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PSILOPSOCIDAE AND MYOPSOCIDAE (INSECTA : PSOCOPTERA) OF THE BISMARCK ARCHIPELAGO, SOLOMON ISLANDS AND NEW HEBRIDES

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SUMMARY

This paper is part of a study of the Psocoptera of the Melanesian arcs; *Psilopsocus manus* sp. n. (Psilopsocidae), *Lophopterygella spilota* sp. n., *Mouldsia marmorata* sp. n., *Phlotodes brunneigena* sp. n. and *Ph. lineatus* sp. n. (Myopsocidae) are described from the Bismarck Archipelago and the male of *Myopsocus amplus* Smithers and Thornton is illustrated for the first time. From the Solomons are described *Phlotodes gregarius* sp. n., *Ph. megops* sp. n. and *Ph. anomalus* sp. n. and from the New Hebrides are described *Ph. platyvalvula* sp. n., *Ph. hoskinsi* sp. n. and *Ph. sagitta* sp. n. Additional records for described species are given from the Bismarcks and the Solomons and keys provided to the four genera of Myopsocidae and the species of *Phlotodes* Enderlein from each of the three island groups.

INTRODUCTION

This paper records psocopteran insects of the closely related families Psilopsocidae and Myopsocidae from the Bismarcks, the Solomons and the New Hebrides and is one of a series dealing with this order in the Melanesian arcs (see Smithers and Thornton 1974). Species from New Guinea and New Caledonia have already been dealt with (Smithers and Thornton 1973, 1974).

Psilopsocus Enderlein is the only genus at present placed in the Psilopsocidae, of which five species have been described, namely, *Ps. marmoratus* Smithers and Thornton, *Ps. nigricornis* Enderlein, *Ps. pulchripennis* Smithers and Thornton (all from New Guinea), *Ps. mimulus* Smithers (from Australia) and *Ps. nebulosus* Mockford (from the Philippines). A sixth species, known only from nymphal material (Smithers 1963) occurs in Natal, South Africa. Psilopsocids do not seem to be common insects; extensive collecting in eastern Australia has yielded very few specimens of *Ps. mimulus*. The peculiar, sclerotized, apex of the abdomen of the nymph (Smithers 1963), figs. 8, 9) and the elongate form of the adult with its very long, narrow wings, suggest that this species may inhabit tunnels in wood. A seventh species has been taken in the Bismarcks and this is described below. Mockford (1961) has discussed the relationships of the Psilopsocidae indicating that the family is closely related to the Myopsocidae. From material so far available it seems that the family is best developed in the New Guinea-Bismarcks area with some extension to Australia, the Philippines and into Africa. It has not been taken in other archipelagos of the Melanesian arcs.

There are at present four genera in the Myopsocidae, *Myopsocus* Hagen, *Lophopterygella* Enderlein, *Phlotodes* Enderlein and *Mouldsia* Smithers. A key to these genera is given below. *Myopsocus*, with more than thirty species, has been recorded from all regions although some of the described species may, in fact, belong to

Phlotodes. *Lophopterygella*, with seven species, has been recorded from East Africa, Singapore, Formosa, Philippines, Marianas, Java, Bismarcks, Haiti and Australia. *Phlotodes*, the largest genus, with more than sixty described species, occurs in all regions. *Mouldsia* is known from three species from Australia, New Guinea and the Bismarcks. (AM) indicates material deposited in the Australian Museum, Sydney.

KEY TO THE GENERA OF MYOPSOCIDAE

1. Ocelli absent *Mouldsia* Smithers
 Ocelli present 2
2. Rs and M in hind wing fused for a length *Phlotodes* Enderlein
 Rs and M in hind wing joined by a crossvein 3
3. Margin of fore wing incurved between veins giving rise to a sinuous wing margin *Lophopterygella* Enderlein
 Margin of fore wing not incurved between veins; margin smoothly rounded *Myopsocus* Hagen

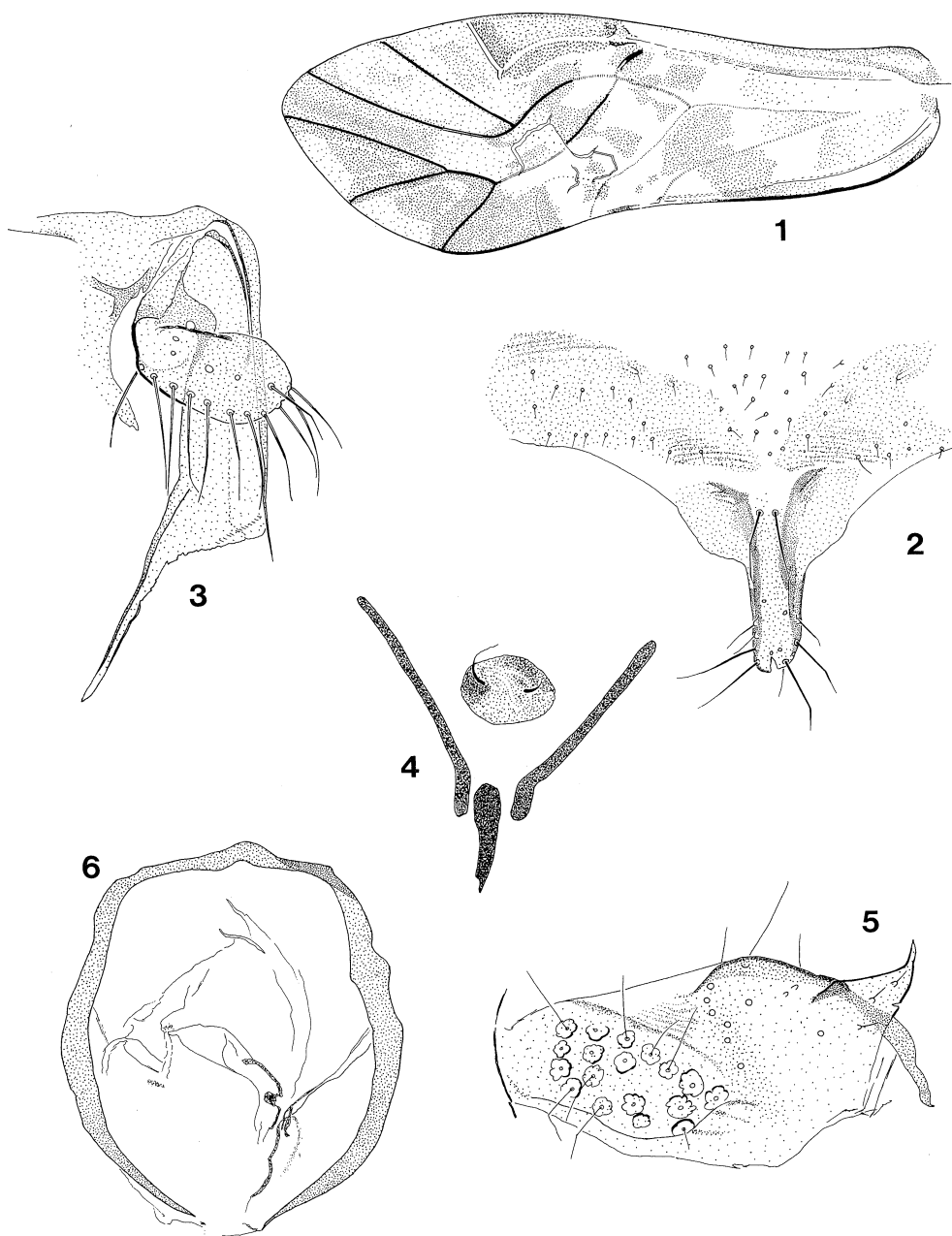
PSILOPSOCIDAE AND MYOPSOCIDAE FROM THE BISMARCK ARCHIPELAGO

PSILOPSOCIDAE

***Psilopsocus manus* sp. n**

FEMALE: *Coloration* (in alcohol). Head very pale brown with darker markings. Median epicranial suture with brown on either side, the band so formed broadening posteriorly and the colour extending across the occipital area. Inner margins of compound eyes bordered with brown. A brown line marking the position of anterior arms of the epicranial suture. Frons with median V-shaped mark, the arms of the V reaching epistomial suture. Postclypeus brown with darker striations. Labrum dark. Scape and pedicel pale; flagellum almost black. Eyes black. Maxillary palp pale basally, third and fourth segments dark brown. Antedorsum brown with pale median line. Dorsal lobes pale but dark around edges; parapsidal sutures pale. Legs pale with dark tips to tibiae and dark tarsi. Fore wing (fig. 1) marked in various shades of brown. Hind wings hyaline, tinged brown, denser near anterior margin. Abdomen pale, terminal structures dark brown.

Morphology. Length of body: 3.0 mm. Median epicranial suture very distinct, anterior arms indistinct but position marked by a brown line. Length of flagellar segments: f_1 : 0.64 mm; f_2 : 0.68 mm. Eyes fairly large, reaching level of vertex. IO/D (Badonnel): 1.0; PO: 0.7. Anterior ocellus a little smaller than lateral ocelli. Measurements of hind leg: F: 0.52 mm; T: 1.0 mm; t_1 : 0.33 mm; t_2 : 0.056 mm; t_3 : 0.084 mm; rt: 6.0:1:1.5. Femur tapering a little distally; tibia broader distally than proximally. Fore wing length: 2.9 mm; width: 1.1 mm. Fore wing (fig. 1) with very short spurvein at hind angle of pterostigma. Stigmapophysis in form of a small, rounded, raised area. Areola postica small. Subgenital plate (fig. 2) with an apical lobe. Gonapophyses (fig. 3) with strongly developed ventral valve; dorsal valve broad in basal half, narrowing abruptly to a long tapering point. Entrance to spermatheca (fig. 4) with a pair of posteriorly converging, sclerotized rods and a median, posterior rod between their apices. Epiproct simple, rounded posteriorly, sparsely setose.



Figs. 1-6. *Psilopsocus manus* sp. n. 1.♀Fore wing; 2.♀Subgenital plate; 3.♀Gonapophyses; 4.♀ Sclerification of entrance to spermatheca; 5.♂Paraproct; 6.♂Phallosome.

MALE: *Coloration* (in alcohol). Similar to female. Wing pattern very similar but with extent and density of patterns differing in minor respects.

Morphology. Length of body: 3.0 mm. Length of first flagellar segment: 0.56 mm. Eyes larger than in female; ratios not measured owing to damage to eye. Measurements of hind leg: F: 0.49 mm; T: 0.96 mm; t_1 : 0.3 mm; t_2 : 0.046 mm; t_3 : 0.084 mm; rt: 6.5:1:1.8; ct: 13, 1, 1. Femur distinctly tapering towards ends; tibia much narrower basally, broadening distally with row of strongly developed ctenidiobothria along whole length of inner margin. Basal tarsal segment slightly curved. Fore wing length: 2.7 mm; width: 0.90 mm. Fore wing form and venation as in female. Epiproct triangular with the basal margin developed into a well sclerotized ridge, the sclerotization extending along lateral margins, decreasing in thickness but becoming broader towards apex. Paraprocts (Fig. 5) with very strongly sclerotized dorsal ridge and pointed apophysis. Hypandrium simply rounded behind, fairly well sclerotized. Phallosome (Fig. 6) simple, in the form of an anteriorly interrupted ring with some very slight thickening of the penial bulb.

MATERIAL EXAMINED. ADMIRALTY ISLANDS. MANUS IS: 2 ♀ (including holotype), 1 ♂ (allotype), forested gully, Karon, c. 300 m. 7.xi.1974 (T. R. New and I. W. B. Thornton); 1 ♀ same locality, 6.xi.1974 (T. R. New and I. W. B. Thornton); 2 ♀ Rossun area, 7.xi.1974 (T. R. New and I. W. B. Thornton).

Holotype, allotype and paratypes in the Australian Museum.

DISCUSSION: *Psilopsocus manus* can be distinguished from all other species of the genus by its wing pattern, the palest areas being near the wing base whereas in other species the basal area is well pigmented. *Ps. manus* most resembles *Ps. marmoratus* but differs in having few terminal setae on the lobe of the subgenital plate. From *Ps. pulchripennis* it differs in the form of the hypandrium, epiproct lobe and phallosome. From *Ps. nigricornis* it differs in having a long, narrow, distal section to the dorsal valve, that of *Ps. nigricornis* narrowing more gradually. *Ps. nebulosus* is a much larger species (wing length 4.4-4.6 mm). In the key provided in Smithers and Thornton (1973) *Ps. manus* would run to *Ps. nigricornis* from which it differs in wing pattern and genitalic characters.

MYOPSOCIDAE

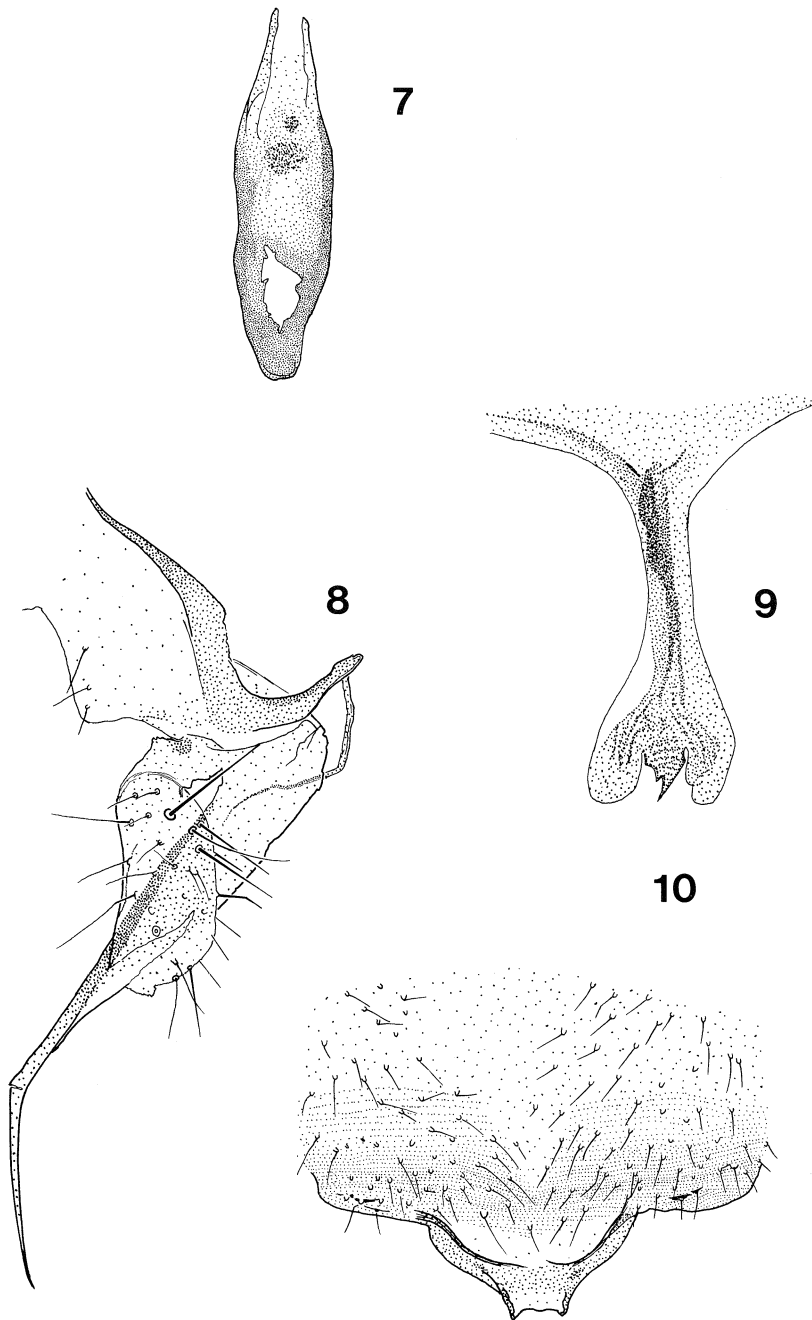
Myopsocus amplus Smithers and Thornton.

