced seta and a few small setae ventrally. Subgenital plate (fig. 36) bilobed, each lobe bearing a strong terminal seta and one smaller seta on inner margin and two on outer margin; preapical row of small setae, posterolateral margins of plate strengthened by a sclerotized rod and internal face sclerotized in a remarkable, asymmetrical fashion, dark sclerotized areas being clearly visible through subgenital plate. Gonapophyses (fig. 37).

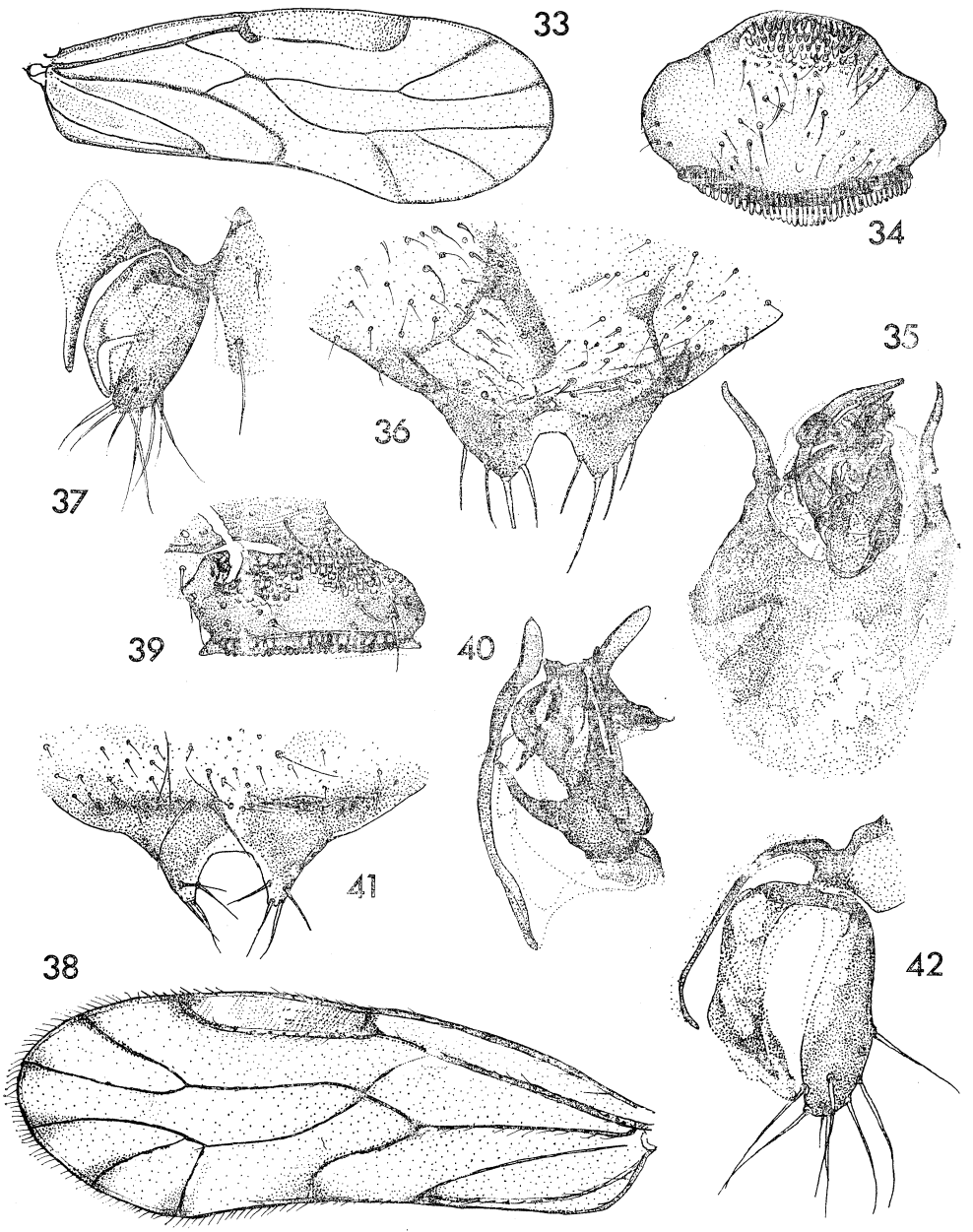
MATERIAL EXAMINED

Norfolk Island: 1 ♂ (holotype), 9 ♀ (including allotype), in garden, Aunt Em's Guest House, Burnt Pine, 3.ix.1971 (C. N. Smithers and I. W. B. Thornton); 1 ♀, Melanesian Mission, 20.xi.1968; 2 ♀, Bumbora, 18.xi.1968; 2 ♀, Anson Bay, 23.xi.1968 (A. S. Smithers); 6 ♀, Rocky Point Reserve, 23.xi.1968 (C. N. Smithers).

Holotype, allotype, and paratypes in Australian Museum, paratypes in Australian National Insect Collection.

DISCUSSION

Ectopsocus insularis belongs to the *ornatus* group of species as defined by Thornton and Wong (1968, p. 140). The male resembles the other species in the general form of the sclerifications of the penial bulb but differences of detail are evident in these complex structures in each species. The shape of the field of tubercles on the ninth



Figs 33–37. *Ectopsocus insularis* sp. n. 33, ♂ fore wing; 34, ♂ 9th tergite; 35, ♂ phallosome; 36, ♀ subgenital plate; 37, ♀ gonapophyses. Figs 38–42. *Ectopsocus inornatus* sp. n. 38, ♂ fore wing; 39, ♂ 9th tergite; 40, ♂ phallosome; 41, ♀ subgenital plate; 42, ♀ gonapophyses.

tergite differs from the other species, being nearest to that of *E. ornatoides* Thornton and Wong. The female is remarkable for the conspicuous, peculiar, asymmetrical sclerifications of the inner lining of the subgenital plate and the strengthening rods along its postero-lateral margins. The *ornatus* group of species is known from Hong Kong, Taiwan, the Marshalls and Gilberts, Fiji, Samoa, Hawaiian Islands, and the Kermadecs. *E. insularis* is most similar to *E. ornatoides*, which is known from Micronesia, Fiji, Samoa, and the Hawaiian Islands.

