

Studies on Queensland Hemiptera

Part II.—Meenoplidae (FULGOROIDEA)

by T. E. WOODWARD

Three new species and one new subspecies of *Phaconeura* Kirkaldy are described from Queensland (*smithi* (with subspecies *lamingtoni*), *brimblecombei* and *hackeri*). Additional taxonomic and distributional data are given for *Ph. froggatti* Kirkaldy and *Ph. pallida* Kirkaldy and the affinities of the five known Australian species of this genus are discussed. The terminalia and other additional taxonomic characters of *Nisia grandiceps* Kirkaldy are described. A new subspecies (*australiensis*) of *Nisia atrovenosa* (Lethierry) is described from Queensland and compared with other subspecies and species of the *atrovenosa* complex. The eight known Australian species and subspecies of the family are keyed out.

INTRODUCTION

The Meenoplidae are distributed mainly in the tropics and sub-tropics, excluding America. Two genera and four species have been recorded from Australia; in this paper three new species are added. All belong to the Nisiinae. All except one are recorded only from Queensland.

The Meenoplids may be distinguished from other Fulgoroidea by the following combination of characters: apex of second segment of hind tarsus with a ventral row of more than two small dark spines; one or both anal (claval) veins granulate; apical segment of rostrum much longer than wide; apex of hind tibia without a large movable spur; abdominal terga divided into right and left plates. For full synonymy and references to the previously described species, and for further family characters, see Metcalf (1945).

The male claspers or harpagones (Snodgrass's terminology, 1935) are sometimes referred to in taxonomic literature also as "styles" or "gonostyli" (indicating their probable homology) and "parameres".

METHODS OF MEASURING

Length of tegmen is measured from its apex to the base of 1A, since the latter is a point readily seen without removing the tegmen or tegula and with the tegmen in any position of flexion. Length of clavus is measured from base of 1A to the anal indentation of the posterior margin. Tegmina which were appreciably curved were not measured for width. Muir (1921) has been followed for venational nomenclature, except that his Cu1 and Cu1a become Cu1a(=CuA₁) and Cu1b(=CuA₂) respectively, his Cl₁ and Cl₂ become 1A and 2A respectively, and his M₁ and M₃ (pl. X, fig. 2), M1+2 and M3+4 respectively. Cells are distinguished by a small initial letter. A magnification of about 70 times is desirable for measuring head and mesonotum widths and in counting the anal granules, particularly the more basal.

Relative measurements were made of the veins margining cell 2 cu1, proportions of cell 1r, the relative length of these two cells, length of cross-veins and of stem of R2+3. These values are extremely variable intraspecifically with ranges widely overlapping interspecifically, and are of no use in separating the species dealt with here.

Terminalia have been drawn from potash prepared material before permanent mounting, so that the several desired aspects could be attained from one specimen. Such structures naturally vary in apparent shape according to the angle of view and for purposes of identification should also be examined first from different aspects before committal to a permanent mount.

KEY TO AUSTRALIAN MEENOPLIDAE

1. Frons with a median carina *Phaconeuva* Kirkaldy .. 2
 Frons without a median carina *Nisia* Melichar 7
2. Tegmina between veins fuscous brown, without broad pale costal band along most of apical half and including all of cell 2c. Harpagones of male without a subbasal anterior lobe; lateral lobes of periandrium with a series of spines along inner margin; anal segment of male divided behind anal lobe into two divergent acuminate processes 3
 Tegmina between veins pale brown, or if dark then with a broad pale costal band along most of apical half and including all of cell 2c and beyond. Harpagones of male with subbasal anterior lobe; lateral lobes of periandrium with no more than a single spine along inner margin; anal segment of male not divided behind anal lobe into two acuminate processes 4
3. Harpagones of male with posterior margin angled before apex and with a series of wart-like swellings on apical half as far as angle; aedeagus nearly straight, rod-like. Plates of last divided tergum of female greatly narrowed posteriorly, with inner posterior margin markedly concave; posterior angles of anal segment not produced. A southern species recorded from N.S.W. and Victoria .. . *Ph. foggatti* Kirkaldy
 Harpagones of male with posterior margin evenly convex, without wart-like swellings; aedeagus curved and ventrally extended beyond gonopore. Plates of last divided tergum of female not greatly narrowed posteriorly, with inner posterior margin nearly straight; posterior angles of anal segment produced. Recorded only from high altitude areas in S.E. Queensland (Bunya Mtus., Lamington Plateau) *Ph. hackeri* sp. n.
4. Tegmina fuscous brown between veins, but with a continuous broad, pale costal band along most of apical half. Aedeagus with two dorso-lateral knobs anterior to gonopore; with a ventral process anteriorly recurved parallel to rest of aedeagus; lateral lobes of periandrium hastate with outer margins conspicuously serrate. Ventral valvulae of female not subglobular, much longer than wide *Ph. brimblecombei* sp. n.
 Tegmina pale brown between veins, without a continuous broad pale costal band along most of apical half. Aedeagus without dorso-lateral knobs; not anteriorly recurved; with a large ventral membranous lobe; lateral lobes of periandrium not hastate, outer margins not serrate. Ventral valvulae of female subglobular 5
5. Small (length 2.4-3.0 mm. (male), 2.7-3.3 mm. (female)). Cu1a and M3+4 fused beyond i-m. Periandrium with lateral lobes narrow, acuminate, about as long as median lobe and completely covered by it above. Last sternum of female widest posteriorly; posterior angles of anal segment not outwardly produced. Recorded only from high altitude areas (Atherton Tableland, Lamington Plateau)
Ph. smithi sp. n. 6
 Larger (length 3.1-3.9 mm. (male), 3.8-4.3 mm. (female)). Cu1a and M3+4 almost always reaching margin separately, forking at or beyond i-m. Periandrium with lateral lobes shorter than median lobe, projecting wing-like beyond it on each side; apices rounded; a long spine from inner margin. Last sternum of female widest anteriorly; posterior angles of anal segment outwardly produced. Recorded only from low altitude areas in S.E. Queensland *Ph. pallida* Kirkaldy