MALE: Male material was not available when this species was described from several localities in New Guinea (Smithers and Thornton, 1974). Three males are associated with females of *M. amplus* in the present material; the characteristic elongated phallosome, with tapering external parameres, is illustrated in Fig. 7.

MATERIAL EXAMINED. NEW BRITAIN: 3, ♂ 3, ♀ Gazelle Peninsula, Baining, St. Paul's, 350 m, 6.ix.1955 (J. L. Gressitt); 1 ♀, Malmaluon — Vunakanau, Gazelle Peninsula, 17.v.1956, (J. L. Gressitt). One of the above males from Baining, is in the Australian Museum collection. This species is known also from northern Australia and New Guinea.

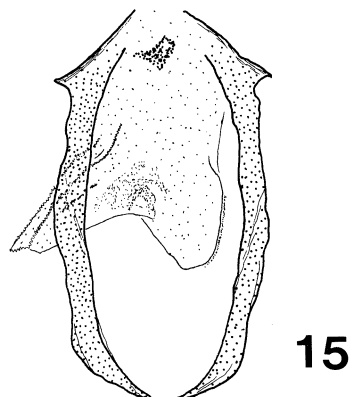
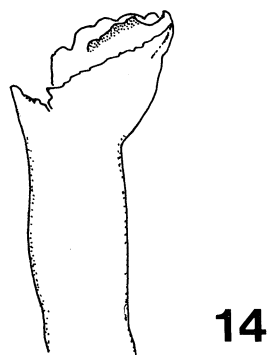
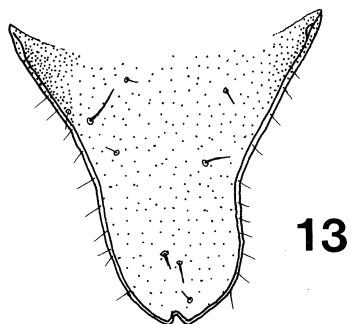
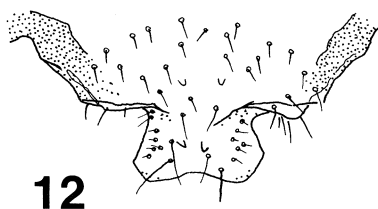
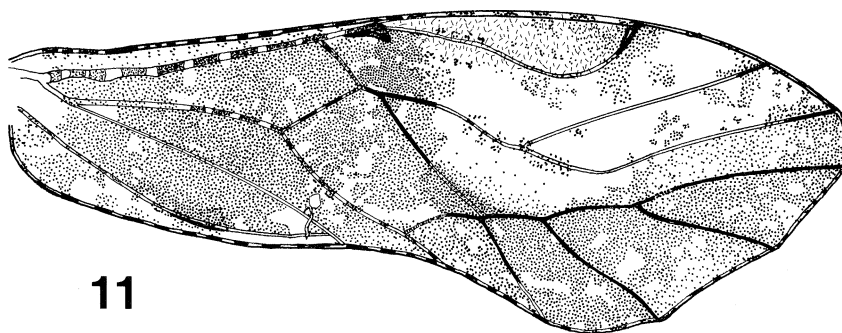
Lophopterygella spilota sp. n.

MALE: *Coloration* (in alcohol). Head pale brown with brown markings. Vertex with irregular spots on either side of the median epicranial suture and adjacent to the compound eyes; an irregular dark patch on either side of ocellar triangle; a fine but broadening line from ocellar triangle to compound eye; a sinuous line from compound eye running mesad of antenna base to epistomial suture. Postclypeus spotted.



Figs. 7-10. 7. *Myopsocus amplus* Smithers and Thornton Phallosome. ♂

Figs 8-10. *Lophopterygella spilota* ♀ sp. n. 8. Gonapophyses; 9. 9th sternite; 10. Subgenital plate.



Figs. 11-15. *Lophopterygella spilota* ♂ sp. n. 11. Forewing; 12. Hypandrium; 13. Epiproct; 14. Lacinia; 15. Phallosome.

Anteclypeus dark basally, pale distally. Labrum pale laterally, darker toward middle. Genae pale anteriorly, dark posteriorly. Flagellar segments of antenna banded in various shades of brown, the bands not of uniform width but varying from segment to segment. Eyes black. Maxillary palps pale except for dark tip to fourth segment. Mesonotum dark brown except for a fine, median, pale line. Femora pale with three dark bands on first and second legs, four such bands on hind legs. Tibiae pale with very dark, almost black tips. First tarsal segment on first and second legs pale in basal part but darker distally; uniformly pale in hind legs; second and third segment dark in all legs. Fore wing (Fig. 11) with complex pattern in various shades of brown with the pale submarginal band usually present in this genus broken into a series of small pale patches. Abdomen pale with some irregular brown markings.

Morphology. Length of body: 2.6 mm. Median epicranial suture distinct, anterior arms indistinct. Frons deep. Lengths of flagellar segments: f_1 : 1.0 mm; f_2 : 1.08 mm. Antennae fine with long fine setae. Eyes large, reaching above level of vertex. IO/D (Badonhel): 0.9; PO: 0.9. Lacinia (Fig. 14) stout with numerous apical teeth. Measurements of hind leg: F: 0.72 mm; T: 1.48 mm; t_1 : 0.53 mm; t_2 : 0.07 mm; t_3 : 0.098 mm; rt: 7.6:1:1.4; ct: 22, 1, 1. Hind tibia slightly curved, ctenidia along lower margin strongly developed and arranged in a row. Fore wing length: 3.0 mm; fore wing width: 1.1 mm. Fore wing with one "pocket" on 1A and the marginal curvature between the ends of branches of M slight but obvious. Rs and M fused for a short length; Cu_{1a} and M meet in a point. Cu_{1a} arising well basad of point at which Cu_{1b} reaches margin. In hind wing Cu_2 approaches Cu_1 in middle. Flap on epiproct (Fig. 13) tapering with sinuous lateral margins and a small apical notch. Hypandrium (Fig. 12) with lateral margins strongly sclerotized and bearing a short, broad, apical lobe. Phallosome (Fig. 15) simple, elongate, without sclerification of the penial bulb.

FEMALE: One very badly damaged specimen is available of which the subgenital plate (Fig. 10), gonapophyses (Fig. 8) and sclerification of the ninth sternite (Fig. 9) are illustrated. It was probably a little larger than the male holotype and the wing pattern seems to be very similar.

MATERIAL EXAMINED. NEW BRITAIN: 1♂(holotype), 8 km E. Keravat, ex *Araucaria*, 17.xi.1974 (T. R. New and I. W. B. Thornton); 1♂(paratype), Gazelle Peninsula, Talili Gap, c. 210 m, 16.xi.1974 (T. R. New and I. W. B. Thornton). NEW IRELAND: 1♀ (allotype), Gilingil Plantation, 2 m, 6.vii.1956 (J. L. Gressitt).

Holotype and paratype in the Australian Museum; allotype in the Bishop Museum.

DISCUSSION: *Lophopterygella spilota* differs from *L. lobata* New and Thornton (from Singapore) in having a broken, submarginal, pale band on the fore wing; this band is lacking in *L. lobata* which is also much larger (wing length 5.4 mm as opposed to 3.0 mm in *L. spilota*). In *L. camelina* Enderlein (from Java, southeast Asia, Philippines and Formosa) and *L. bursulipennis* Enderlein (from East Africa) the pale submarginal band is almost continuous with an inward curvature at each vein. In *L. spilota* the band is broken into short sections. In *L. cincticornis* Thornton, Lee and Chui (from the Marianas) the band is broken into two sections, one from R_4+5 to M_2 and another from M_3 to Cu_{1a} , that is, the band is broken in cell M_2 . *L. spilota* resembles *L. petersi* Smithers (from Australia) but can be distinguished by the form of the submarginal band as well as the differences in form of the lobe of the hypandrium; in *L. spilota* it is broadly attached to the body of the hypandrium but in *L. petersi* the attachment is much narrower. In *L. petersi* the apex of the epiproct lobe is inwardly curved whereas in *L. spilota* it is notched. Although the phallosomes are similar in the two species that of *L. spilota* is relatively a little longer.

***Mouldsia marmorata* sp. n.**

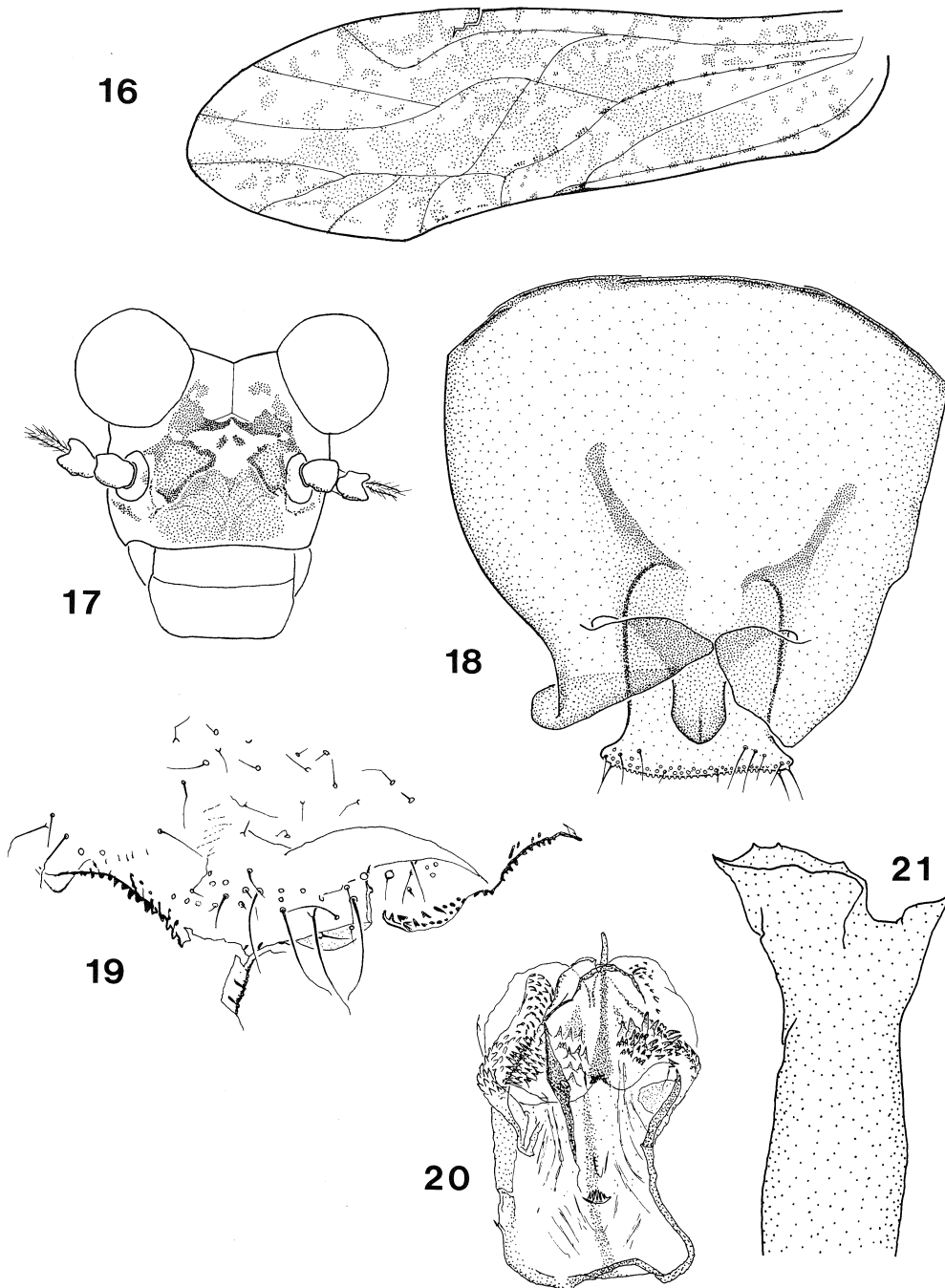
MALE: *Coloration* (in alcohol): Head (fig.17) with pale vertex and a characteristic pattern on front of head. Genae pale with two transverse brown bands, one at antenna level and the other nearer base of mandible. Eyes black. Antennae pale. Maxillary palps pale. Femora pale with a faint transverse band in middle, tibiae very pale with a short black band near middle. Basal tarsal segment pale, second and third brown. Mesothorax pale dorsally, with a brown patch on each dorsal lobe. A broken, dark lateral line runs through pleura. Fore wing (fig. 16) hyaline marked with a pale pattern in various shades of brown. Abdomen pale with segmentally arranged, dark brown, transverse bands dorsally in basal two thirds.

Morphology: Length of body: 2.3 mm. Median epicranial suture distinct, in furrow between large eyes. Postclypeus almost flat. Length of flagellar segments: f_1 : 1.0m.; f_2 : 1.04 mm. Scape and pedicel very much thicker than flagellar segments. Eyes extremely large. IO/D (Badonnel): 0.54; PO: 1.0. *Ocelli absent*. Antennae fine; setae fine, alveoli not particularly conspicuous. Lacinia (fig. 21). Measurements of hind leg: F: 0.46 mm; T: 1.32 mm; t_1 : 0.46 mm; t_2 : 0.07 mm; t_3 : 0.10 mm; rt: 6.6:1:1.4; ct: 23, 1, 1. Tibia of hind leg broadened a little at distal end. Fore wing length: 2.9 mm; width: 0.9 mm. Fore wings (fig. 16) narrow, broadest opposite distal end of pterostigma. R_1 curving slightly before broadest part of pterostigma. Basal section of Sc evanescent. Rs and M fused for a length. Apex of areola postica fused with M for a length. Cu_{1b} very distinct and about half as long as first section of Cu_{1a} ; distal section of Cu_{1a} curving slightly backward to meet wing margin. Cu_2 meets 1A before end of latter near wing margin; at point of fusion 1A and adjacent wing margin thickened. Hind wing length: 2.3 mm; width: 0.84 mm. Rs and M fused for a length; M separating from Rs beyond fusion at an acute angle. Apex of abdomen (fig. 18) complex; ninth tergite strongly sclerotized and sparsely setose, the setae very fine; a large lobe which overlies the base of the epiproct arising from near posterior margin on each side. Ninth tergite extended medially into a posterior, rounded lobe. Epiproct (fig. 18) lightly sclerotized, glabrous except near posterior margin, with sinuous, well sclerotized, lateral margins. Posterior margin sclerotized, bearing setae which arise from conspicuously raised alveoli; a large median, broadly rounded lobe arising from the base of the epiproct. Paraprocts with narrow basal attachment, with large lightly sclerotized posterior lobe. Hypandrium (fig. 19, damaged in preparation) well sclerotized, setose; hind margin with small teeth laterally, three large setae arise in middle near posterior margin. Phallosome (fig. 20) closed anteriorly with median sclerotized bar and a strong posteriorly tapering, well sclerotized, median rod; penial bulb developed into two lobes which are spiculate and bear tooth-like projections.