Ectopsocus inornatus sp. n.

MALE

Coloration (in alcohol).—Head light buff with very slightly darker areas near eyes, median epicranial suture and frons. Epistomial suture dark, thus giving a dark, curved line between antennae bases. Postclypeus, anteclypeus and labrum pale, without markings on postclypeus. A dark mark connects antennal bases and compound eyes. Genae pale. Antennae brown. Ocelli pale, on a pale tubercle but margined centripetally with dark brown crescents. Eyes black. Maxillary palps pale. Thorax pale brown above, clearly darker than head under low power (x8). Thorax laterally with a longitudinal dark brown stripe; seen from the side, the insect thus has a stripe from antenna base, through eye and along side of the body to base of abdomen. Legs very pale, the tibiae a little darker than the other segments. Fore wing (fig. 38) hyaline, faintly tinged with yellowish brown, marked with darker areas as in figure. Hind wings hyaline with ill-defined darker areas bordering apices of r_{2+3}, r_{4+5}, *m* and cu_1. Abdomen pale, with irregular, segmental brown markings; apex of abdomen dark due to sclerotization of hypandrium, tergite and other terminal structures.

Morphology.—Length of body: 1.7 mm. Head with long sparse setae on vertex and frons; shorter setae on postclypeus. Lengths of flagellar segments: f_1: 0.41 mm; f_2: 0.26 mm. Eyes fairly large, hemispherical, but not reaching level of vertex; inner margins diverge very slightly when viewed from above. IO/D: 2.3, PO: 0.66. Measurements of hind leg: F: 0.425 mm; T: 0.700 mm; t_1: 0.42 mm; t_2: 0.06 mm; rt: 7:1; ct: 17, 0. Fore wing length: 2.0 mm; fore wing width: 0.7 mm. Fore wing (fig. 38) with *rs* and *m* meeting in a point; pterostigma a little broader towards distal end; r_{2+3} slightly sinuous; cu_1 strongly recurved near wing margin; wing margin setose, with additional setae from distal end of pterostigma to wing apex; veins setose. Hind wing length: 1.5 mm; hind wing width: 0.5 mm. Hind wing margin with setae between r_1 and r_{4+5}; cu_1 more strongly developed than other veins. Epiproct simple, rounded posteriorly with a group of six small setae in distal half and two long posterior marginal setae. Paraproct with oval field of about eight trichobothria with a small simple seta ventrad of field; paraproct has only one large seta in addition to the usual small setae near the posterior margin; a large double cone and small adjacent setae on margin. Hypandrium simple, hind margin more strongly sclerotized laterally than mesially. Ninth tergite (fig. 39) with a strongly sclerotized extensive oval area which is strongly sculptured in a regular pattern; posterior comb reduced to a row of small, rounded tubercles. Phallosome (fig. 40) with apically broadened external parameres, interior parameres fused into a median plate with a posterior tooth on each side; sclerifications of penial bulb complex; phallosome strongly upcurved posteriorly, so that external parameres are almost pointing upwards.

FEMALE

Coloration (in alcohol).—As male.

Morphology.—General features as male. Length of body: 1.9 mm. Lengths of flagellar segments: f_1: 0.400 mm; f_2: 0.212 mm. Antennae finer than male. Eyes smaller than male. IO/D: 4.0; PO: 1.5. Measurements of hind leg: F: 0.50 mm; T: 0.70 mm; t_1: 0.20 mm; t_2: 0.09 mm; rt: 2.2:1; ct: 16, 0. Fore wing length: 2.0 mm; fore wing width: 0.7 mm. Hind wing length: 1.5 mm; hind wing width: 0.5 mm. Venation and setae as male. Epiproct broad, trapezoid, with four strong setae in basal half, two on each side, and a row of smaller posterior, marginal setae. Paraproct with almost round field of eight trichobothria and row of five, strong setae; posterior double cones short and stout, with one small seta close to them and flanked by two larger setae. Subgenital plate (fig. 41) with four strong setae on each lobe, two terminal and two arising well basad of end of lobe. Gonapophyses (fig. 42).

MATERIAL EXAMINED

Norfolk Island: 6 ♂ (including holotype), 3 ♀ (including allotype), Mount Pitt, 21.xi.1968; 1 ♀, Palm Glen, 22.xi.1968 (A. S. Smithers); 1 ♂, 1 ♀, Captain Cook Monument, 22.xi.1968 (C. N. Smithers); 1 ♂, 3 ♀, Mount Pitt Reserve, 28.viii.1971 (C. N. Smithers and I. W. B. Thornton).

Holotype, allotype, and paratypes in Australian Museum; paratypes in Australian National Insect Collection.

DISCUSSION

E. inornatus resembles *E. nidicolus* Thornton and Wong (from New Guinea) and agrees well with the definition of the *E. basalis* group in which *E. nidicolus* is included (Thornton and Wong, 1968). It differs, however, in details of the sclerification of the penial bulb and in having marginal setae on the hind wing between r_1 and r_{4+5}. The *E. basalis* group includes species from the Philippines, New Guinea, the Caroline Islands, and Malaya.

PERIPSOCIDAE

Peripsocus milleri (Tillyard)

MATERIAL EXAMINED

Norfolk Island: 1 ♀, Mount Pitt, 29.viii.1971 (C. N. Smithers and I. W. B. Thornton).

This species has been recorded from New Zealand and Western Australia.