6. Periandrial lobes smaller and relatively narrower; apical part of harpagones more curved, subbasal lobe larger, more broadly rounded (Fig. 3, E, G, H). Recorded only from Atherton Tableland, N. Queensland *Ph. smithi smithi* subsp. n.
 Periandrial lobes larger and relatively broader; apical part of harpagones less curved, subbasal lobe smaller, more narrowly rounded (Fig. 4, A-C). Recorded only from Lamington Plateau, S.E. Queensland *Ph. smithi lamingtoni* subsp. n.
7. Smaller (length 3.5-4.4 mm. (male), 4.0-5.2 mm. (female)). Harpagones of male outwardly curved and widely separated for most of their length, converging only apically; with a bilobed basal process. Ventral valvulae of female very short, broad, not projecting lance-like from abdomen
N. atrovenosa (Lethierry) *australiensis* subsp. n.
 Larger (length 4.7-5.2 mm. (male), 5.7-6.2 mm. (female)). Harpagones of male not outwardly curved, nearly apposed throughout length; without basal lobes. Ventral valvulae of female elongate, lance-like, conspicuously projecting
N. grandiceps Kirkaldy.

Sub-family NISIINAE Kirkaldy, 1907 (Muir, 1930)

Phaconeura Kirkaldy, 1906*Phaconeura froggatti* Kirkaldy (Fig. 1)

Phaconeura froggatti Kirkaldy, 1906, *Bull. Hawaii. Sugar Pl. Assoc., Div. Ent.* 1 (9): 427-428; pl. XXIX, figs. 3, 4.

This, the type species of the genus, has been recorded from N.S.W. and the author has collected specimens from Victoria. It is the only species of Meenoplid

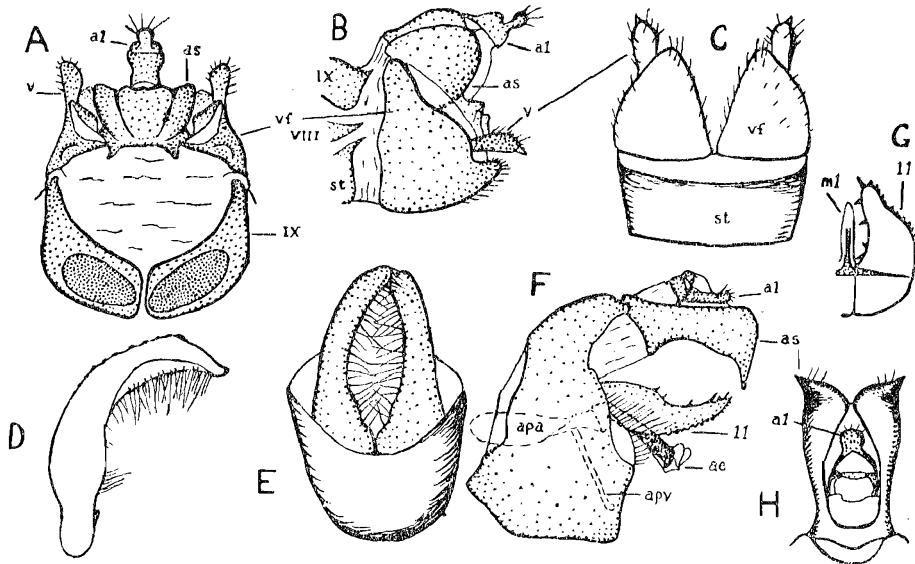


FIG. 1.—*Phaconeura froggatti* (Kirkaldy). A-C, female terminalia; A, dorsal; B, lateral; C, ventral. D-H, male terminalia; D, right clasper, external aspect; E, pygophor and harpagones, posterior; F, terminalia, lateral, claspers removed; G, periandrium, dorsal lobe and left lateral lobe; H, anal segment, dorsal. ae, aedeagus; al, anal lobe; apa, anterior apodeme of aedeagus; apy, ventral apodeme of aedeagus, connecting to base of harpagones; as, anal segment; ll, lateral lobe of periandrium; ml, median lobe of periandrium; st, last sternum; v, ventral valvula; vf, ventral valvifer; VIII, divided eighth tergum; IX, divided ninth tergum. All X 47.

listed as occurring in Australia outside Queensland and is included here for the sake of completeness, for comparison with the Queensland species, and because it may yet be found in the southern parts of this State.