MATERIAL EXAMINED. NEW BRITAIN: 1♂(holotype), Hoskins area, Kapiula Forest, Kasiloli, 19.xi.1974 (T. R. New and I. W. B. Thornton).

Holotype in the Australian Museum.

DISCUSSION: Two other species of *Mouldsia* are known, *M. inocellata* (Smithers and Thornton) (known from female only) from New Guinea and *M. barbarae* Smithers from Queensland. In *M. inocellata* the facial pattern is simple, being dark brown with a row of four small pale spots in line between the eyes and with the vertex pale; in *M. marmorata* the pattern is more complex (Fig. 17); also, wing pattern differs in details. *M. marmorata* can be distinguished from *M. barbarae* on facial pattern. In the latter species the postclypeus is striped and the lower part of the gena dark brown; the eyes are further apart and relatively larger in *M. marmorata* (IO/D: 1.1; PO: 1.0 in *M. barbarae*; IO/D 0.54; PO: 1.0 in *M. marmorata*). In *M. marmorata* the male ninth tergite is extended into a posteriorly directed median lobe which is absent in *M. barbarae* and the posterior edge of the epiproct is clearly tuberculate but only slightly so in *M. barbarae*.



Figs. 16-21. *Mouldsia marmorata* ♂ sp. n. 16. Forewing; 17. Head; 18. Apex of abdomen; 19. Hypandrium; 20. Phallosome; 21. Lacinia.

KEY TO THE SPECIES OF *PHLOTODES* FROM THE BISMARCKS

1. Postclypeus with anteriorly converging stripes 2
 Postclypeus marked but not with converging stripes 3
2. Hind femur pale; small dark spot in distal half. ♂ hypandrium simple.
 ♀ subgenital plate without preapical setae on posterior lobe but with two
 terminal setae *maculatus*
 Hind femur dark in basal half, distal half pale with narrow dark apical band. ♂
 hypandrium 3-lobed. ♀ subgenital plate with preapical setae on
 posterior lobe in addition to two terminal setae *kolbei*
3. Genae entirely dark brown *brunneigena*
 Genae not entirely dark brown, pale at least in posterior half 4
4. Postclypeus mostly dark brown, the mark forming a broadly V-shaped pattern.
 In fore wing cell R₃ with few dark spots *platyvalvula*
 Postclypeus without V-shaped mark but with some irregular dark spotting in
 fore wing cell R₃ heavily spotted..... 5
5. Membrane in basal area of cell R₃ (in fork) and between forking and apex of
 areola postica hyaline *preclarus*
 Membrane in basal area of cell R₃ (in fork) and between forking and apex of
 areola postica with dark spots *lineatus*

***Phlotodes kolbei* (Enderlein)**

MATERIAL EXAMINED. NEW BRITAIN: 1♂, 3♀, 8 km E. Keravat, ex *Araucaria* sp., 17.xi.1974 (T. R. New and I. W. B. Thornton); 1♂, Gazelle Peninsula, Toma area, 300 m, 16.xi.1974 (T. R. New and I. W. B. Thornton) (AM). Known also from New Guinea.

***Phlotodes maculatus* Smithers and Thornton**

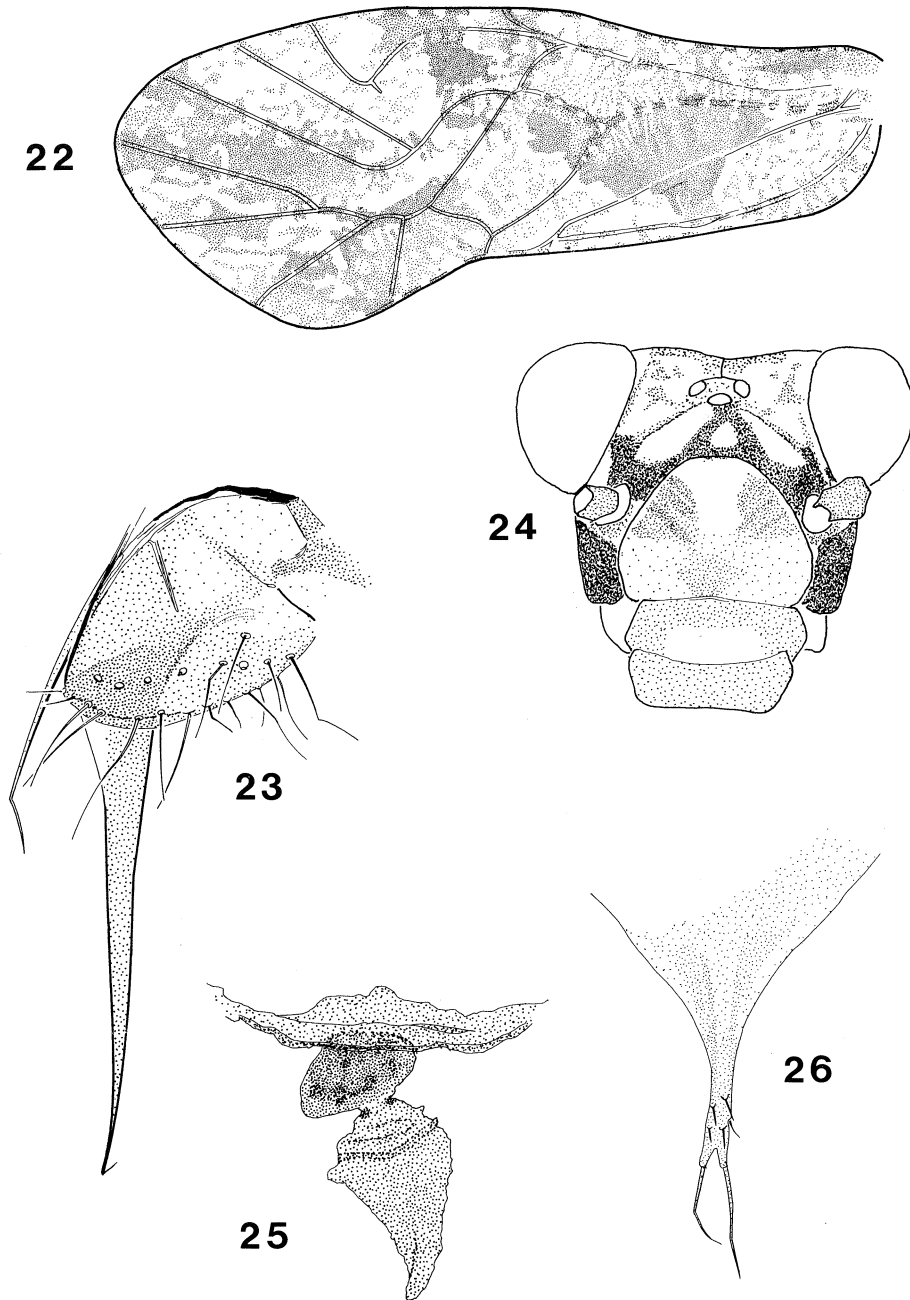
MATERIAL EXAMINED. NEW BRITAIN: 1♀, Cape Gloucester area, 21.xi.1974 (T. R. New and I. W. B. Thornton) (AM). Known also from New Guinea.

***Phlotodes preclarus* Smithers and Thornton**

MATERIAL EXAMINED. NEW BRITAIN: 1♂, Gazelle Peninsula, Talili Gap, 210 m., 16.xi.1974 (T. R. New and I. W. B. Thornton) (AM); 1♀, Gazelle Peninsula, Malmaluan-Vunakanau, 5-12.v.1956 (J. L. Gressitt) (Bishop Museum); 1♀, 8 km E. Keravat, ex *Araucaria klinkii*, 17.xi.1974 (T. R. New and I. W. B. Thornton). MANUS ISLAND: 1♂, Karon, 304 m, forest gully, 7.xi.1974 (T. R. New and I. W. B. Thornton). NEW GUINEA: 1♂, Maprik, Sepik district, 1958 (Malaria Control project) (AM). This species was described from specimens from New Guinea and has also been taken in the Solomons (Guadalcanal).

***Phlotodes brunneigena* sp. n.**

FEMALE: *Coloration* (in alcohol). Head pale brown with darker brown markings (fig. 24). Scape brown, pedicel pale, first flagellar segment pale (remainder of antennae missing). Eyes black. Maxillary palps entirely brown. Antedorsum dark brown with pale



Figs. 22-26. *Phlotodes brunneigena* ♀ sp. n. 22. Forewing; 23. Gonapophyses; 24. Head; 25. Spermathecal entrance; 26. Subgenital plate.

median line; dorsal lobes mottled in dark and pale brown. Femora pale, with dark distal tip; tibiae pale, a little darker at distal end; first tarsal segment pale, second and third dark brown; coxae pale. Pleura of thorax dark brown. Fore wings (fig. 22) hyaline with complex pattern in various shades of brown. Hind wings hyaline, veins brown, basal parts of Rs and M being particularly dark.

Morphology: Length of body: 2.3 mm. Median epicranial suture distinct especially on top of head; anterior arms evanescent although a pigmented line suggests their position. Antennae broken. Eyes fairly large, reaching level of vertex. IO/D (Badonnel): 1.2; PO: 0.83. Measurements of hind leg: F: 0.65 mm; T: 1.24 mm; t_1 : 0.45 mm; t_2 : 0.07 mm; t_3 : 0.08 mm; rt : 6.4:1:1.1; ct : 20, 1, 1. Fore wing length: 3.3 mm; width: 1.3 mm. Costal margin somewhat sinuous basad of pterostigma. Pterostigma very strongly angled behind. Rs and M meeting in a point. Cu_{1a} and M fused for a length. $1A$ meets Cu_2 a little before wing margin. Epiproct simple, setose, a row of four strong setae across posterior third, posterior to which is a group of three small, closely spaced median setae. Paraprocts with a circular field of trichobothria in the middle of which are two setae with poorly developed "rosettes"; posterior to the trichobothrial field is a very strong, long, seta. Subgenital plate (fig. 26) with a long posterior extension bearing two strong apical setae, each arising from a tubercle; basad of the apical setae are a few small, fine setae arising from the posterior lobe of the plate; these do not protrude laterally from the lobe. Gonapophyses (fig. 23). Spermethecal entrance (fig. 25).

MATERIAL EXAMINED. MANUS ISLAND: 1 ♀ (holotype), Rossun area c. 243 m, 7.xi.1974 (T. R. New and I. W. B. Thornton).

Holotype in the Australian Museum.

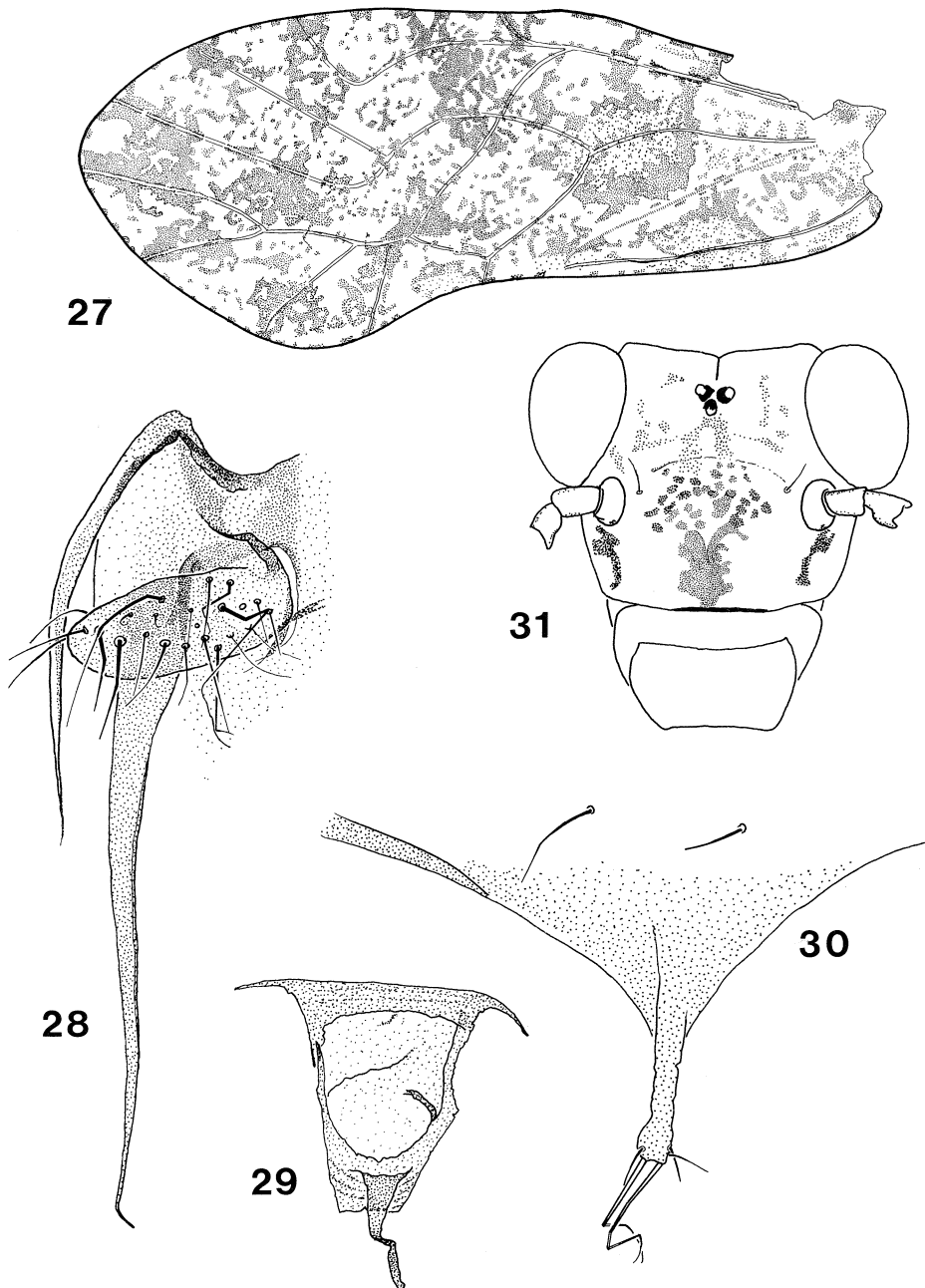
***Phlotodes platyvalvula* Smithers and Thornton**

MATERIAL EXAMINED. NEW BRITAIN: 1 ♀, Talili Gap, Gazelle Peninsula, c. 200 m, 16.xi.1974 (T. R. New and I. W. B. Thornton) (AM). Description of this species is given below (page 537) on material from the New Hebrides (Tanna, Erromanga and Efate).