Peripsocus norfolkensis sp. n.

MALE

Coloration (in alconol).—Head pale brown with broad dark brown mark each side of median epicranial suture and dark brown spot on vertex near each eye; a small brown spot abuts inner margin of compound eye opposite anterior end of median epicranial suture. Frons very pale brown in middle, dark brown laterally. Postclypeus very pale with a broad, irregular dark brown band each side mesad of antennal bases from epistomial suture to anterior margin of postclypeus. A brown

mark connects this band to eye just above antennal base. Anteclypeus pale; labrum brown. Genae very pale. Antennae brown. Eyes black. Maxillary palps brown. Mesothoracic notum brown, pale adjacent to sutures and with median, longitudinal pale stripe on antedorsum. Legs brown, femora a little paler than other segments. Fore wings (fig. 43) hyaline, slightly testaceous; pterostigma with dark spot at base, dark pigment along r_1 from hind angle to costal margin, a dark spot at nodulus; veins brown except *m* between separation from *rs* and m_3, which is pale. Thorax brown laterally with darker lateral stripe. Abdomen pale, almost colourless; terminal structures dark brown.

Morphology.—Length of body: 1.6 mm. Head small, eyes conspicuous. Antennae short, 1.6 mm, shorter than fore wing. Lengths of flagellar segments: f_1: 0.22 mm; f_2: 0.22 mm. Eyes large, reaching just beyond level of vertex; when viewed from above inner margins convex, hind margins strongly divergent. IO/D: 0.86; PO: 1.00. Abdomen slender, cylindrical. Measurements of hind leg: F: 0.322 mm; T: 0.650 mm; t_1: 0.175 mm; t_2: 0.087 mm; rt: 2:1; ct: 17, 1. Fore wing length: 2.0 mm; fore wing width: 0.8 mm, fore wings broad; costa thickened for a length basad of pterostigma; veins *rs* and *m* fused for a length, *rs* divides opposite hind angle of pterostigma, m_3 arises opposite *rs* bifurcation; veins well defined but *m* distad of separation from *rs* somewhat evanescent and pale as far as origin of m_3; m_1 reaches margin at wing apex. Hind wing length: 1.6 mm; hind wing width: 0.6 mm. Epiproct semi-circular, sclerotized, with a few fine setae along posterior margin. Hypandrium simple, rather more lightly sclerotized in middle than laterally. Phallosome (fig. 44) with broad anterior end, with complex and characteristic sclerification of the penial bulb. No caudal comb on ninth tergite.

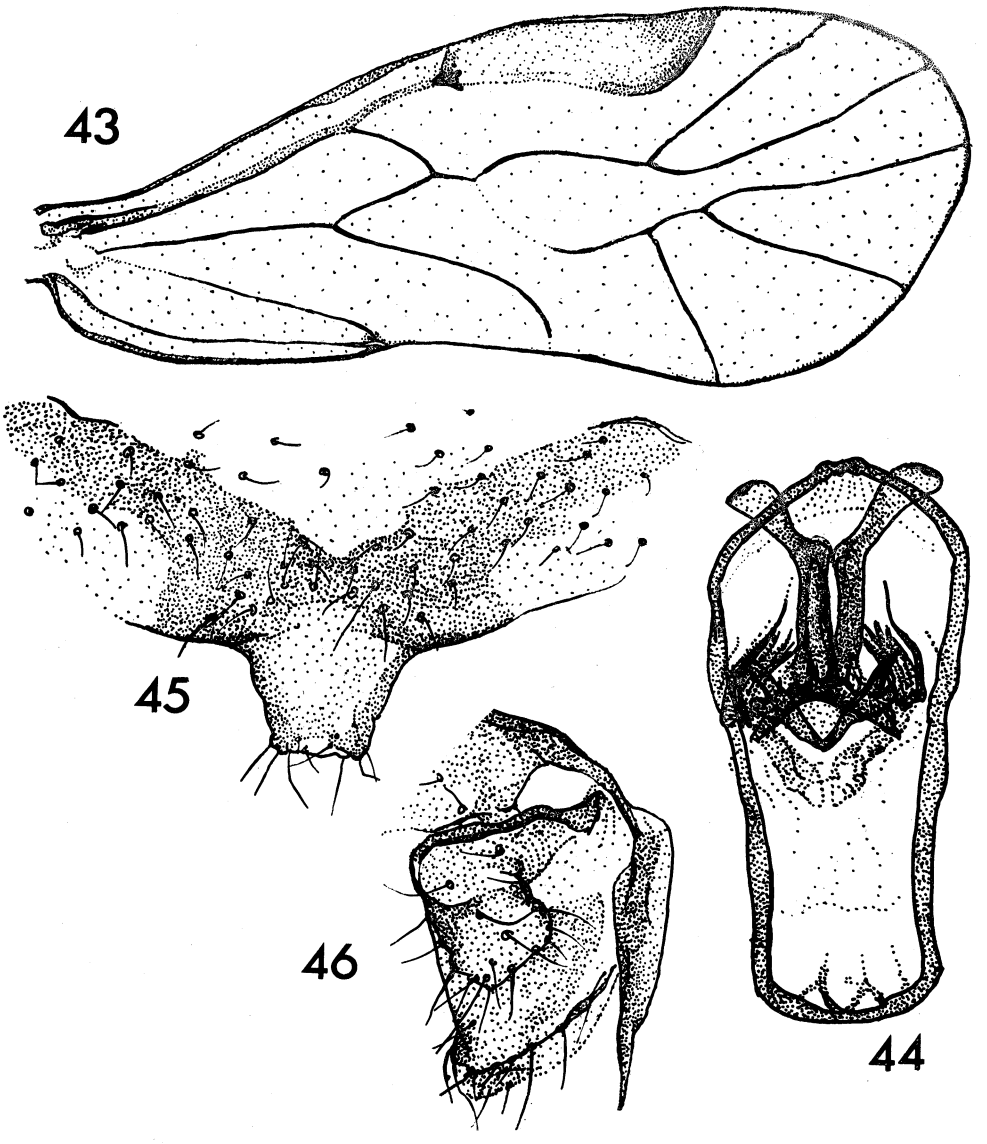
FEMALE

Coloration (in alcohol).—Head similar to male but spot near inner margin of eyes much bigger and more conspicuous owing to reduced area of head occupied by eyes. Genae with dark brown spot at lower end. Abdomen almost colourless dorsally and ventrally as male but with distinct lateral segmental bands of brown.