Muir (1923; pl. IV, fig. 6) has figured the male terminalia in lateral aspect, showing their relationships. In the present paper the isolated structures are figured for detailed comparison with those of the other species of the genus. To Kirkaldy's description the following data may be added:

Length (to apex of tegmina): males, 3.5-3.9 mm.; females, 3.7-4.3 mm. Length of body: males, 2.2-2.4 mm.; females, 2.0-2.9 mm. Width of head across eyes: males, 0.71-0.77 mm.; females, 0.67-0.79 mm. Width of mesonotum across tegulae: males, 1.11-1.24 mm.; females, 1.09-1.26 mm.

The minimum figures for female body length, head width and mesonotum width are those of an exceptionally small individual. The next lowest figures for these measurements (of 13 females examined) are respectively, 2.3 mm., 0.73 mm. and 1.15 mm.

Tegmina.—Length (from base of 1A): males, 3.0-3.2 mm.; females, 3.2-3.6 mm. Ratio, length: greatest width, 2.8-3.2. Ratio, length tegmen: length clavus, 1.7-1.9. Number of tubercles along 1A: anterior margin, 15-19; posterior margin, 19-23. Rs usually 2-branched, occasionally unbranched (in 3 of 24 male tegmina, in none of 26 female tegmina). Cula completely fused with M3+4 except at extreme base.

Male terminalia.—Pygophor dorsally much shortened and deeply excavated posteriorly; with a small lobe on each side, just above insertion of harpagones, bearing a tuft of long setae. Harpagones large, hook-like, narrowed at apex; posterior surface angled before apex, notched on inner margin, and with a series of small wart-like swellings on apical half as far as the angle; apical two-thirds with an anterior series of numerous long conspicuous setae; sub-basal part of anterior margin without a lobe but convex in side view. Aedeagus short, straight, rod-like, apex deflexed, with a small, triangular, mostly membranous projection ventrad and just basad of gonopore; a pair of larger subapical dorso-lateral lobes forming lip of gonopore. Periandrium with the lateral lobes broad; somewhat obliquely flattened; narrowed toward apex, outer margins conspicuously serrate; inner margin with a series of short spines. Dorsal lobe of periandrium very narrow, linear, shorter than lateral lobes, apical half and margins membranous. Anal segment divided behind anal lobe into two divergent, acuminate processes with apices directed ventrad.

Female terminalia.—Seen from above, the two plates of the last divided (IX) abdominal tergum considerably narrowed for about apical third; apical half of mesial margin concave; seen from side, the posterior angle acuminate. Last abdominal sternum wider posteriorly than anteriorly. Ventral valvulae much longer than wide, with a tiny conical style at apex.

Locality of specimens examined.—VICTORIA: Frankston, Melbourne (on *Exocarпус*, 17.i.1955, 12 males, 13 females, T. E. Woodward (U.Q.)).

Phaconeura pallida Kirkaldy (Fig. 2)

Phaconeura pallida Kirkaldy, 1906, *Bull. Hawaii. Sugar Pl. Assoc., Div. Ent.* 1 (9): 428.

Total length is much more variable than indicated by Kirkaldy and cannot be used to separate this species from *froggatti*. The terminalia have not previously been described or figured. To Kirkaldy's description the following data may be added:

Length (to apex of tegmina): males, 3.1-3.0 mm.; females, 3.8-4.3 mm. Length of body: males, 1.8-2.2 mm.; females, 1.8-2.8 mm. Width of head across eyes: males, 0.57-0.64 mm.; females, 0.61-0.69 mm. Width of mesonotum across tegulae: males, 0.93-1.11 mm.; females, 1.06-1.17 mm.

Tegmina.—Length (from base of 1A): males, 2.6-3.3 mm.; females, 2.9-3.7 mm. Ratio, length: greatest width, 2.65-2.85. Ratio, length tegmen: length clavus, 1.85-2.1. Number of

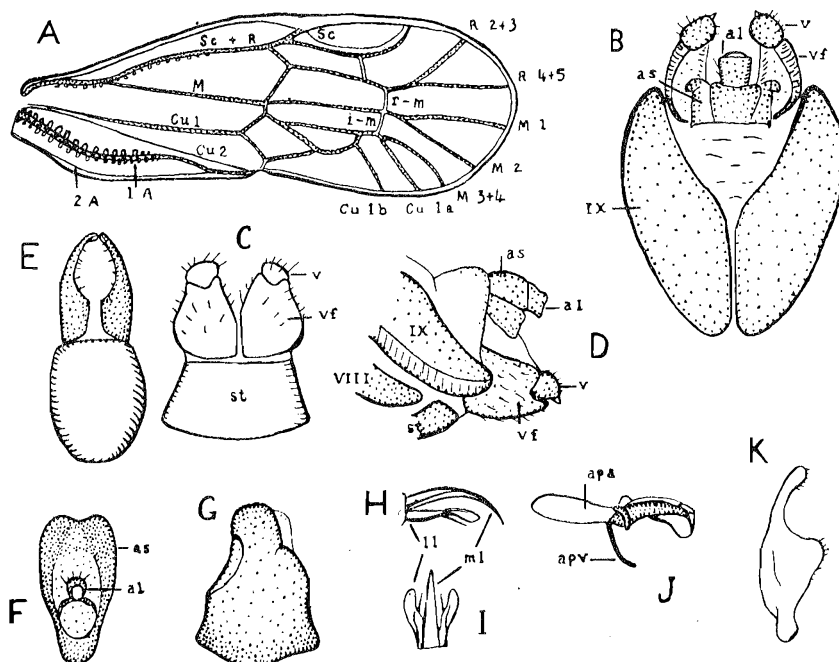


FIG. 2.—*Phaconeura pallida* (Kirkaldy). A, tegmen, female. B-D, female terminalia; B, dorsal; C, ventral; D, lateral. E-K, male terminalia; E, pygophor and harpagones, posterior; F, anal segment, dorsal; G, pygophor, from left side; H, periandrium, lateral; I, periandrium, dorsal; J, aedeagus, lateral; K, right clasper, external aspect. Labelling as in Fig. 1. A, X 18.8; B-K, X 47.