***Phlotodes lineatus* sp. n.**

FEMALE: *Coloration* (in alcohol). Head (fig. 31) pale with a dark patch of variable width from ocellar triangle to anteclypeus, the patch made up of spots. A few spots on either side of median epicranial suture. An irregular dark line from antenna base to anterior angle of mandible. Ocellar triangle black. Eyes black. Antennae pale. Maxillary palp pale with a slightly darker fourth segment. Femora pale with two dark bands in distal half; femora pale with apices a little darker; basal segment of tarsi pale, second and third segments brown. Fore wing (fig. 27) with complex pattern in various shades of brown.

Morphology: Length of body: 3.1 mm. Median epicranial suture very distinct. Ocellar triangle large. Eyes large, reaching level of vertex. IO/D (Badonnel): 1.4; PO: 0.91. Eyes diverging strongly behind when viewed from above. Measurements of hind leg: F: 0.72 mm; T: 1.3 mm; t_1 : 0.47 mm; t_2 : 0.07 mm; t_3 : 0.05 mm; rt : 6.7:1:1.4; ct : 17, 0, 0. Fore wing length: 3.7 mm; width: 1.4 mm. Stigmapophysis poorly developed. Pterostigma with strongly curved hind margin. Rs and M meet in a point, with Rs curved before fusion with M; Cu_{1a} and M fused for a length. Hind wing length: 2.4 mm. Rs and M fused for a fairly long distance with M curving, leaving Rs at right angle and curving in a wide arc towards hind margin. Paraproct with a group of very long setae on rounded apex. Subgenital plate (fig. 30) with a long, parallel-sided posterior projection terminating in two long, fine, apical setae just basad of which arise four small setae.



Figs 27-31. *Phlotodes lineatus* sp. n. ♀. 27. Forewing; 28. Gonapophyses; 29. Spermathecal entrance; 30. Subgenital plate; 31. Head ♀.

Gonapophyses (fig. 28) with lightly sclerotized ventral valve; dorsal valve very long, tapering to a fine point; external valve short, with rounded apex, setose. Sclerifications at entrance to spermatheca very characteristic (fig. 29).

MATERIAL EXAMINED. NEW BRITAIN: 1♀ (holotype), Gazelle Peninsula, Toma area, c. 300 m. 16.xi.1974 (T. R. New and I. W. B. Thornton).

Holotype in the Australian Musuem.

DISCUSSION AND COMPARISONS OF SPECIES OF *PHLOTODES* FROM THE BISMARCKS

Using venational and genitalic characters, Smithers and Thornton (1974, p. 124) defined four species groups and assigned over thirty of the known species of *Phlotodes* to the groups. Unfortunately, many of the described species are known from one sex only or their descriptions do not include mention of genitalia so they cannot be placed with certainty. The species described here, like those from New Guinea that are assignable to groups, do not belong to the groups III or IV. As males are not available for *Ph. brunneigena* and *Ph. lineatus* it is not possible to determine to which of groups I or II they belong. *Ph. platyvalvula* appears to belong to group I. Members of this genus have very complex, often attractive, wing patterns made up of patches and spots of various sizes and shapes which make the insects very inconspicuous on bark. The patterns are too complex for verbal description of the differences to be helpful in most cases although differences are often easily appreciated in illustrations. There is a tendency for the pattern to include a more or less distinct broad band running from the area just basad of the pterostigma across the wing to the area of the anal cell basad of the nodulus. This band is usually outlined by darkening of its irregular edges. Of the species of *Phlotodes* included in groups I and II from New Guinea and New Caledonia only *Ph. preclarus* Smithers and Thornton (New Guinea) has this band clearly developed. It is also developed in the two species described here. Perusal of the figures of wings and genitalia in this paper will provide distinguishing features by which the two new species can be recognized. In *Ph. lineatus* the transverse band is broken at Cu₂ and there are concentrations of dark spots adjacent to the branches of Rs and M. In *Ph. brunneigena* the band is not so broken and the concentration of colour near the vein branches not apparent. In *Ph. platyvalvula* the pattern is generally intense but there is an irregular, small, dark area behind the basal end of the pterostigma which stands out as a dark mark on the wing. Females of all six species of *Phlotodes* known from the Bismarcks are available; the males of *Ph. brunneigena* and *Ph. lineatus* are unknown. Only *Ph. kolbei* and *Ph. brunneigena* have entirely dark genae but these two species can be distinguished from each other on features of facial pattern. In *Ph. kolbei* the postclypeus is striped whereas in *Ph. brunneigena* it is pale with some diffuse brown areas. In *Ph. brunneigena* cell R₃ is lightly pigmented whereas in *Ph. kolbei* it is as strongly patterned as the other distal cells. *Ph. preclarus* is the only species from the Bismarcks with a heavily patterned wing in which the centre of membrane (i.e. the area behind the pterostigma around Rs fork and the adjacent part of cell R₅) is hyaline and stands out in strong contrast to the rest of the wing. In *Ph. maculatus* the posterior lobe of the subgenital plate is short and without preapical setae although the two terminal setae are strong with a tubercle between their bases; in the other species the lobe is long and bears small preapical setae. The male pallosome of *Ph. maculatus* is remarkable in being Y-shaped, the stem of the Y is very narrow and the arms are considerably expanded, thickened and apically incurved; the penial bulb is lightly and irregularly sclerotized between the distal expansions of the external parameres. The phallosome of *Ph. platyvalvula*, like that of *Ph. kolbei* and *Ph. preclarus*, is circular to ovoid in outline with a longitudinal, median

sclerotized bar. In *Ph. preclarus* the phallosome frame is almost circular with a more or less evenly developed but narrow rim; in *Ph. kolbei* it is a little narrower and has a thick rim with the distal parts of the external parameres broader than the proximal parts of the rim. In *Ph. platyvalvula* the phallosome is somewhat elongate, narrower anteriorly than posteriorly with an evenly developed rim and with the median rod distally expanded. In *Ph. lineatus* the dorsal valve of the female gonapophyses is very long and fine; in *Ph. platyvalvula* it is curved at the end whilst in *Ph. preclarus* the ventral valve is extremely short. There are differences in head and wing pattern; *Ph. lineatus* has a pale head with a few, irregular facial markings.

MYOPSOCIDAE FROM THE SOLOMONS

KEY TO SPECIES OF *PHLOTODES* FROM THE SOLOMONS

1. Postclypeus with distinct, clearly developed stripes *australis*
 Postclypeus, if marked, without striped pattern 2
2. Postclypeus almost uniformly brown; a dark irregular mark from epistomial suture to compound eye mesad of antenna base *anomalus*
 Postclypeus pale with some dark marks, sometimes indistinct 3
3. Front of head with distinct pattern.....
 darker, indistinct spots in midline *gregarius*
 Front of head with distinct pattern..... 4
4. Epicranial plate without marks on top of head *megops*
 Epicranial plate with some markings mesad of eyes on top of head *preclarus*

***Phlotodes preclarus* Smithers & Thornton**

MATERIAL EXAMINED. SOLOMON ISLANDS: GUADALCANAL: 1♀, Honiara, 6.ix.1975 (I. W. B. Thornton); 1♂, near Honiara, 8.ix.1975 (I. W. B. Thornton); 2♂, Mt. Austen, 400 m, 14 ix 1975 (C. N. Smithers and I. W. B. Thornton) (AM).

This species is known to occur also in New Guinea, New Britain and Manus Island.

***Phlotodes australis* (Brauer)**

MATERIAL EXAMINED. SOLOMON ISLANDS. GUADALCANAL: 1♀, Lambi, 3.ix.1975 (I. W. B. Thornton) (AM).

Ph. australis has been recorded from Australia (where it is a widespread and common species), New Zealand and Norfolk Island. It belongs to *Phlotodes* species Group IV (Smithers and Thornton 1974) which is a clearly defined Australian group; the occurrence of *Ph. australis* in New Zealand, Norfolk Island (where it is the only myopsocid) and in the Solomons, is probably due to recent introduction.

***Phlotodes gregarius* sp. n.**

MALE. *Coloration* (in alcohol): Head (fig. 37) unusual for the genus in that the head is creamy white without markings except for a few brown spots across the occiput, brown, irregular markings on the hind part of the genae and a few, hardly discernible spots on the postclypeus. Antennae pale brown. Eyes black. Maxillary palp pale brown with dark

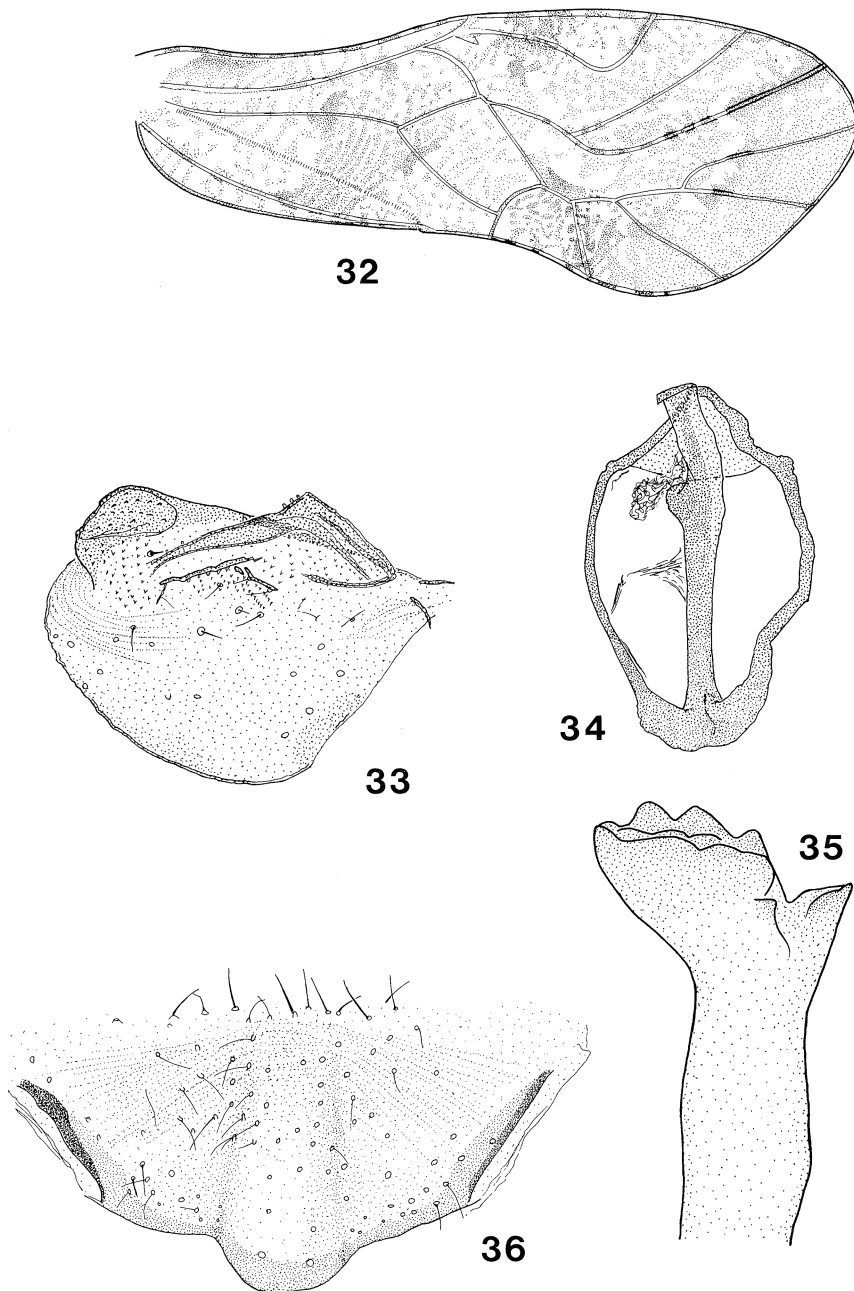
brown fourth segment. Pterothorax mottled brown above. Pleura mainly pale but with brown broken band below wing bases. Fore and middle femora dark brown with a narrow paler band at distal quarter, hind femur without band. Tibiae pale with dark distal tip. Tarsi with pale basal segment, second and third segments brown. Fore wings (fig. 32) with complex mottled brown pattern. Hind wings hyaline; abdomen pale, hypandrium very dark brown.

Morphology: Length of body: 2.2 mm. Median epicranial suture distinct, anterior arms not obvious. Head fairly heavily setose. Vertex narrow with median groove in which lies the epicranial suture. Epistomial suture indistinct. Head fairly short, narrow towards mandibles. Lengths of flagellar segments: f_1 : 0.80 mm.; f_2 : 0.60 mm. Eyes very large, with slightly sinuous margin near antenna bases. IO/D (Badonnel): 0.7; PO: 1.0. Inner margins diverging strongly behind when viewed from above. Antennae fine with very long, fine setae, many of the setae being several times longer than diameter of flagellum. Third segment of maxillary palp somewhat expanded distally. Lacinia (fig. 35) with apex extended laterally at the tip and bearing a few, distinct, blunt apical teeth. Femora setose; tibiae with many ctenidiobothria especially along inner margin of hind leg where they are arranged in a comb-like fashion as an extension of the tarsal row. Ctenidia well developed, the setal component being very strongly curved towards tip of tarsus. Measurements of hind leg: F: 0.60 mm; T: 1.08 mm; t_1 : 0.392 mm; t_2 : 0.056 mm; t_3 : 0.084 mm; rt: 7.0: 1:1.5; ct: 17,0,0. Fore wing length: 2.9 mm; width: 1.1 mm. Hind border of pterostigma concave. Stigmapophysis conical, large, spiculate. Sc evanescent just before wing margin. R curved parallel to curvature of C before pterostigma. Rs and M fused for a short length. Hind wing length: 2.1 mm; width: 0.8 mm. Rs and M fused for a short length; M arising as a weak vein from the much stronger Rs and at right angles to it. Epiproct (fig. 33) with a pair of broad, shallow, spiculate lobes arising from anterior margin. Hypandrium (fig. 36) very well sclerotized, setose. Phallosome (fig. 34) closed anteriorly and posteriorly and with a median, apically upturned rod bearing a small, dorsal knob about two thirds of the way from base; the rod flanged on either side from a little basad of the knob to the distal end.