Morphology.—Length of body: 1.7 mm. Antennae shorter than fore wings. Lengths of flagellar segments: f_1: 0.220 mm; f_2: 0.175 mm. Eyes small, much smaller than male, not reaching level of vertex. IO/D: 4.0; PO: 0.75. Measurements of hind leg: F: 0.322 mm; T: 0.622 mm; t_1: 0.175 mm; t_2: 0.087 mm; rt: 2:1; ct: 12, 0. Fore wing length: 2.2 mm; fore wing width: 1.3 mm; fore wing form and venation similar to male. Hind wing length: 1.6 mm; hind wing width: 0.6 mm. Subgenital plate (fig. 45). Gonapophyses (fig. 46) with well developed ventral valve; dorsal valve broad with small, apparently separate, posterior accessory sclerite; outer valve small, very lightly sclerotized, short and broad.

MATERIAL EXAMINED

Norfolk Island: 5 ♂ (including holotype), 11 ♀ (including allotype), Stockyard Creek, 25.viii.1971 (C. N. Smithers and I. W. B. Thornton); 4 ♂, 13 ♀, Point Ross, 24.xi.1968; 1 ♂, 3 ♀, Palm Glen, 24.xi.1968; 1 ♂, 2 ♀, Burnt Pine, 21.xi.1968; 10 ♀, Melanesian Mission, 20.xi.1968 (A. S. Smithers); 2 ♂, 2 ♀, Mount Pitt, 23.iii.1969; 1 ♀, Jonneniggabunnit, 24.iii.1969; 3 ♀, Point Ross, 27.xi.1968; 1 ♂, Collin's Head, 24.iii.1969; 15 ♂, 6 ♀, 21–29.x.1967 (C. N. Smithers); 1 ♂, 1 ♀, Selwyn Pine Road, 31.viii.1971; 2 ♂, 5 ♀, Rocky Point Reserve, 28.viii.1971; 1 ♂, 1 ♀, Captain Cook Monument, 31.viii.1971; 1 ♂, in garden, Aunt Em's Guesthouse, Burnt Pine, 3.ix.1971; 2 ♀, *ex* Cypress trees, Mission Rd, 28.viii.1971 (C. N. Smithers and I. W. B. Thornton); 1 ♂, Mount Pitt forest, 17.iv.1972; 1 ♀, Anson Bay Rd, 13.iv.1972; (A. L. Dyce, H. A. Standfast, and P. Ferrar).



Figs 43–46. *Peripsocus norfolkensis* sp. n. 43, ♂ fore wing; 44, ♂ phallosome; 45, ♀ subgenital plate; 46, ♀ gonapophyses.

Holotype, allotype, and paratypes in Australian Museum, paratypes in Australian National Insect Collection, British Museum, and Bernice P. Bishop Museum.

DISCUSSION

Peripsocus norfolkensis can be distinguished from other species of the genus by the form of the phallosome in the male and the gonapophyses in the female. The only species with which it is likely to be confused is *P. maoricus* (Tillyard) from New Zealand which, however, has three small lobes on the posterior end of the phallic frame and lacks the multipointed parts of the sclerification of the penial bulb in the male. The proportions of the lobe of the subgenital plate differ in the two species and in females of *P. maoricus* there is a definite darkening of the wing membrane in a band running from basad of the pterostigma towards the nodulus (of Smithers, 1969, figs 96–101). *P. norfolkensis* and *P. maoricus* are closely related species.

PSEUDOCAECILIIDAE

Heterocaecilius variabilis sp. n.