tubercles along 1A: anterior margin, 14-18; posterior margin, 18-21. Rs 2-branched in all tegmina seen. Cula separate from M3+4 apically, the two veins forking at or beyond i-m (except in one tegmen (male) out of 53 examined for this character, in which the veins are apically fused).

Male terminalia.—Pygophor much smaller than in *froggatti*, much shortened dorsally, but not deeply excavated posteriorly as in *froggatti*; postero-dorsal angle not produced; without a posterior setiferous lobe. Harpagones much smaller than in *froggatti* and with apical portion much more slender, curved, not angled or notched posteriorly, and without wart-like swellings; anterior hairs relatively few and inconspicuous; apex rounded; basal portion produced into conspicuous dorsal lobe. Aedeagus short, apex deflexed, with the apical ventral membranous lobe much larger than in *froggatti*, reaching more than half-way along aedeagus and apically deeper than it; without a pair of subapical dorso-lateral lobes. Periandrium with median dorsal lobe acuminate, longer and basally broader than lateral lobes, apically deflexed. Lateral lobes of periandrium dorso-ventrally flattened, though narrower than in *froggatti*, projecting far beyond lateral margins of median lobe; apices rounded; apical half broadened, spatulate, deflexed; from inner margin at about half-way, a long, needle-like process directed posteriorly and somewhat ventrad; outer margins without serrations, inner margins without spines. All lobes shorter than aedeagus. Anal segment apically broadened and rounded, not produced behind anal lobe into two acuminate processes. Anal lobe with apical process subspherical.

Female terminalia.—Seen from above, the two plates of the last divided (IX) abdominala tergum not strongly narrowed for apical third; form nearly ellipsoid; apical half of mesial margin nearly straight; seen from side, the posterior angle rounded. Last abdominala sternum wider anteriorly than posteriorly. Ventral valvifers much smaller than in *froggatti*. Ventral

valvulae subglobular, about as wide as long, with a tiny conical style at apex. Posterior angles of lateral lobes of anal segment produced, rounded.

Localities of specimens examined.—S.E. QUEENSLAND: Brisbane (1 male, 1 female, 25.x.1933; 1 female, 16.ii.1926; 7 males, 8 females, 19.iv.1926; all coll. H. Hacker (Q.M.)). Mt. Coot-tha, Brisbane (3 males, 3 females, i.1924, H. Hacker (Q.M.)). Gold Creek, near Brisbane (3 males, 5 females, 16.xii.1928, H. Hacker (Q.M.)).

Kirkaldy's original record was from Bundaberg.

This species differs from *froggatti* in its paler colour, the very distinct male terminalia (the basal lobe of the harpagones is readily visible without dissection), the differently shaped female terminalia, Cu1a and M3+4 of tegmen almost always separated apically (fused in all *froggatti* seen). Although there is occasional overlapping, most specimens of *pallida* can be distinguished from *froggatti* by the narrower head and the somewhat narrower mesonotum. The number of anal vein tubercles has a lower range in *pallida*, but the two species widely overlap in this respect.

Phaconeura smithi sp. n. (Fig. 3)

Length (to apex of tegmina): male, 2.4 mm.; females, 2.7 mm., 2.8 mm. Length of body: male, 1.80 mm.; females, 1.89 mm., 1.97 mm. Width of head across eyes: male, 0.48 mm.; females, 0.51 mm., 0.56 mm. Width of mesonotum across tegulae: male, 0.83 mm.; females, 0.96 mm., 1.03 mm.

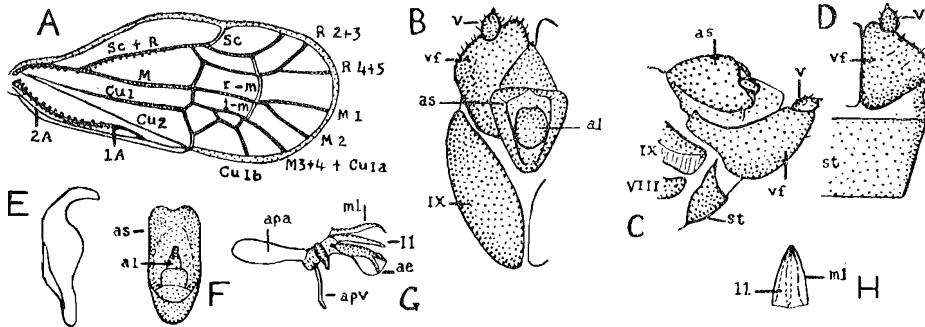


FIG. 3.—*Phaconeura smithi smithi* sp. et subsp. n. A, tegmen, female. B-D, female terminalia; B, dorsal, right half (anal lobe retracted); C, lateral; D, ventral, left half. E-H, male terminalia; E, right clasper, external aspect; F, anal segment, dorsal; G, perianthrium and aedeagus, lateral; H, perianthrium, dorsal. Labelling as in Fig. 1. A, X 18.8; B-H, X 47.