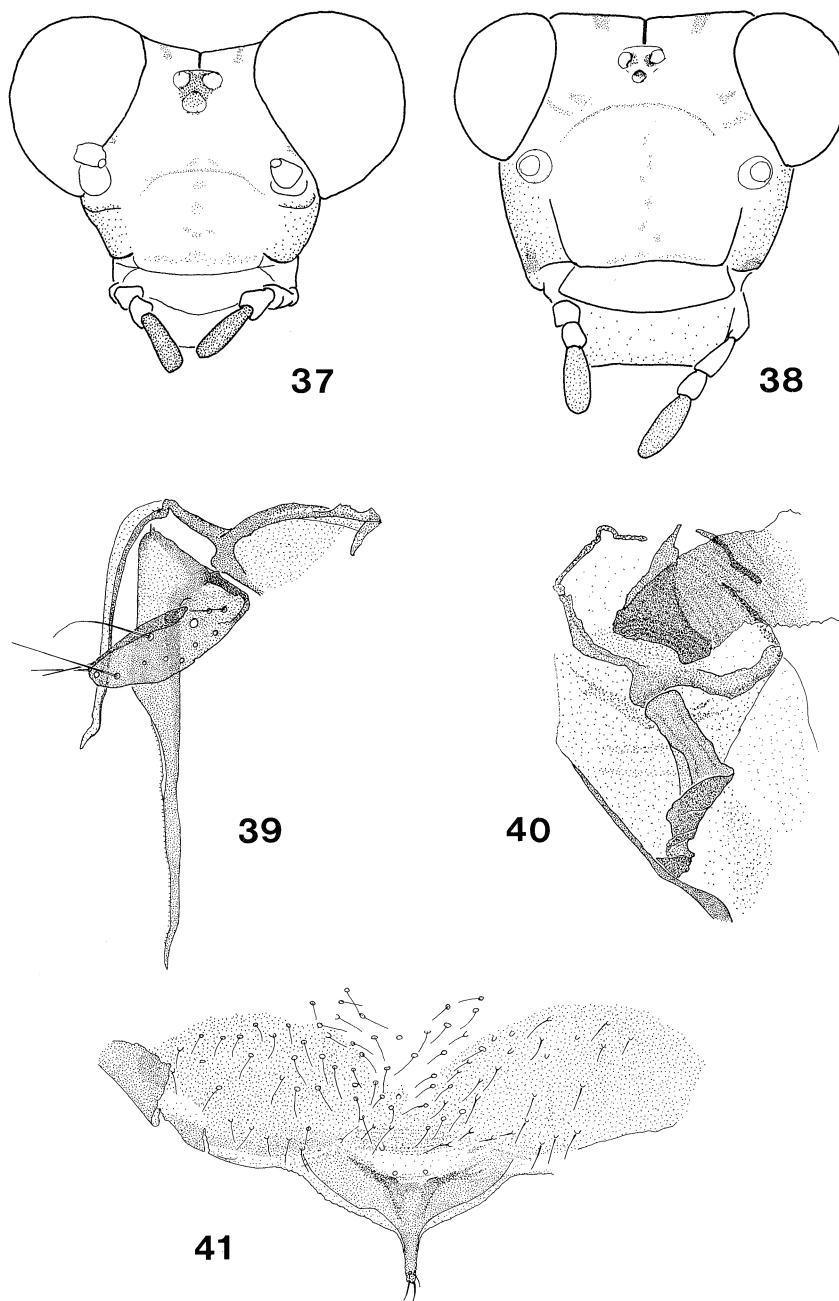
FEMALE. *Coloration* (in alcohol): As in male. Head (fig. 38). Abdomen entirely pale.

Morphology: Length of body: 2.3 mm. Median epicranial suture distinct; anterior arms difficult to see. Vertex straighter than in male with little indication of median groove. Epistomial suture indistinct. Head not narrowing anteriorly as in male. Lengths of antennal segments: f_1 : 0.74 mm; f_2 : 0.66 mm. Eyes smaller than in male. IO/D (Badonnel): 1.5. PO: 0.91. Inner margins of eyes diverging strongly posteriorly when viewed from above. Antennal setae shorter than in male, mostly only a little longer than diameter of flagellum. Lacinia as in male. Measurement of hind leg: F: 0.64 mm; T: 1.16 mm; t_1 : 0.44 mm; t_2 : 0.084 mm; t_3 : 0.084 mm; rt: 5.2:1:1; ct: 19,0,0. Fore and hind wing similar to male. Epiproct simple, rounded behind, setose in basal half; a row of four strong setae across middle and three short, but stout setae near middle of posterior margin. Paraproct with large circular field of trichobothria in which two setae in the middle are without distinct "rosettes". Subgenital plate (fig. 41). Sclerites of ninth sternite at entrance to spermatheca (fig. 40). Gonapophyses (fig. 39); dorsal valve unusual in having fine spicules along its ventral margin.

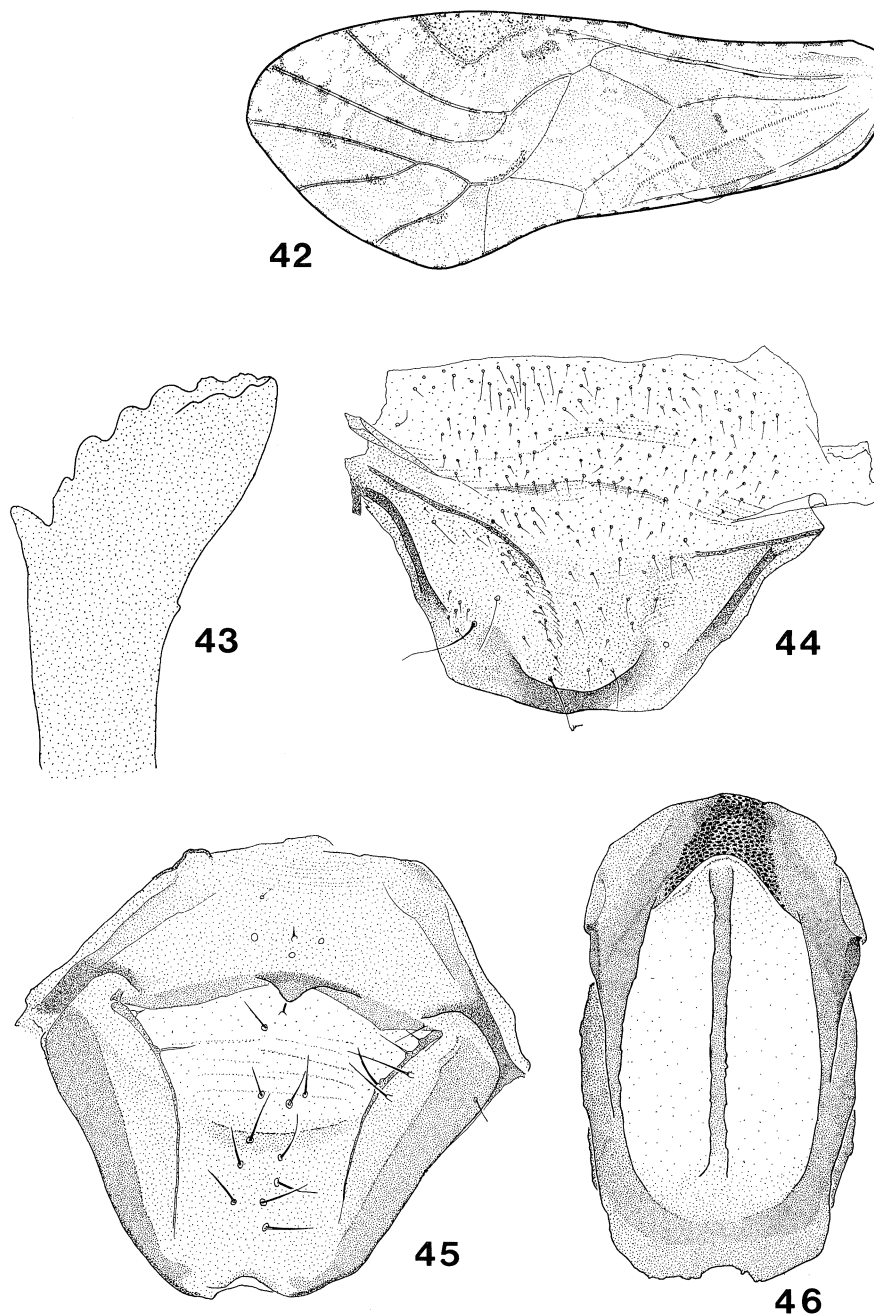
MATERIAL EXAMINED. SOLOMON ISLANDS. GUADALCANAL: 7 ♂ (including holotype), 7 ♀ (including allotype), 18 nymphs, ex. *Araucaria excelsa*, Mt. Austen, 7.ix.1975 (I. W. B. Thornton); 1 ♀, Botanic Gardens, Honiara, 19.ix.1975 (C. N. Smithers and I. W. B. Thornton); 1 ♀, Mt. Austen, 2.ix.1975 (I. W. B. Thornton) (AM); 2 ♂, 1 ♀, 2 nymphs, ex *Pinus caribea*, Mt. Austen, 7.ix.1975 (I. W. B. Thornton) (Bishop Mus.).



Figs. 32-36. *Phlotodes gregarius* sp. n. ♂. 32. Forewing; 33. Epiproct; 34. Phallosome; 35. Lacinia; 36. Hypandrium.



Figs. 37-41. *Phlotodes gregarius* sp. n. 37. Head♂; 38. Head♀; 39. Gonapophyses♀; 40. Spermathecal entrance; 41. Subgenital plate.



Figs. 42-46 *Phlotodes megops* sp. n. ♂. 42. Forewing; 43. Lacinia; 44. Hypandrium; 45. Epiproct; 46. Phallosome.

NGGELA ISLAND: 2♀, Tulagi, c. 100 m, 5.ix.1975 (I. W. B. Thornton). SAN CHRISTOBAL: 2♂, 4♀, Pamua, 16.ix.1975 (C. N. Smithers and I. W. B. Thornton). NEW GEORGIA: 3♀, 1 nymph, near Ileimi, Viru Harbour, 23.ix.1975 (C. N. Smithers and I. W. B. Thornton) (AM).

Holotype, allotype and paratypes in the Australian Museum; paratypes in the B.P. Bishop Museum. Nymphal material is not designated as paratypes.

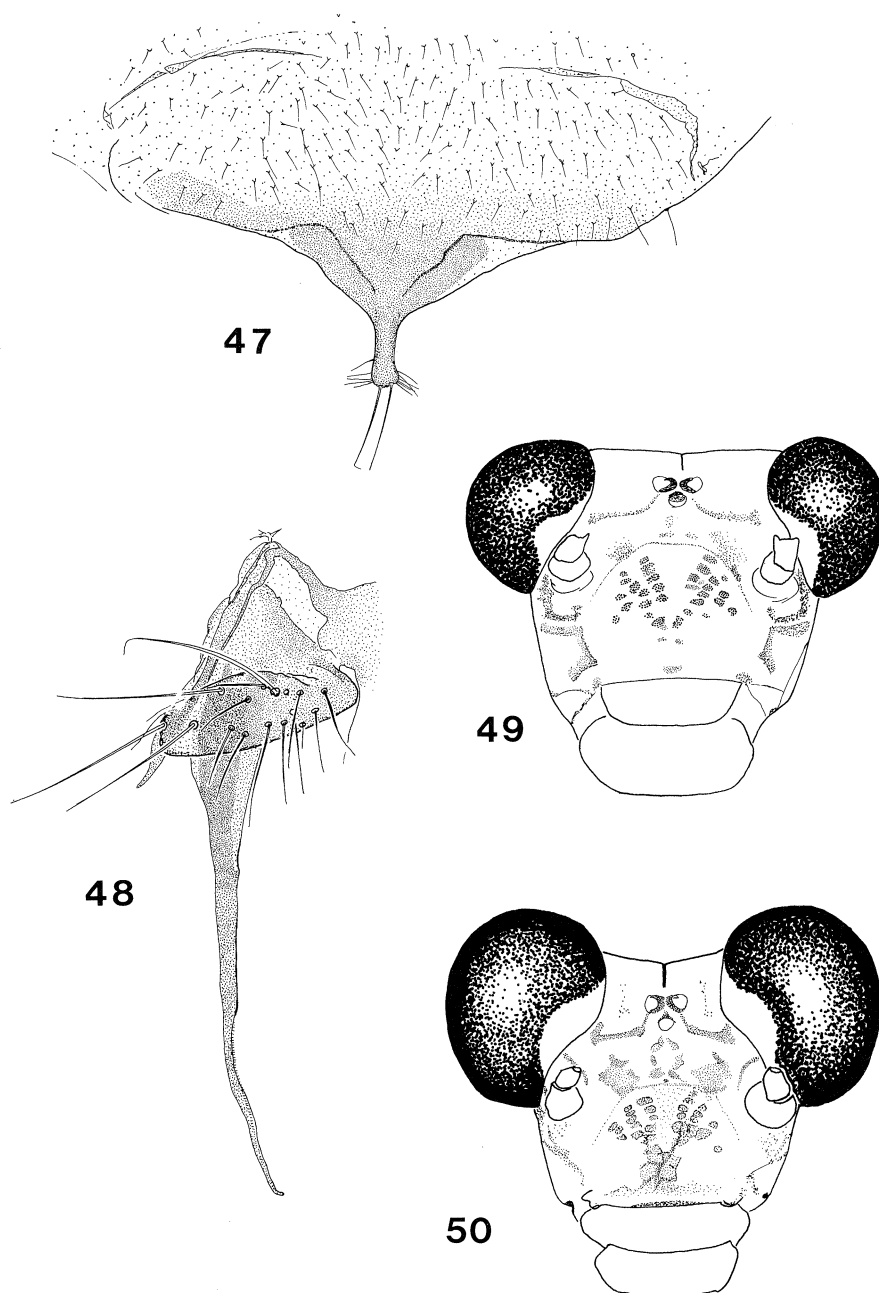
Phlotodes megops sp. n.

MALE. *Coloration* (in alcohol): Head very pale brownish yellow with sparse brown markings (fig. 49). Labrum pale. Genae pale with a small brown mark adjacent to antennal socket. Antennae very pale brownish yellow. Eyes black, a small area adjacent to antenna base not pigmented. Ocelli centripetally margined in black so that they stand out conspicuously against the unusually pale head. Maxillary palp pale, fourth segment pale brown. Thorax dorsally very pale, almost colourless, except for the pale brown anterior section of antedorsum of mesothorax; pleura pale. Coxae colourless. Femora very pale brown with three slightly darker bands. Tibiae pale brown, distal apices a little darker. First tarsal segment pale, second and third segments brown. Fore wings (fig. 42) hyaline with complex pattern of brown marks as usual in the genus. Hind wings hyaline, veins pale brown. Abdomen pale with some dark marks laterally near base and sides of sixth segment with irregular purplish colour due to subcutaneous pigments. Terminal structures pale.