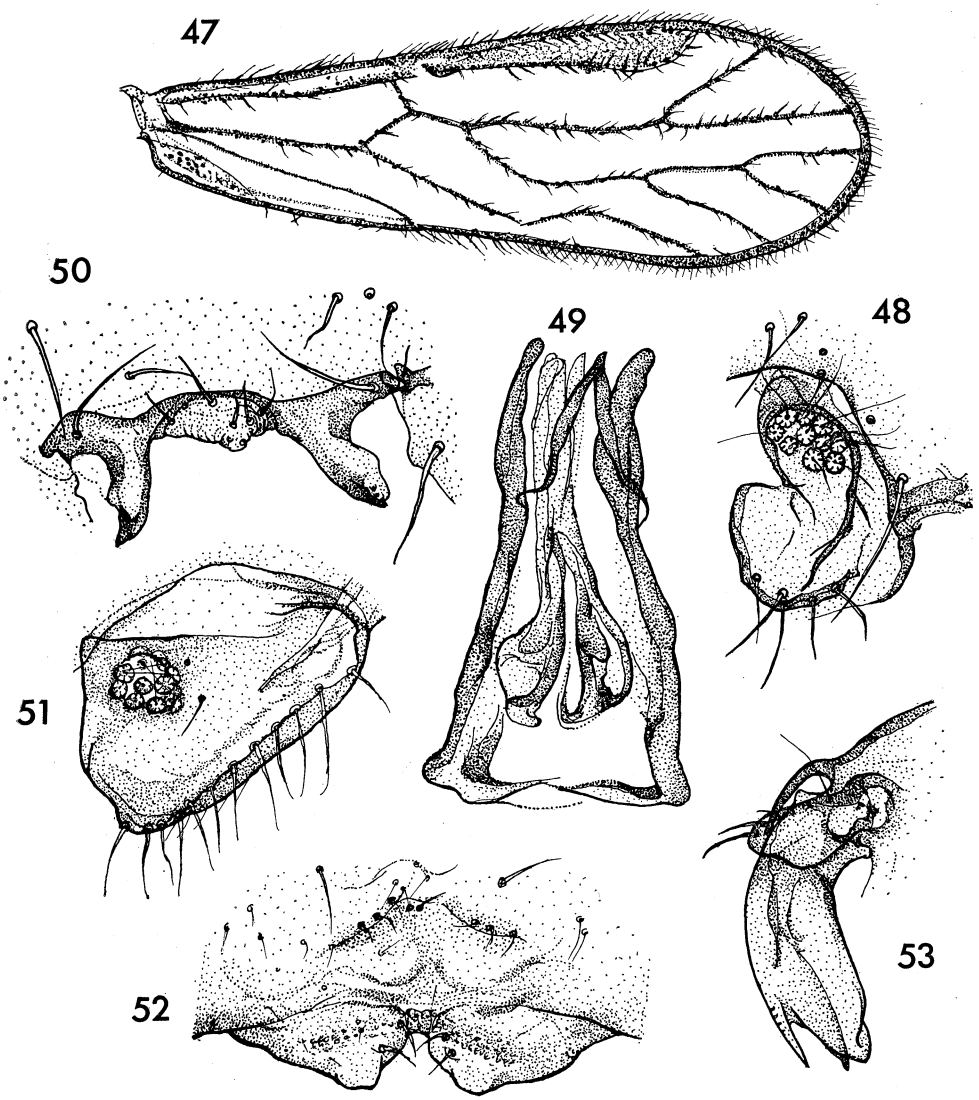
MALE

Coloration (in alcohol).—Coloration variable, possibly dependant on age. Some specimens almost uniformly very pale buff, with almost colourless antennae and black eyes; apex of abdomen a little darker due to strong sclerotization of ninth tergite, especially its anterior border. Specimens with greater pigment deposition have head very pale buff with brown mark across vertex, darker mesially than nearer the eyes; antennae pale brown, eyes black; Ocelli colourless with borders adjacent to one another marked with very dark brown (the marks occur also in the paler specimens and stand out in sharp contrast to the rest of the head). Maxillary palps pale. Mesonotum dark brown, pale along sutures. Legs pale, tibiae a little darker than other segments. Fore wing (fig. 47) hyaline, colourless; pterostigma opaque white. Veins pale brown. Abdomen colourless, except for those terminal structures which are well sclerotized.

Morphology.—Length of body: 2.2 mm. Head with sparse, long, dark setae, symmetrically arranged. Lengths of flagellar segments: f_1: 0.55 mm; f_2: 0.35 mm. Eyes not quite reaching level of vertex. IO/D (Pearman): 1.7; IO/D (Badonnel): 1.3; PO: 0.75. Measurements of hind leg: F: 0.48 mm; T: 0.84 mm; t_1: 0.24 mm; t_2: 0.08 mm; rt: 3:1; ct: 13, 0. Fore wing length: 2.3 mm; fore wing width: 0.8 mm. Fore wing (fig. 47) with r_1 meeting wing margin at an acute angle; veins with strong setae in two series; vein r_{2+3} a little sinuous as are branches of *m;* areola postica long and flat; large field of sensilla in basal area of cell Cu_2 adjacent to anal vein; vein cu_2 without setae. Hind wing length: 1.9 mm; hind wing width: 0.6 mm. In hind wing veins *rs* and *m* fused for a long length; veins in distal part of wing setose. Epiproct semicircular, strongly sclerotized with a few setae and a median rugose area in posterior half; posterior margin with a row of strong, posteriorly directed setae. Paraproct (fig. 48). Phallosome (fig. 49). Hypandrium (fig. 50) with lightly sclerotized, lateral projecting bars ending in a strongly sclerotized lobe and tooth; posterior margin with small, single median projection. Ninth tergite strongly sclerotized, particularly along anterior margin; two small, rugose papillae adjacent to each side of base of epiproct.

FEMALE

Coloration (in alcohol).—As male but even in strongly pigmented specimens extent of dark areas on vertex is much less than in males, being limited to area near median epicranial suture.



Figs 47–53. *Heterocaecilius variabilis* sp. n. 47, ♂ fore wing; 48, ♂ paraproct; 49, ♂ phallosome; 50, ♂ hypandrium; 51, ♀ paraproct; 52, ♀ subgenital plate; 53, ♀ gonapophyses.

Morphology.—Length of body: 2.2 mm. Lengths of flagellar segments: f_1: 0.52 mm; f_2: 0.26 mm. Eyes small, much smaller than in males. IO/D (Pearman): 2.8; IO/D (Badonnel): 2.0; PO: 0.71. Measurements of hind leg: F: 0.46 mm; T: 0.74 mm; t_1: 0.24 mm; t_2: 0.1 mm; rt: 2.4:1; ct: 13, 0. Fore wing length: 2.20 mm; fore wing width: 0.64 mm. Fore wing venation and setae as male; no sensilla in cell Cu_2. Hind wing length: 1.60 mm; hind wing width: 0.44 mm; venation and setae as in male. Epiproct rounded posteriorly, lightly sclerotized with a transverse row of four strong setae near posterior margin and a few smaller marginal setae; a few small setae on body of epiproct basad of transverse row. Paraproct (fig. 51). Subgenital plate (fig. 52) with two posterior lobes each bearing three setae; a group of spicules occurs mesially at the bases of the lobes. Gonapophyses (fig. 53).