Tegmina.—Length (from base of 1A): male, 2.07 mm.; females, 2.33 mm. Ratio, length: greatest width, 2.30-2.33. Ratio, length tegmen: length clavus, 1.75. Number of tubercles along 1A; anterior margin, 14-15; posterior margin, 18. Rs 2-branched. Cu1a fused with M3+4.

Colour.—Similar to *pallida* (tegmina pale brown; head and mesonotum paler brown than in *froggatti*, not piceous).

Male terminalia.—Pygophor similar in general form to that of *pallida*, not strongly excavated posteriorly nor produced back. Harpagones of the *pallida* type, but slender apical portion more strongly curved, sub-basal dorsal lobe much less strongly produced. Aedeagus similar to that of *pallida*, but shorter. Lobes of perianthrium nearly as long as aedeagus; median dorsal lobe acuminate, apex downcurved, broader than and subequal in length to lateral lobes; lateral lobes narrow, acuminate, not laterally expanded, nearly apposed in mid-line, without mesial processes; completely covered above by dorsal lobe. Anal segment smaller than and not broadened toward apex as in *pallida*, sides nearly parallel. Anal lobe more elongate than in *pallida*, narrowed toward apex.

Female terminalia.—Resembles *pallida* in the shape of the last (IX) tergal plates (not greatly narrowed posteriorly, inner posterior margin nearly straight, posterior angles rounded in lateral aspect (though nearly a right angle), the short valvulae (though these are more nearly oval), but differs from *pallida* and resembles *froggatti* in the posterior angles of the anal segment not being produced and the last sternum being widest posteriorly.

Locality.—N. QUEENSLAND: E. Barron, Atherton Tableland (1 female, 16.ix.1930; 1 male, 1 female, 4.iii.1931; all ex *Paspalum*, J. H. Smith (D.A.)).

Types.—The holotype male (T 5548), allotype female (T 5547) have been deposited in the Queensland Museum; paratype female in Dept. of Agriculture and Stock, Brisbane.

This species is named after the collector of the type material, Mr. J. H. Smith, Queensland Department of Agriculture and Stock.

Ph. smithi resembles *pallida* and differs from *froggatti* in its pale coloration. The structure of the male terminalia also indicates a closer relationship to *pallida*, but there are several good differences from this species, the most striking being in the form of the periandrial lobes. *Smithi* is smaller than either *pallida* or *froggatti*, in total length, width of head and mesonotum, and length of tegmina. It also differs from the former in having Cula fused with M3+4 on the tegmen.

Phaenoneura smithi lamingtoni subsp. n. (Fig. 4)

Length (to apex of tegmina): male, 3.0 mm.; female, 3.3 mm. Length of body: male, 1.83 mm.; female, 1.87 mm. Width of head across eyes: male, female, 0.61 mm. Width of mesonotum across tegulae: male, 1.01 mm.; female, 1.03 mm.

Tegmina.—Length (from base of 1A): male, ca. 2.7 mm. (damaged); female, 2.9 mm. Ratio, length: greatest width: ca. 2.6. Ratio, length: length clavus: ca. 1.9. Venation as in type subspecies. Number of granules along 1A: anterior margin, 15-17; posterior margin, 19-20.

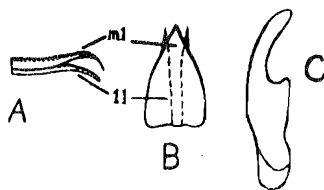


FIG. 4.—*Phaenoneura smithi lamingtoni* sp. et subsp. n. Male terminalia. A, periandrium, lateral; B, periandrium, dorsal; C, right clasper, external aspect. Labelling as in Fig. 1. All X 47.

Differs from the type subspecies in several features of the male terminalia: all lobes of periandrium longer and also relatively broader, median lobe less narrowly acuminate at apex; apical part of harpagones less curved, subbasal lobe smaller, more narrowly rounded and more nearly triangular. The aedeagus, pygophor and anal segment are similar, except that the last is a little more broadened apically. The female terminalia are very similar. The available specimens are larger than typical *smithi* but are insufficient to determine whether size is a diagnostic character.

Locality.—S.E. QUEENSLAND: Lamington National Park (1 male, 1 female, 25.x.1923, H. Hacker (Q.M.)).

Types.—Holotype male (T 5550) and allotype female (T 5549) in Queensland Museum.

Ph. smithi is evidently a relatively high altitude species and subspeciation has resulted apparently from the isolation of populations in two now separated high

areas. The north-south mountain system between them was no doubt previously higher and more continuous than at present. The known subspecies of *smithi* are thus apparently relict populations and other representatives of the species could well be searched for in high altitude areas such as the Eungella Range.

***Phaconeura hackeri* sp. n. (Fig. 5)**

Length (to apex of tegmina): males, 3.7-4.0 mm.; females, 4.4-4.5 mm. Length of body: males, 2.13-2.50 mm.; females, 2.40-2.60 mm. Width of head across eyes: males, 0.69-0.75 mm.; females, 0.77-0.79 mm. Width of mesonotum across tegulae: males, 1.09-1.17 mm.; females, 1.27-1.32 mm.