Morphology: Length of body: 3.2 mm. Median epicranial suture distinct, short. Vertex lower in middle. Frons deep. Lengths of first flagellar segment: f_1 : 1.52 mm. Antennae very long and fine, many setae several times as long as flagellar diameter. Eyes very large. IO/D (Badonnel): 0.64; PO: 1.0. Ocellar tubercle well developed. Ocelli large, small setae between facets. Lacinia (fig. 43) outwardly curved at apex, inner major tooth reduced, not much larger than the teeth of the outer part of the apex. Measurements of hind leg: F: 0.92 mm; T: 1.84 mm; t_1 : 0.66 mm; t_2 : 0.098 mm; t_3 : 0.126 mm; rt: 6.8:1:1.3; ct: 26, 1, 1. Hind tibia slightly curved, narrower at proximal end. First tarsal segment with dense clothing of strong setae, second and third segments almost bare except for ctenidiobothria. Fore wing (fig. 42) with costal margin somewhat incurved between base and proximal end of pterostigma. Rs and M fused for a short length. Distal section of Cu_{1a} not as well developed as other sections. A narrow "pocket" present in the wing membrane adjacent to IA. Fore wing length: 4.5 mm; width: 1.8 mm. Hind wing length: 3.3 mm; width: 1.3 mm. Hypandrium well sclerotized with strongly developed hind margin. Epiproct (fig. 45) with thickened lobe overlying ninth tergite, the lobe being slightly emarginate. Phallosome (fig. 46) closed at both ends, the rim very well developed and broad posteriorly; a narrow median rod present.

FEMALE. *Coloration* (in alcohol): As in male (allotype specimen a little paler than paratypes, probably more recently moulted). Eyes pigmented as in male.

Morphology: Length of body: 3.0 mm. Median epicranial suture distinct, short. Antennae long and fine, setose, setae not as long as in male. Length of first flagellar segment: f_1 : 1.2 mm. Eyes large for a female but not as large as in male. IO/D (Badonnel): 1.3; PO: 0.93. Ocelli large, anterior ocellus a little smaller than lateral ocelli. Inner tooth of lacinia larger than in male. Measurements of hind leg: F: 0.84 mm; T: 1.72 mm; t_1 : 0.62 mm; t_2 : 0.098 mm; t_3 : 0.112 mm; rt: 6.4:1:1.1; ct: 26, 1, 1. Fore wing length: 4.6 mm; width: 1.9 mm. Epiproct simple, setose with a group of isolated setae in central area of epiproct. Subgenital plate (fig. 47) with long terminal setae and a large group of short setae at end of posterior extension of plate. Gonapophyses (fig. 48) with small, spindle shaped external valve; ventral valves fairly short.



Figs. 47-50. *Phlotodes megops* sp. n. 47. Subgenital plate ♀; 48. Gonapophyses ♀; 49. Head ♀; 50. Head ♂.

MATERIAL EXAMINED: BOUGAINVILLE: 1 ♂ (holotype), S. side saddle, W. Mt. Negrohead, near Panguna, 900 m. 10.ix.1975 (C. N. Smithers and I. W. B. Thornton); 1 ♀ (allotype) Valley between Sugarloaf and Negrohead, 300 m., Pihei River, ex *Casuarina* sp., 11.ix.1975 (C. N. Smithers and I. W. B. Thornton). 2 ♂, 2 ♀, as holotype, 12.ix.1975 (C. N. Smithers and I. W. B. Thornton).

Holotype and allotype in the Australian Museum.

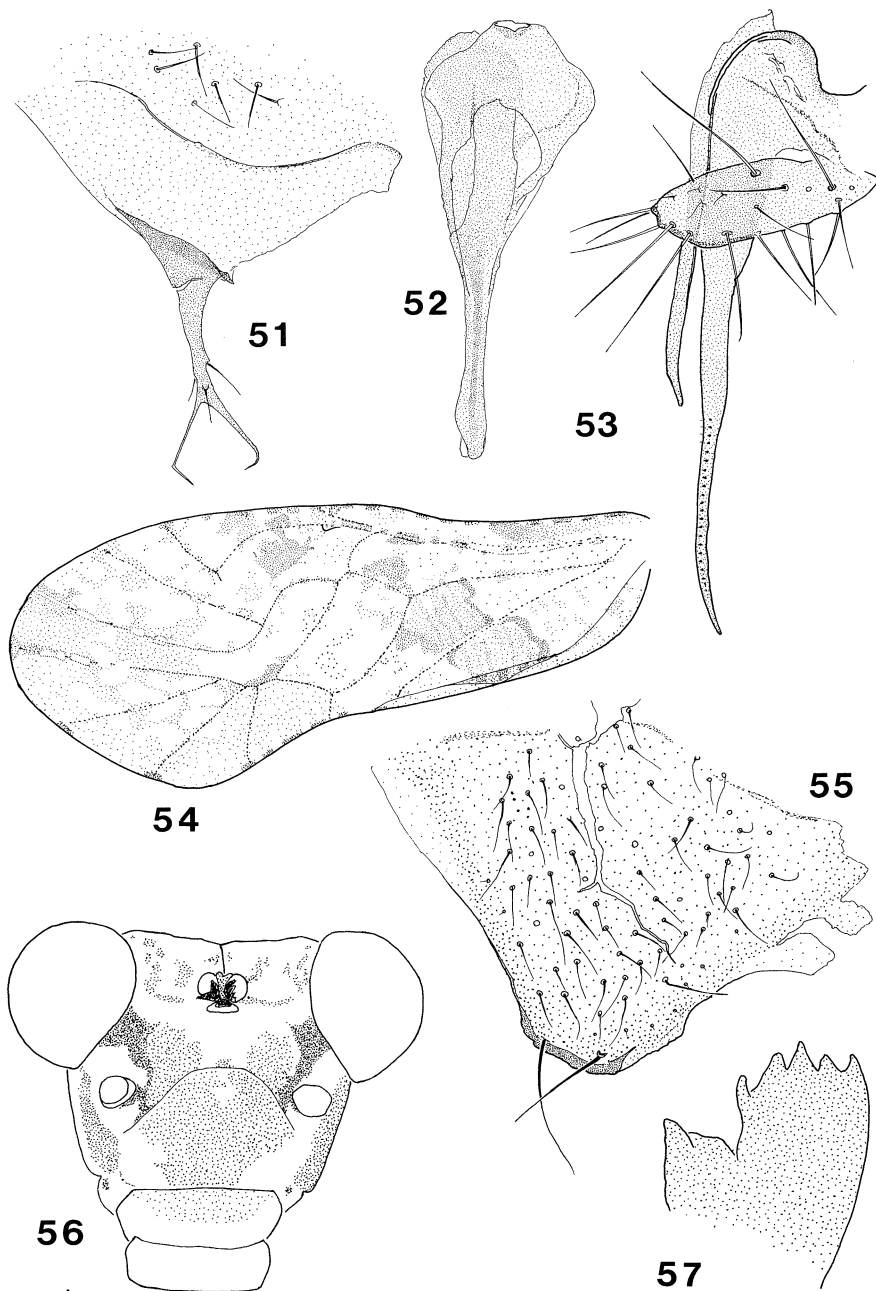
***Phlotodes anomalus* sp. n.**

MALE. *Coloration* (in alcohol): Head very pale on vertex, but with pattern in various shades of brown anterior to vertex. Postclypeal striations distinct, very dark brown. Ocellar tubercle dark. Genae pale with dark mark in posterior half from eye to mandible, broader below than above. Antennae very pale brownish. Eyes black. Maxillary palp brown, fourth segment not darker than others. Thorax pale above and laterally. Legs pale brown without any banding of femora. Fore wings (fig. 54) hyaline with brown pattern. Hind wings hyaline, veins grey. Abdomen pale with irregular brown markings laterally.

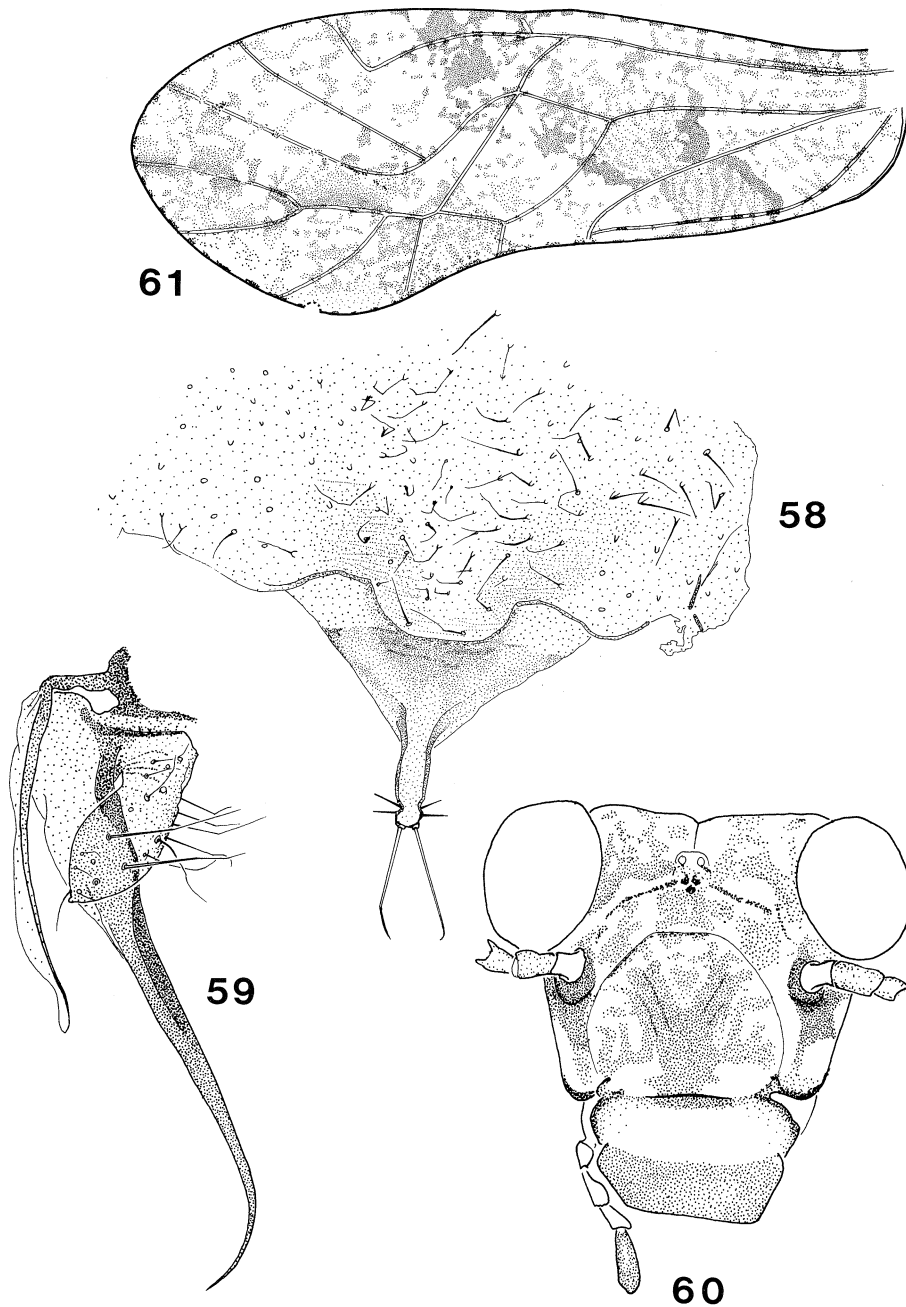
Morphology: Length of body: 2.2 mm. Median epicranial suture distinct as far as ocellar triangle; anterior arms evanescent. Antennae fine with extremely long setae, several times longer than flagellar diameter. IO/D (Badonnel): 0.53; PO: 0.93. Anterior ocellus very small, separated from lateral ocelli by a distance greater than its diameter. Measurements of hind leg: F: 0.57 mm; T: 1.02 mm; t_1 : 0.35 mm; t_2 : 0.062 mm; t_3 : 0.075 mm; rt: 5.4:1:1.2; ct: 17, 1, 1. Hind tibiae narrower at basal end than distally, slightly curved. Fore wing length: 3.0 mm; width: 1.1 mm. Costal area a little broadened near wing base, narrow to base of pterostigma. R_1 (hind margin of pterostigma) very strongly curved so that pterostigma is strongly concave behind. Rs and M fused for a very short length. Rs distad of fusion strongly curved before bifurcation so that $R_4 + 5$ near its base is close to M. M and Cu_1 before branching both curved so that discoidal cell is concave distally and convex basally. Hind wing with Rs and M fusion very short; M very fine. Epiproct simple, rhomboidal with rounded posterior corners, setose, without anterior extension. Hypandrium (fig. 55) well sclerotized in the form of a posteriorly narrowing laterally and posteriorly upturned lobe, setose with two, much stronger, convergent setae near hind margin. Phallosome (fig. 52) unusual; phallic frame very narrow and elongated anteriorly, broadening and closed posteriorly; the frame is curved dorsally towards the broadened, posterior end; a remarkable, broad transverse flap arises about a third of way from hind end.

FEMALE. *Coloration* (in alcohol): Similar to male but with a few spots on pale vertex in addition to other head pattern (fig. 56); postclypeal stripes not pronounced but postclypeus dark brown, similar to postclypeus of male.

Morphology: Length of body: 2.7 mm. Median epicranial suture distinct to ocellar triangle. Frons deep. Antennae fine but setae only about twice as long as flagellar diameter. Length of first flagellar segment: f_1 : 0.8 mm. Eyes large. IO/D (Badonnel): 1.1; PO: 1.2. Ocelli as in male but anterior ocellus very small. Measurements of hind leg: F: 0.62 mm; T: 1.17 mm; t_1 : 0.42 mm; t_2 : 0.052 mm; t_3 : 0.075 mm; rt: 8:1:1.4; ct: 18, 1, 1. Fore and hind wing similar to that of male. Fore wing length: 3.2 mm; width: 1.3 mm. Epiproct broadbased, with a row of four setae across middle, the outer setae very long. Subgenital plate (fig. 51) with exceptionally well developed, strongly diverging setae at end of posterior lobe as well as two unusually strong preapical setae. Gonapophyses (fig. 53) with fairly long ventral valve; external valve spindle shaped with some unusually long setae.



Figs. 51-57. *Phlotodes anomalus* sp. n. 51. Subgenital plate ♀; 52. Phallosome ♂; 53. Gonapophyses ♀; 54. Forewing; 55. Hypandrium; 56. Head ♀; 57. Lacinia.



Figs. 58-61. *Phlotodes platyvalvula* sp. n. ♀. 58. Subgenital plate; 59. Gonapophyses; 60. Head; 61. Forewing.

MATERIAL EXAMINED. SOLOMON ISLANDS. NEW GEORGIA: 1 ♂ (holotype), Tetemara Village, Viru Harbour, 23.ix.1975 (C. N. Smithers and I. W. B. Thornton); MALAITA: 1 ♀ (allotype), Kokomadama, 350 m, 20.ix.1975 (C. N. Smithers and I. W. B. Thornton).

Holotype, allotype and paratypes in the Australian Museum.