MATERIAL EXAMINED

Norfolk Island: 5 ♂ (including holotype), 8 ♀ (including allotype), Captain Cook Monument, 22.xi.1968 (C. N. Smithers); 1 ♂, Bumbora, 18.xi.1968; 1 ♀, Palm Glen, 22.xi.1968; 1 ♀, Burnt Pine, 21.xi.1968; 2 ♀, Mount Pitt, 19.xi.1968 (A. S. Smithers); 2 ♀, Rocky Point Reserve, 23.xi.1968; 1 ♀, 21–29.x.1967 (C. N. Smithers); 2 ♂, 1 ♀, Mount Pitt, 19.xi.1968 (G. F. Smithers); 1 ♂, Mount Pitt, 28.viii.1971; 4 ♂, 3 ♀, Selwyn Pine Rd, 31.viii.1971; 1 ♂, Captain Cook Monument, 31.viii.1971; 1 ♀, Mount Pitt, 29.viii.1971 (C. N. Smithers and I. W. B. Thornton).

Holotype, allotype, and paratypes in Australian Museum, paratypes in Australian National Insect Collection.

DISCUSSION

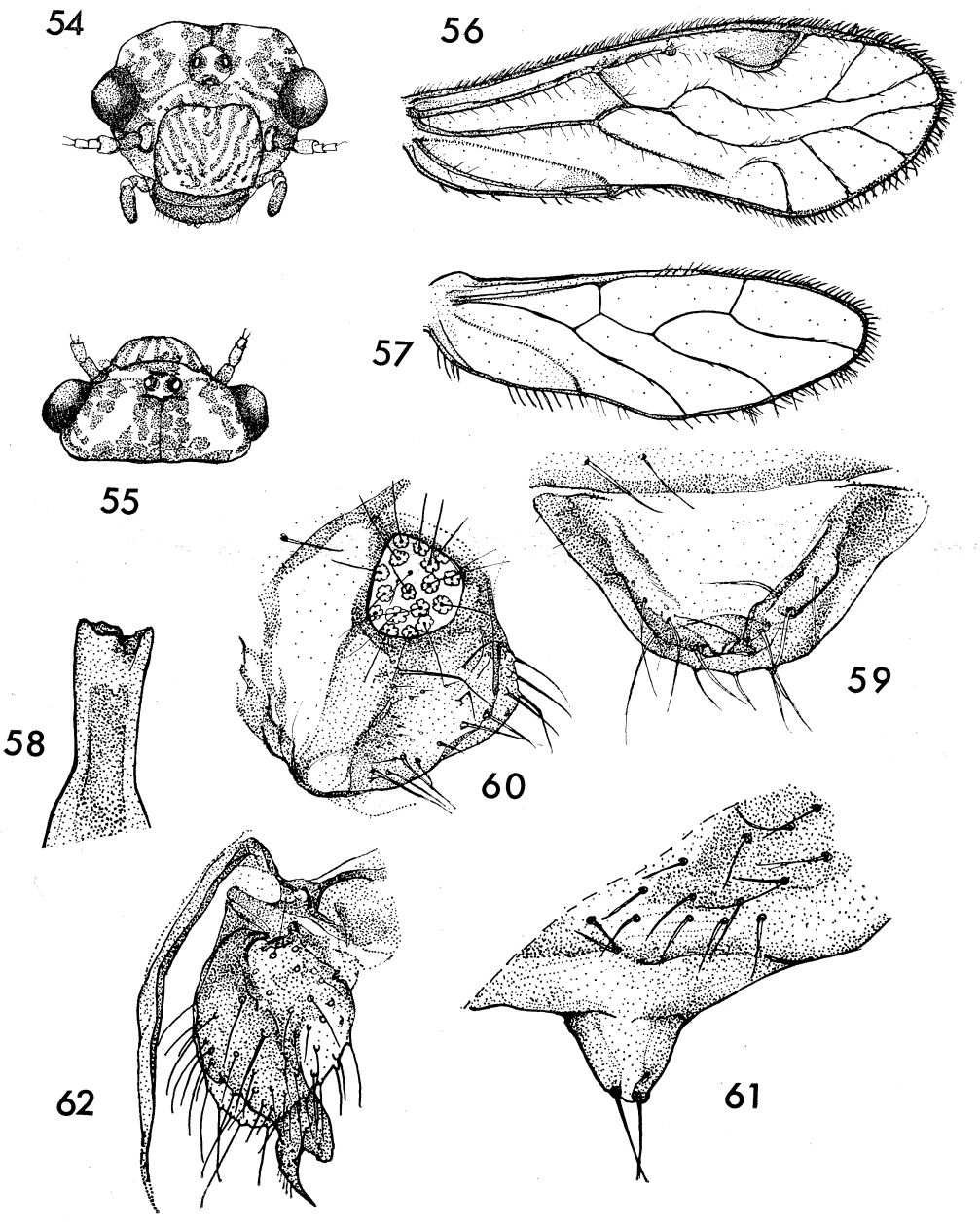
H. variabilis belongs to the *H. maculifrons* group as defined by Lee and Thornton (1967). It can be distinguished from other members of the group (other than *H. campanula* Lee and Thornton) by the form of the sclerification of the penial bulb and the form of the hypandrium, the absence of a preapical tooth on the tarsal claw and the presence of a field of sensilla in the male in cell Cu_2. In many features it resembles *H. campanula* which is clearly its nearest relative. It differs in size, however, and in the male having rugose areas of the ninth tergite on distinct papillae, also in the forms of the hypandrium, epiproct and paraproct. The female differs in lacking a sclerotized triangular area on each lobe of the subgenital plate, in having three large setae on each lobe and in the form of the paraproct. *H. campanula* is known from the Caroline Islands, the Marshalls, the Gilberts, and Kapingamaranga Atoll, that is, from Micronesia.