Tegmina.—Length (from base of 1A): males, 3.13-3.40 mm.; females, 3.73-3.90 mm. Ratio, length: greatest width, 2.66-2.88. Ratio, length tegmen: length clavus, 1.78-1.96. Number of tubercles along 1A: anterior margin, 17-20; posterior margin, 21-24. Rs 2-branched. Cula fused with M3+4.

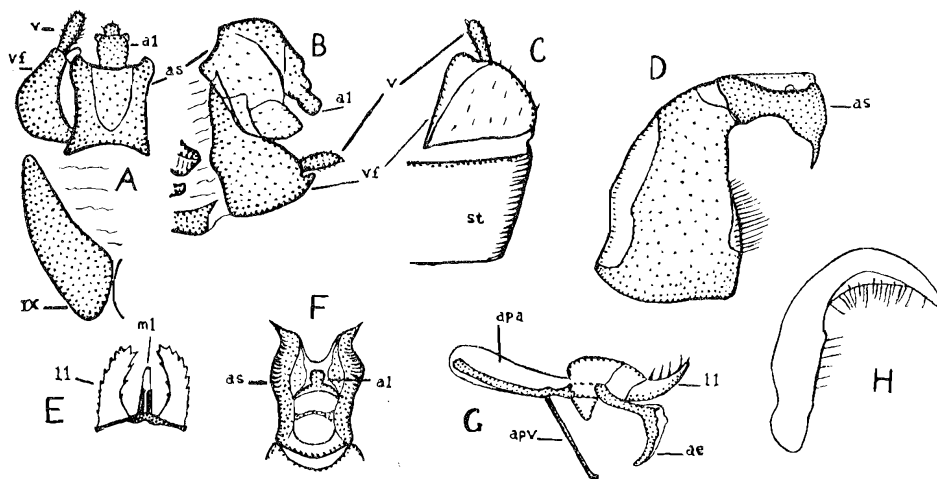


FIG. 5.—*Phaconeura hackeri* sp. n. A-C, female terminalia; A, dorsal, right half; B, lateral; C, ventral, left half. D-H, male terminalia; D, pygophor and anal segment, lateral; E, perianthrium, dorsal; F, anal segment, dorsal; G, perianthrium and aedeagus, lateral; H, right clasper, external aspect. Labelling as in Fig. 1. All X 47.

Colour.—Similar to *froggatti*; most of the tegminal cells fuscous brown; mesonotum, except carinae and margins, and abdomen, except for margins, piceous brown; head, rostrum and legs yellowish brown, frons rather darker brown.

Male terminalia.—Pygophor only shallowly excavated posteriorly and less narrowed dorsally than in *froggatti*. Posterior margin with a slight lobe below middle, bearing long setae. Harpagones of the *froggatti* type but with posterior margin evenly convex and smooth, not angled before apex and without wart-like swellings; in side view sub-basal part of anterior margin nearly straight; from behind, very similar to those of *froggatti*. Aedeagus longer than in *froggatti*, with a long, apically curved ventral projection, extending somewhat behind level of gonopore, and mostly sclerotized, but with posterior margin, continuous with rim of gonopore, membranous. Perianthrium of the *froggatti* type but lateral lobes with outer margins not concave near middle, much less expanded basally; spines of inner margin longer (seen best in lateral aspect). Anal segment divided and produced behind anal lobe as in *froggatti*, but the two processes, as seen from above, with sides more strongly convex and apices more narrowly acuminate and more strongly produced outward and downward.

Female terminalia.—Resembles *froggatti* in the valvulae being much longer than wide and the last sternum broadest posteriorly; differs in the two plates of the last divided tergum (IX) being much less narrowed posteriorly and with the posterior angle rounded in lateral aspect, and in the lateral angles of the anal segment being more produced.

Localities.—S.E. QUEENSLAND: Bunya Mtns. (2 males, 10.xii.1925, H. Hacker (Q.M.); 3 males, 2 females, i.1926, E. J. Dumigan (Q.M.)). Lamington National Park (1 female, 25.x.1923, H. Hacker (Q.M.)).

Types.—Holotype male (T 5557), allotype female (T 5553), paratype males and females (from Bunya Mtns.) (T 5551-2, T 5554-6) in Queensland Museum.

This species is named after Mr. H. Hacker, who has done so much for systematic entomology in Queensland, notably in the Hemiptera.

Ph. hackeri is most nearly related to the southern *froggatti*, resembling this species in colour, venation, and in the general configuration of the male and female terminalia, but differing from it in the specific terminalia characters noted above. The tegmina are usually relatively broader, but there is some overlap in this character.

Phaconeura brimblecombei sp. n. (Fig. 6)

Length (to apex of tegmina): males, 3.33 mm., 3.50 mm.; female, 3.50 mm. Length of body: males, 2.2 mm.; female, 2.7 mm. Width of head across eyes: males, 0.51 mm., 0.56 mm.; female, 0.67 mm. Width of mesonotum across tegulae: males, 1.03 mm., 1.09 mm.; female, 1.09 mm.