DISCUSSION AND COMPARISONS OF SPECIES OF *PHLOTODES* FROM THE SOLOMONS

Phlotodes preclarus is the only species from the Solomons in which the central area of wing membrane is hyaline and stands out in strong contrast to the rest of the wing. *Ph. australis* is the only Solomon species in which the facial pattern includes strong postclypeal stripes. The distinct differences in head pattern of the remaining three species permit easy identification of females and the differences in proportions of the subgenital plates are clear. In males facial pattern and form of the phallosome are distinctly different. In *Ph. gregarius* and *Ph. megops* the phallosome consists of an ovoid ring with a longitudinal median bar whereas in *Ph. anomalus* it is extremely narrow anteriorly, broadened posteriorly with median fusion of the external parameres at their posterior extremity. The phallosome bears a peculiar transverse flap. In *Ph. megops* the phallic frame is broad and well developed with a narrow median rod whereas in *Ph. gregarius* it is a narrow irregular, ring-like structure with a broad, median, longitudinal strap.

MYOPSOCIDAE FROM THE NEW HEBRIDES

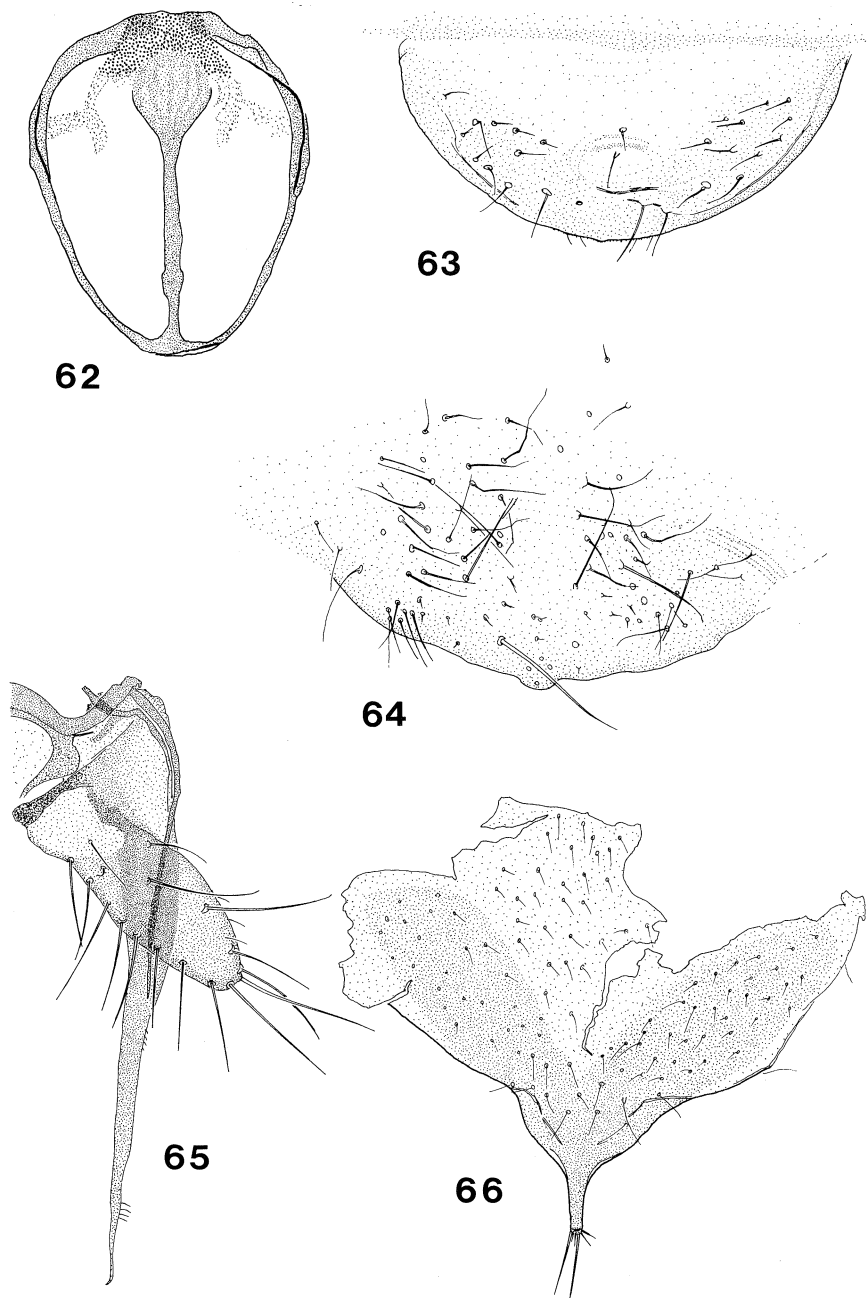
KEY TO SPECIES OF *PHLOTODES* FROM NEW HEBRIDES

1. Hind femur pale with two dark transverse bands in distal third *platyvalvula*
Hind femur dark in basal half, pale in distal half or entirely brown 2
2. ♂ epiproct with raised, transverse rugose ridge. ♀ posterior lobe of subgenital plate with two smaller subapical setae and two, usual, larger apical setae .. *sagitta*
♂ epiproct with pair of curved, pointed, anteriorly-directed processes which may overlay the ninth tergite. ♀ posterior lobe of subgenital plate with four small setae arising near the bases of the two, usual, larger apical setae .. *hoskinsi*

***Phlotodes platyvalvula* sp. n.**

FEMALE. *Coloration* (in alcohol): Head (fig. 60) pale brown with darker brown markings; some of the converging lines on the postclypeus are broad and laterally fused forming a V-shaped mark. Scape, pedicel and flagellum pale brown. Genae brown below level of antenna bases but pale above mandible. Eyes black. Maxillary palp pale brown with darker fourth segment. Antedorsum dark brown with pale median line; dorsal lobes dark brown anteriorly, mottled in various shades of brown in posterior half; sutures pale. Fore femur pale, with double brown band in distal third; tibia pale with dark tip; first tarsal segment pale, second and third segments dark brown. Hind leg similar to fore leg but femur has only one band near distal end. Fore wings (fig. 61) with complex pattern in shades of brown, on hyaline background. Hind wings hyaline with brown veins, a small brown patch in costal area near wing base.

Morphology: Length of body: 2.9 mm. Median epicranial suture distinct. Anterior arms evanescent. Length of first flagellar segment: f_1 : 0.88 mm. Eyes moderately large,



Figs. 62-64. *Phlotodes platyvalvula* sp. n. ♂. 62. Phallosome; 63. Epiproct; 64. Hypandrium.

Figs. 65-66. *Phlotodes hoskinsi* sp. n. ♀; 65. Gonapophyses; 66. Subgenital plate.

reaching vertex. IO (Badonnel): 1.3; PO: 0.83. Measurements of hind leg: F: 0.68 mm; T: 1.24 mm; t_1 : 0.49 mm; t_2 : 0.07 mm; t_3 : 0.10 mm; rt : 7.1:1:1.1; ct : 21, 1, 1. Fore wing length: 3.4 mm; width: 1.3 mm. Epiproct and paraproct similar to *P. brunneigena*. Subgenital plate (fig. 58) with fairly short lobe terminating in two strong setae, not set on tubercles and with four, laterally directed, small, preapical setae. Gonapophyses (fig. 59).

MALE. *Coloration* (in alcohol). As in female.

Morphology: Length of body: 2.8 mm. Median epicranial suture distinct. Length of first flagellar segment: f_1 : 1.28 mm. Antennae fine, strongly setose, some setae twice as long as flagellar thickness. Eyes large. IO/D (Badonnel): 0.64; PO: 0.94. Measurements of hind leg: F: 0.80 mm; T: 1.52 mm; t_1 : 0.55 mm; t_2 : 0.07 mm; t_3 : 0.09 mm; rt : 6.1:1:1.3; ct : 24, 1, 1. Hind femur fairly short and stout; tibia slightly curved and a little wider at distal end than proximally. Fore wing length: 3.9 mm; width: 1.4 mm; venation similar to female. Hind wing length: 2.8 mm.; width: 1.0 mm. M and Cu_2 very fine. Epiproct (fig. 63). Paraproct well sclerotized, with a large, ovoid field of trichobothria and a broad, posterodorsally directed posterior lobe; very similar to the paraproct of *Ph. sagitta* (fig. 75). Phallosome (fig. 62). Hypandrium (fig. 64).

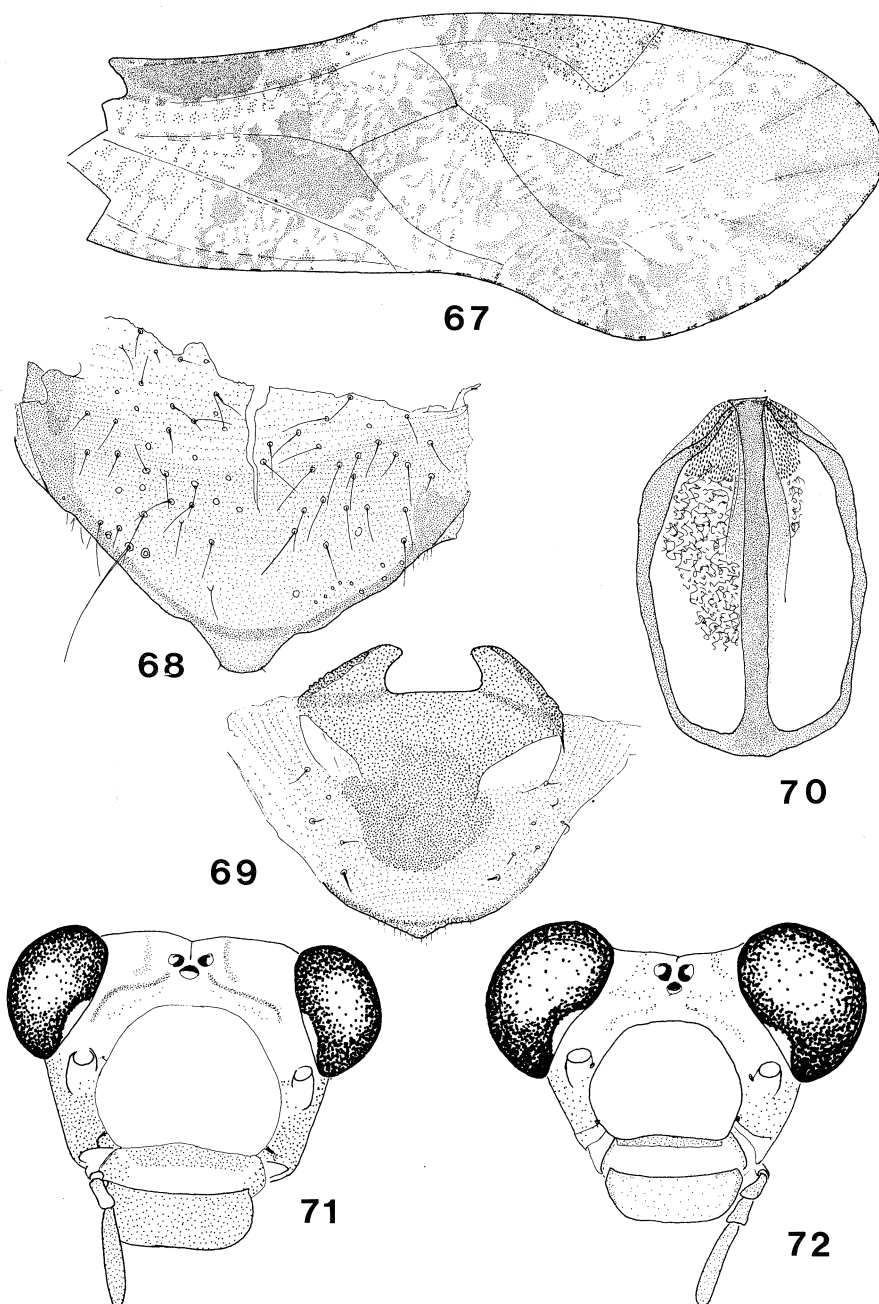
MATERIAL EXAMINED. NEW HEBRIDES. TANNA ISLAND: 1 ♀ (holotype), 2 ♂ (including allotype), Bethel, 24.ix.1976 (C. N. Smithers & I. W. B. Thornton); 1 ♀, British Agent's Garden, Isangel, 25.ix.1976 (C. N. Smithers and I. W. B. Thornton). ERROMANGA: 1 ♀, Dillon's Bay, 27.ix.1976 (C. N. Smithers & I. W. B. Thornton). EFATE: 1 ♀, 4 km NW Forari, 22.ix.1976 (C. N. Smithers & I. W. B. Thornton), 5 ♀, 2 km NW Klom, 23.ix.1976 (C. N. Smithers & I. W. B. Thornton).

Holotype, allotype and paratypes in the Australian Museum. Known also from Bismarcks.

***Phlotodes hoskinsi* sp. n.**

MALE. *Coloration* (in alcohol): Head (fig. 72, paratype), very pale with brown markings. A very faint mark on vertex on either side of the median epicranial suture reaching forward to the ocellar triangle. Faint browning between ocellar triangle and eyes. A brown line from in front of ocellar triangle curving to antenna base on each side. Anterior half of postclypeus with convergent rows of brown spots. Genae dark brown. Anteclypeus and labrum dark brown. Eyes black with indications of a grey top and suggestion of a median, transverse brown band. Antennae pale brown, each flagellar segment with a pale tip making segmentation conspicuous. Ocelli bordered centripetally in black. Maxillary palps entirely dark brown; mesothoracic notum pale, antedorsum dark brown, lateral lobes with mottled brown markings. Pleura dark brown below wing base, otherwise pale. Coxae dark brown. Fore and middle femora dark brown with narrow preapical pale band; hind femora entirely dark brown. Tibiae brown in basal half, paler in distal half except for brown tips. Basal tarsal segments pale, second and third segments dark. Fore wing (fig. 67) pale with complex pattern in various shades of brown; particularly noteworthy is the very dark brown coloration of the costal area near the base of the wing. Hind wing hyaline, dark in costal area near wing base and a few small dark spots on costal margin just basad of R_{2+3} ; veins brown, anterior veins darker than those in posterior part of wing. Abdomen pale, well sclerotized terminal structures dark brown.

Morphology: Length of body 2.4 mm. Epicranium curving down to a furrow in which lies conspicuous epicranial suture. Frons deep, i.e. epistominal suture distant from ocellar triangle. Length of flagellar segments: f_1 : 0.88 mm; f_2 : 0.64 mm. Antennae with long, erect setae. Eyes large. IO/D (Badonnel): 0.71; PO: 1.1. Small setae between facets. Eyes diverging strongly behind when viewed from above. Ocelli large. Gena with a row of



Figs. 67-72. *Phlotodes hoskinsi* sp. n. 67. Forewing; 68. Hypandrium ♂; 69. Epiproct ♂; 70. Phallosome ♂; 71. Head ♀; 72. Head ♂.

strong, short, conspicuous setae below antenna base. Measurements of hind leg: F: 0.68 mm; T: 1.24 mm; t_1 : 0.504 mm; t_2 : 0.070 mm; t_3 : 0.098 mm; rt: 7:1:1.2; ct: 19, 0, 0. Hind tibiae slightly curved. Fore wing length: 2.9 mm; width: 1.0 mm. R_1 strongly curved before apex of pterostigma. Rs and M and Cu_{1a} and M fused for a length. Hind wing length: 2.2 mm, width: 0.8 mm. Epiproct (fig. 69) with two hood shaped lobes, the apices of which tend to overlie the ninth tergite. Hypandrium (fig. 68). Phallosome (fig. 70).