PHILOTARSIDAE

Haplophallus emmus sp. n.

FEMALE

Coloration (freshly killed, in alcohol).—Head cream, brown markings as in figures (54) and (55). Gena with a small brown patch at anterior corner. Eyes black, ocelli pale, ringed with black. Maxillary palp pale brown, apical segment dark brown. Antenna brown. Mesothorax with dark brown lobes, sutural areas and median stripe on antedorsum cream. Legs cream, banded brown, two bands on femur and three on tibia, femoral bands distinct on fore leg, confluent dorsally on hind leg, apical tibial band darker brown than rest. Fore wing markings as in



Figs 54–62. *Haplophallus emmus* sp. n. 54, ♀ head-front; 55, ♀ head; 56, ♀ fore wing; 57, ♀ hind wing; 58, ♀ lacinia; 59, ♀ epiproct; 60, ♀ paraproct; 61, ♀ subgenital plate; 62, ♀ gonapophyses.

figure (56). Hind wing (fig. 57) with faint fuscous areas in anal angles. Basal two abdominal terga largely white, terga 3–5 largely granular brown, 6–9 largely white with brown granulation on anterior and posterior margins and two dark longitudinal streaks dorsally. Sterna uniform brown.

Morphology.—Body length: 2.50 mm. IO/D: 3.33. Median epicranial suture distinct. Length of flagellar segments: f_1: 0.378 mm; f_2: 0.275 mm; f_1:f_2: 1.375. Anterior ocellus much smaller than lateral ocelli. Lacinial apex as in figure 58. Measurements of hind leg: F: 0.480 mm; T: 0.992 mm; t_1: 0.330 mm; t_2: 0.050 mm; t_3: 0.066 mm; rt: 6.60:1:1.32; ct: 15, 0, 0. Fore wing length: 3.18 mm; fore wing width: 1.15 mm. Fore wing with costa fairly thick beyond distal section of subcosta, *rs* long, curving strongly before forking. Hind wing length: 2.41 mm; hind wing width: 0.48 mm. Setae on hind wing veins: r_1: 6, *rs:* 0, r_{2+3}: 0; r_{4+5}: 12, *m:* 10, cu_1: 8. Epiproct (fig. 59) rounded apically, with scattered setae. Paraproct (fig. 60) simple, with circular field of 18 trichobothria, 2 not in rosette sockets. Subgenital plate as in figure 61, number of apical seta varies. Gonapophyses as in figure 62, dorsal valve with sharp curved subapical spine bearing a group of short fine setae subapically, outer valve oval with long setae.

MALE

Coloration (freshly killed, in alcohol).—As female, with following exceptions: pterostigma pigment more extensive, almost filling pterostigma (fig. 63); hind wing (fig. 64); all markings except those along vertex-frons suture darker than in female; femoral bands merge completely in hind leg; abdominal terga 1–5 with extensive brown granulation, terga 6–8 largely white, brown granulation on anterior and posterior margins, two dark longitudinal streaks along abdomen dorsally and an additional longitudinal mark each side over terga 1–5. Ninth tergite, hypandrium (fig. 65) and paraprocts (fig. 66) dark brown, epiproct and trichobothrial fields white.

Morphology.—Body length: 2.25 mm. Lengths of flagellar segments: f_1: 0.515 mm; f_2: 0.305 mm; f_1:f_2: 1.689. Antennae thicker than in female, eyes a little larger than in female. IO/D: 2.5. Anterior ocellus smaller than lateral. Measurements of hind leg: F: 0.515 mm; T: 1.096 mm; t_1: 0.330 mm; t_2: 0.045 mm; t_3: 0.066 mm; rt: 7.33:1:1.47; ct: 16, 0, 0. Fore wing length: 3.16 mm; fore wing width: 1.16 mm. Fore wing morphology as female. Hind wing length: 2.39 mm; hind wing width: 0.51 mm. Setae on hind wing veins as follows: r_1: 7, *rs:* 3, r_{2+3}: 0, r_{4+5}: 14, *m:* 12, cu_1: 8. Epiproct rounded apically, setose near apical margin. Paraproct with circular field of 24 trichobothria, 2 not in rosette sockets, hind margin of paraproct thickened. Hypandrium (fig. 65) simple. Phallosome (fig. 67).