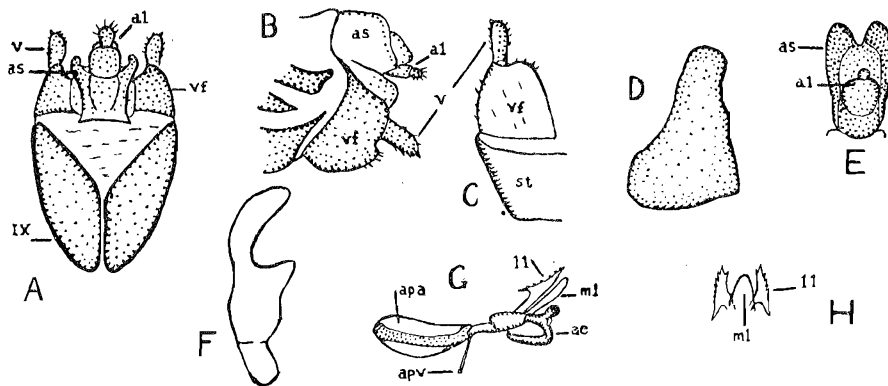


FIG. 6.—*Phaconeura brimblecombei* sp. n. A-C, female terminalia; A, dorsal; B, lateral; C, ventral, right half. D-H, male terminalia; D, pygophor, from left side; E, anal segment, dorsal; F, right clasper, external aspect; G, acedeagus and periandrium, lateral; H, periandrium, dorsal. Labelling as in Fig. 1. All X 47.

Tegmina.—Length (from base of 1A): males, 2.87 mm., 2.93 mm.; female, 3.13 mm. Ratio, length: greatest width, 2.41-2.69. Ratio, length tegmen: length clavus, 1.72-1.91. Number of tubercles along 1A: anterior margin, 15-16; posterior margin, 17-21. Cu1a fused with M3+4.

Colour.—Tegmina fuscous brown basally, lighter brown apically; a broad, continuous, unpigmented band along most of apical half of costa, including all of cell 2c and beyond but not including cell r2+3; other pale areas near centre, near middle of posterior margin, and on each side of 1A. Head, legs, most of tegminal veins, posterior margins of abdominal segments, yellowish brown.

Male terminalia.—Pygophor considerably shortened dorsally, scarcely produced; posterior margin shallowly, sinuately excavated. Harpagones of the *pallida* type but apical part broader

and anterior lobe more acute. Aedeagus with ventral sclerotized process long, extended anteriorly parallel to and beyond rest of aedeagus, with apex upcurved; a dorsal pair of prominent sclerotized processes, with rounded ends, just anterior to gonopore. Periandrium extending well beyond posterior level of aedeagus, directed obliquely upward, lateral lobes hastate, with outer posterior angles acuminate and considerably produced forward; apex acuminate; outer margins serrate; inner margin without spines but with a large subapical tooth. Dorsal lobe of periandrium relatively broad; apex rounded; rather shorter than lateral lobes. Anal segment of *pallida* type, but shorter, less expanded and more deeply emarginate posteriorly than in *pallida*.

Female terminalia.—Seen from above, the two plates of the last divided tergum (IX) of the *pallida* type, not strongly narrowed for apical third, posterior half of inner margin straight; seen from side, the posterior angle narrowly rounded. Last abdominal sternum wider posteriorly than anteriorly, as in *froggatti*. Ventral valvifers small, as in *pallida*. Ventral valvulae much longer than wide. Posterior angles of lateral lobes of anal segment produced further back than in *pallida*.

Locality.—S.E. QUEENSLAND: Beenleigh (2 males, 1 female, i.1934, A. R. Brimblecombe (D.A.)).

Types.—Holotype male (T 5546), allotype female (T 5545), deposited in Queensland Museum; paratype male in Dept. of Agriculture and Stock, Brisbane.

Named after its collector, Mr. A. R. Brimblecombe, Department of Agriculture and Stock, Brisbane.

This is an interesting species with apparent affinities to both *froggatti* and *pallida*. In the fusion of Cula with M3+4 and in its dark coloration it resembles *froggatti* and differs from *pallida*, but differs also from the former in the broad pale costal band of the tegmina. It resembles *pallida* in the shape of the ninth tergal plates and the produced angles of the anal segment of the female, and in the general form of the harpagones and of the anal segment of the male. On the other hand, it resembles *froggatti* in the long ventral valvulae and the posteriorly widened last sternum of the female and in the serrate outer margins of the lateral lobes of the periandrium. In several respects the terminalia show striking specific peculiarities, notably in the form of the aedeagus and the periandrial lobes, although in general features the periandrium is more or less intermediate between that of *froggatti* and *pallida*. It might be supposed that this combination of annectant and divergent characters is due to *brimblecombei* having retained some of the original features of the ancestral Australian *Phaconeura* in a more or less modified form.

All the Australian species of *Phaconeura* differ from *Ph. nitida* (Bierman, 1910) (Java) and *Ph. fletcheri* Kirkaldy, 1908 (Ceylon) in 2A being without granules and joining 1A toward the apex instead of near the middle. *Ph. pallida* and *Ph. laratica* Muir, 1913 (Larat, Tanimbar Is.) are the only species with Cula and M3+4 apically free.

Nisia Melichar, 1903

Nisia atrovenosa (Lethierry)

Meenoplus atrovenosus Lethierry, 1888, *Ann. Mus. Stor. nat. Genova* 26: 466.

Nisia atrovenosa (Lethierry) Melichar, 1903, *Homopteren-Fauna von Ceylon* 1903: 53.