FEMALE. *Coloration* (in alcohol): Head pale, as in male, with pattern in pale brown (paratype, fig. 71). Eyes marked as in male. Body, legs and wings as in male.

Morphology: Length of body: 3.1 mm. Median epicranial suture distinct, anterior arms evanescent. Genae with row of short, stout setae below antenna base. Length of flagellar segments: f_1 : 0.88 mm; f_2 : 0.72 mm. Antennae with fewer and shorter setae than in male. Eyes moderately large. IO/D (Badonnel): 1.3; PO: 0.86. Small setae between facets. Eyes strongly divergent behind. Ocelli large. Measurements of hind leg: F: 0.76 mm; T: 1.40 mm; t_1 : 0.504 mm; t_2 : 0.070 mm; t_3 : 0.098 mm; rt: 1.7:1:1.2; ct: 21, 0, 0. Fore wing length: 3.4 mm; width: 1.2 mm. Venation as in male. Hind wing length: 2.5 mm; width: 0.9 mm. Epiproct almost triangular with rounded posterior angle bearing a transverse row of small setae across middle, two very large lateral setae nearer apex, three almost at apex and a marginal row of small setae. Subgenital plate (fig. 66). Gonapophyses (fig. 65).

MATERIAL EXAMINED. NEW HEBRIDES. AOBA ISLAND: 2♂ (including holotype), 3♀ (including allotype), Lolawai, 18.ix.1976 (C. N. Smithers & I. W. B. Thornton); 2♂, 2♀, Naruga, 19.ix.1976 (C. N. Smithers & I. W. B. Thornton); 1♂, 1 nymph, Targil, 21.ix.1976 (C. N. Smithers & I. W. B. Thornton); 1♂, Vureas, 19.ix.1976 (C. N. Smithers & I. W. B. Thornton). ERROMANGA: 4♀, 3 nymphs, Airstrip, 27.ix.1976 (C. N. Smithers & I. W. B. Thornton). EPI: 1♂, Purumba Village, 14.ix.1976 (C. N. Smithers & I. W. B. Thornton); 1♂, Lamen Bay, 15.ix.1976 (C. N. Smithers & I. W. B. Thornton). EFATE: 1♂, 3♀, Rentapoa, 22.ix.1976 (C. N. Smithers & I. W. B. Thornton). ESPIRITU SANTO: 1♂, Narango, 16.ix.1976 (C. N. Smithers & I. W. B. Thornton). TANNA ISLAND: 1♀, 2 km SE Bethel, 26.ix.1976 (C. N. Smithers & I. W. B. Thornton).

Holotype, allotype and paratypes (excluding nymphs) in Australian Museum.

Phlotodes sagitta sp. n.

MALE. *Coloration* (in alcohol): Head (fig. 78) pale brown, marked in various shades of darker brown; hind part of occipital region (not visible in illustration) very dark next to median suture. Median epicranial suture very dark. Genae irregularly marked in brown. Scape and pedicel brown, flagellar segments pale brown except for darker brown at each end with a pale band at junctions of segments, the flagellar segments are thus very clearly defined. Eyes black. Maxillary palp with all segments brown. Antedorsum of mesothorax dark brown, dorsum otherwise pale, sparsely mottled with brown. Fore and middle femora pale at base, dark in middle section, with a pale distal band and dark band at end; tibiae pale with almost black distal tip; first tarsal segment pale, second and third segments almost black. Hind legs similar to those of meso- and metathorax but femur pale in basal half becoming dark brown in distal half, not banded. Fore wing (fig. 73) with mottled pattern as usual in the genus. Hind wing hyaline, a few dark marks along anterior margin between ends of R_1 and R_2+3 .

Morphology: Length of body: 2.7 mm. Median epicranial suture distinct; anterior arms evanescent. Head with usual clothing of fine setae but with scattered, longer setae; a few short setae on genae below eyes. Length of first flagellar segment: f_1 : 1.24 mm. First

flagellar segment somewhat curved. Antennae with setae up to three times as long as segment diameter. IO/D (Badonnel): 0.70; PO: 1.0. Eyes large, reaching above level of vertex, upper margin strongly diverging behind. Small setae between facets. Lacinia (fig. 74). Measurements of hind leg: F: 0.76 mm; T: 1.48 mm; t_1 : 0.54 mm; t_2 : 0.07 mm; t_3 : 0.098 mm; rt: 7.7:1:1.4; ct: 21, 0, 0. Tibia slightly curved. Fore wing length: 4.0 mm width: 1.4 mm. Basal section of Sc strongly developed, disappearing about one third of distance from pterostigma. Stigmapophysis flattened, not strongly protruding. Hind margin of pterostigma strongly concave, Rs and M and Cu_{1a} and M fused for a length. Hind wing length: 2.8 mm; width: 1.0 mm. Epiproct (fig. 82) well sclerotized with a transverse, spiculate flap across middle. Hypandrium (fig. 76). Phallosome (fig. 77). Paraproct (fig. 75).

FEMALE. *Coloration* (in alcohol): As in male but much darker. Head (fig. 81). Eyes with suggestion of dark banding.

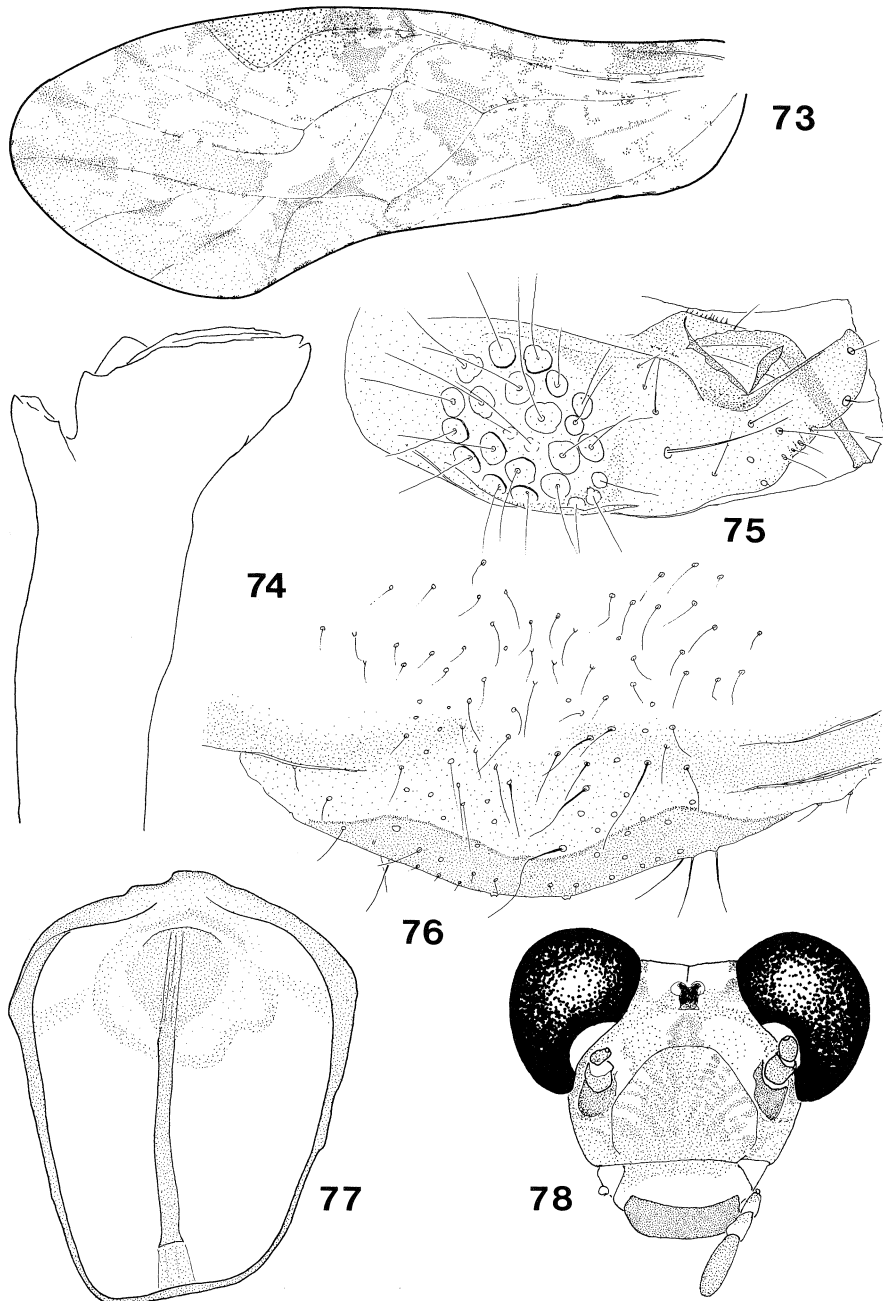
Morphology: Length of body: 3.0 mm. Antennae as in male but with setae relatively shorter. Eyes fairly large, just reaching level of vertex. IO/D (Badonnel): 1.25; PO: 0.9. Upper margins strongly divergent. Second segment of maxillary palp flask-shaped, narrow in basal half, broadened considerably in distal half so that third segment appears to arise from out of mouth of flask. Measurements of hind leg: F: 0.52 mm; T: 1.80 mm; t_1 : 0.68 mm; t_2 : 0.084 mm; t_3 : 0.10 mm; rt: 8:1:1.2; ct: 25, 0, 0. Tibia very slightly curved. Fore wing length: 4.6 mm; width: 1.7 mm. Basal section of Sc fairly well developed running about 1/8th way to pterostigma before becoming evanescent in costal cell. Hind margin of pterostigma strongly concave, Rs and M and Cu^1 and M fused for a length. Hind wing length: 3.6 mm; width: 1.3 mm. Epiproct tapering posteriorly, truncated. Subgenital plate (fig. 79) with fairly long posterior extension, two strong apical setae and a pair of shorter preapical setae. Gonapophyses (fig. 80) with strongly chitinized dorsal valve in which the basal part is strongly ridged dorsally; ventral valve fine, apically curved downwards; external valve fairly broad with some of its setae arranged in a curved row parallel to its posterior border.

MATERIAL EXAMINED. NEW HEBRIDES. ERROMANGA: 2 ♂ (including holotype), Airstrip, 29.ix.1976 (C. N. Smithers & I. W. B. Thornton); 3 ♂, Dillon's Bay, 27.ix.1976 (C. N. Smithers & I. W. B. Thornton). EPI: 1 ♀ (allotype), Lamén Bay, 15.ix.1976 (C. N. Smithers & I. W. B. Thornton).

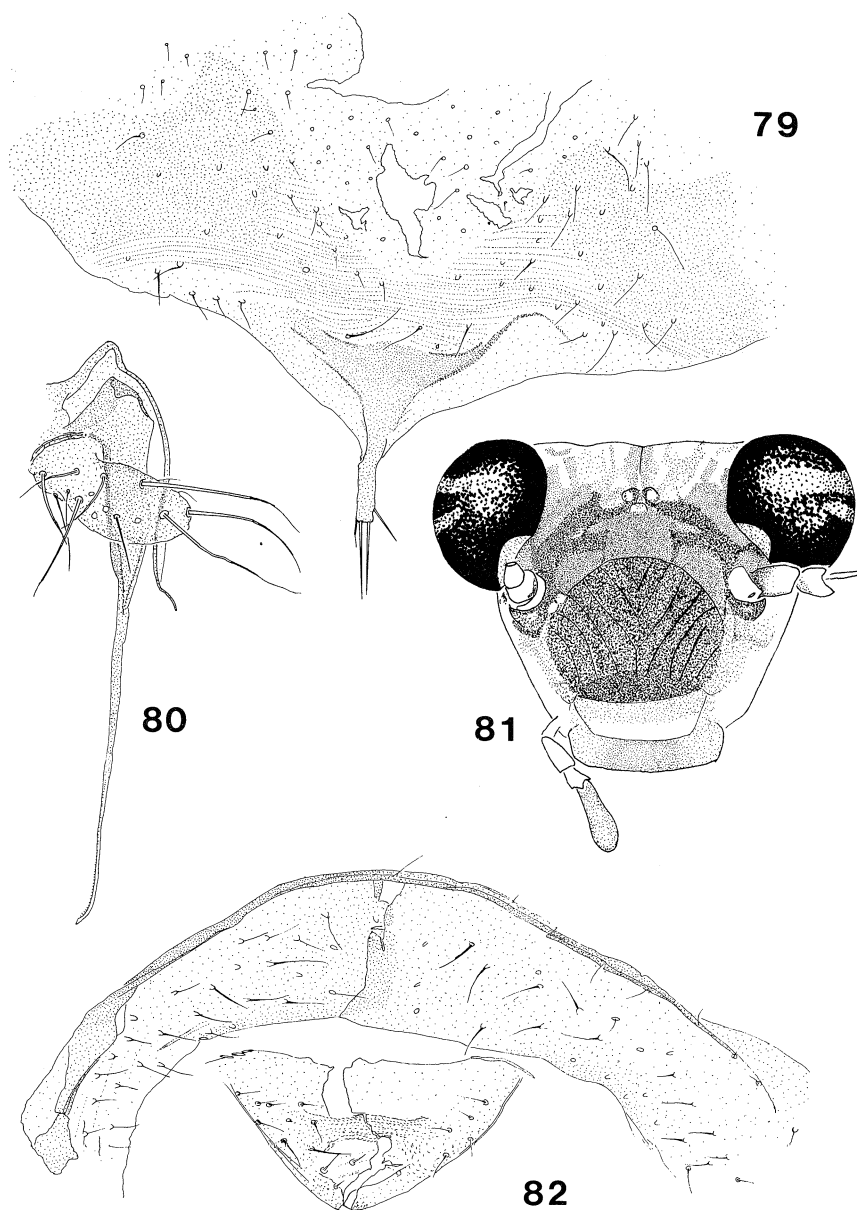
Holotype, allotype and paratypes in the Australian Museum.

DISCUSSION AND COMPARISONS OF SPECIES OF *PHLOTODES* FROM THE NEW HEBRIDES

Of the three species of *Phlotodes* now known from the New Hebrides only *Ph. hoskinsi* has a postclypeus without pattern; both *Ph. sagitta* and *Ph. platyvalvula* have dark colouring on the postclypeus. The males of *Ph. sagitta* differ from those of *Ph. hoskinsi* in having a transverse, raised ridge across the epiproct, in *Ph. hoskinsi* there is a pair of curved, forwardly-directed processes. In *Ph. sagitta* females there are two preapical setae on the posterior lobe whereas in *Ph. hoskinsi* there are four. There are also differences in the complex wing pattern discernible by reference to the figures in this paper.



Figs. 73-78. *Phlotodes sagitta* sp. n. ♂ 73. Forewing; 74. Lacinina; 75. Paraproct; 76. Hypandrium; 77. Phallosome; 78. Head.



Figs. 79-82. *Phlotodes sagitta* sp. n. 79. Subgenital plate♀; 80. Gonapophyses♀; 81. Head♀; 82. Ninth tergite and epiproct.♂

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