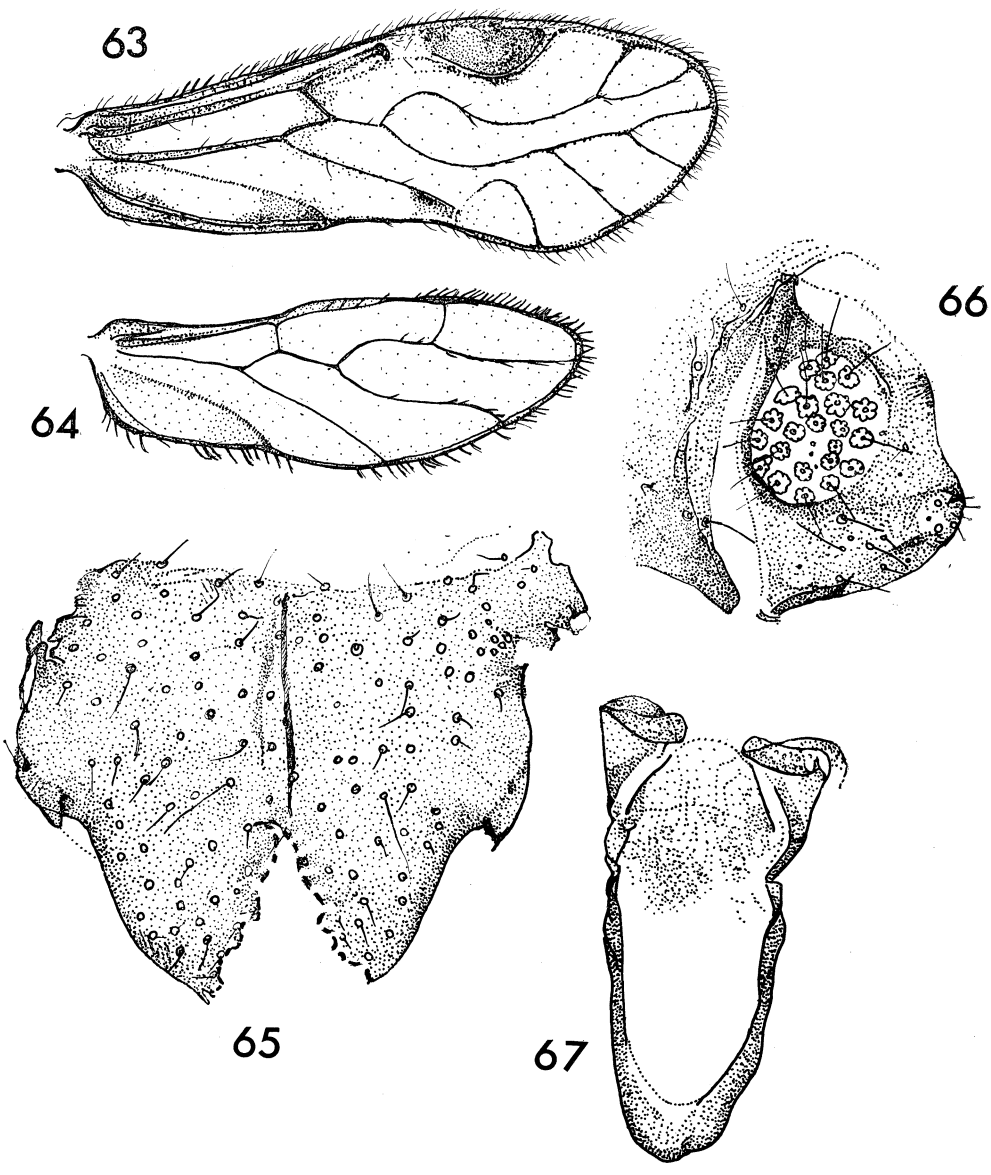
MATERIAL EXAMINED

Norfolk Island: 1 ♀ (holotype) Captain Cook Monument, 31.viii.1971; 1 ♂ (allotype) Mount Pitt, 2.ix.1971 (C. N. Smithers and I. W. B. Thornton); 1 ♀ Mount Pitt, 3.iii.1969 (C. N. Smithers); 2 ♀ Ross Point, 24.xi.1968 (A. S. Smithers); 2 ♀ Rocky Point Reserve, 23.xi.1968 (C. N. Smithers).

Holotype, allotype, and paratypes in Australian Museum.

DISCUSSION

H. emmus belongs to a group of philotarsids in which the hind wing veins are setose, cu_2 in the fore wing is bare, the antennal segments lack white apices and the fore wing setae are not sited on dark spots, veins *rs* and r_{2+3} in the hind wing are



Figs 63–67. *Haplophallus emmus* sp. n. 63, ♂ fore wing; 64, ♂ hind wing; 65, ♂ hypandrium; 66, ♂ paraproct; 67, ♂ phallosome.

bare or carry only very few setae, and the phallosome is simple. This group includes *Haplophallus orientalis* Thornton, the type species of *Haplophallus*, found in Hong Kong and Ceylon, *H. fenestristigma* (Enderlein) from the Seychelles, *H. basilewskyi* (Smithers) from Tanganyika, *H. maculatus* (Tillyard) from New Zealand, *H. fuscistigma* Thornton *et al.* and *H. boninensis* Thornton *et al.* from Micronesia, and a species yet to be described, found in New Caledonia, Fiji, and Samoa. *H. emmus* is most similar to the last species mentioned above, but differs in the following features: fore wing without brown clouds in apical cells, dorsal valve of female gonapophyses with subapical projection sharply pointed, outer valve not so nearly circular, female subgenital plate with only two apical setae. The male genitalia are extremely similar, the outer parameres being somewhat wider apically in *H. emmus*. It seems very likely that *H. emmus* and the New Caledonian species have a close phylogenetic relationship, the latter species having a wider range and thus possibly being the older. *H. emmus* could have diverged from the ancestral form as a result of its isolation on the small island of Norfolk.

PSOCIDAE

Blaste lignicola (Enderlein)

MATERIAL EXAMINED

Norfolk Island: 4 ♂, 14 ♀, Ross Point, 24.xi.1968; 2 ♂, 7 ♀, Melanesian Mission, 20.xi.1968 (A. S. Smithers); 1 ♀, Mt Pitt, 19.xi.1968 (G. F. Smithers); 3 ♂, 9 ♀, Bumbora, 31.viii.1968 (C. N. and A. S. Smithers); 3 ♂, 10 ♀, Ross Point, 27.xi.1968; 3 ♂, 1 ♀, Rocky Point Reserve, 23.xi.1968; 1 ♂, Palm Glen, 24.xi.1968 (C. N. Smithers); 1 ♂, Middlegate, xii.1968 (N. L. H. Krauss); 4 ♀, Ross Point, 31.viii.1971; 1 ♀, Rocky Point Reserve, 28.viii.1971; 3 ♂, Selwyn Pine Rd, 31.viii.1971 (C. N. Smithers and I. W. B. Thornton).

This species is known from eastern Australia.

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Footnote: Since this paper was written, two females of *Phlotodes griseipennis* (McL.), a common Australian species, have been taken at Point Blackbourne and Cascade, 17–23.iii.1974, by Mr and Mrs F. Jowett.