This is an extremely widespread species (see Metcalf, 1945: 225-227). Moreover, as several authors have pointed out (*e.g.*, Muir (1927, 1930)), a number of different taxa have been confused under this name; most members of the *atrovenosa* complex cannot be separated except by a study of the male terminalia. The terminalia of the Queensland specimens differ from those figured by Muir (1927, figs. 1, 2) from South Africa, Singh-Pruthi (1925, pl. 30, fig. 261) (locality not stated), and Fennah (1950, fig. 16, a-c) (Fiji). They also differ from those of

specimens taken in Samoa. At least until more is known of the *atrovenosa* complex, it seems that these morphologically close but geographically separated forms are best treated as subspecies. In this the writer has followed the example of Fennah (1950: p. 47), in his description of the Fijian subspecies *levuana*.

***Nisia atrovenosa* (Lethierry) *australiensis* subsp. n. (Fig. 7)**

Length (to apex of tegmina): males, 3.5-4.4 mm.; females, 4.0-5.2 mm. Length of body: males, 1.9-2.4 mm.; females, 2.2-3.1 mm. Width of head across eyes: males, 0.60-0.67 mm.; females, 0.63-0.72 mm. Width of mesonotum across tegulae: males, 1.03-1.24 mm.; females, 1.01-1.44 mm.

Tegmina.—Length (from base of 1A): males, 3.2-3.7 mm.; females, 3.4-4.5 mm. Ratio, length: greatest width, 2.1-2.5. Ratio, length tegmen: length clavus, 1.8-2.1. Rs 2-branched. M1 and M2 usually fused, occasionally separate apically for a greater or less distance (in 5 tegmina of 56 examined). Cula and M3+4 apically separate. M3 and M4 usually fused (apically separate in 1 of 56 tegmina).

Male terminalia.—Anal segment with its two posterior processes shortly deflexed at apex, appearing acuminate in side view. Pygophor with dorso-lateral angles not produced. Harpagones outwardly curved, widely separated for most of length, converging only apically; antero-posteriorly flattened; posterior margin curved near base, thence only gradually curved cephalad; apex narrowly rounded, otherwise of nearly uniform width, except for a slight constriction at about half-way; base with an anterior bilobed process, each lobe flattened, wing-like, subtriangular; outer lobe flattened nearly at right angles to harpagones, its anterior angle nearly a right angle, its dorsal apex acuminate, directed mesad, its inner margin strongly concave; inner lobe flattened almost in same plane as harpagones, shorter and broader than outer lobe, its outer margin with two curved spines, one at about half-way, the other shorter and stouter, at apex; inner apical angle of inner lobe acuminate, produced cephalad as a spine. Lateral lobes of perianthium broad, flattened, oblique, apically strongly deflexed; dorsal surface strongly convex; apex acuminate; reaching slightly further back than apex of aedeagus, which is entirely concealed in lateral aspect by the lobes. Aedeagus reaching about as far back as anal segment; apex down-curved, appearing acuminate in side view.

Female terminalia.—Seen from above, the two separated plates of the last abdominal tergum (IX) broader than the plates of either of the two preceding terga. The last abdominal sternum broad and short, not or scarcely longer than wide. The ventral (first) valvifers no longer than broad at base, their valvulae small, wart-like; dorsal (second) valvulae obsolete.

Colour.—Tegminal cells varying from white to pale translucent brown (and sometimes with bluish reflections when fresh); veins from yellowish brown to fuscous brown. Head, thorax and legs from pale yellowish brown to more or less infuscated brown. The total macroscopic difference between paler and darker specimens is considerable.

Localities of specimens examined.—S.E. QUEENSLAND: Brisbane (1 female, 20.iv.1925, H. Hacker (Q.M.)); 1 female, 8.iii.1926, H. Hacker (Q.M.); 1 male, 1 female, 19.iv.1926, H. Hacker (Q.M.); Sunnybank, 1 female, 8.ii.1932, J. A. Weddell (D.A.); Kedron, 1 female, 4.v.1953, R. W. Downes (U.Q.); Lota (light trap, tea-tree scrub, E. J. Reye, 16.ii.1955 (R.A/21), 6 females, 22.ii.1955 (R.A/22), 1 female), 1 male, iv.1955, A. J. Cowan (U.Q.); 1 female, ix.1955, J. Thapa (U.Q.); 1 male, 21.iv.1956, T. H. Kirkpatrick (U.Q.); 1 male, 1 female, 24.iv.1956, J. H. D. Martin (U.Q.); 1 female, 24.iv.1956, H. J. Lavery (U.Q.). Eight Mile Plains (1 female, 14.iv.1954, F. R. From (U.Q.)). Redcliffe, 1 male, 3.iii.1939 (D.A.). Toowoomba (2 females, i.1955, ii.1955, N. J. Thomson (U.Q.)). N. Tamborine (1 female, at light, grassland near rain forest, 16.iii.1955, M. B. Wilson (Q.M.)). Gatton (1 female, iii.1931 (D.A.)). Fraser I. (1 female, iii.1938, A. R. Brimblecombe (D.A.)). Roma (2 females, 17.ii.1951, E. F. Henzell (U.Q.)). CENTRAL COASTAL QUEENSLAND: Carmila (1 female, 13.v.1927 (D.A.)). N. QUEENSLAND: Dunk I. (1 male, 21-23.v.1927, A. J. Turner (Q.M.)).

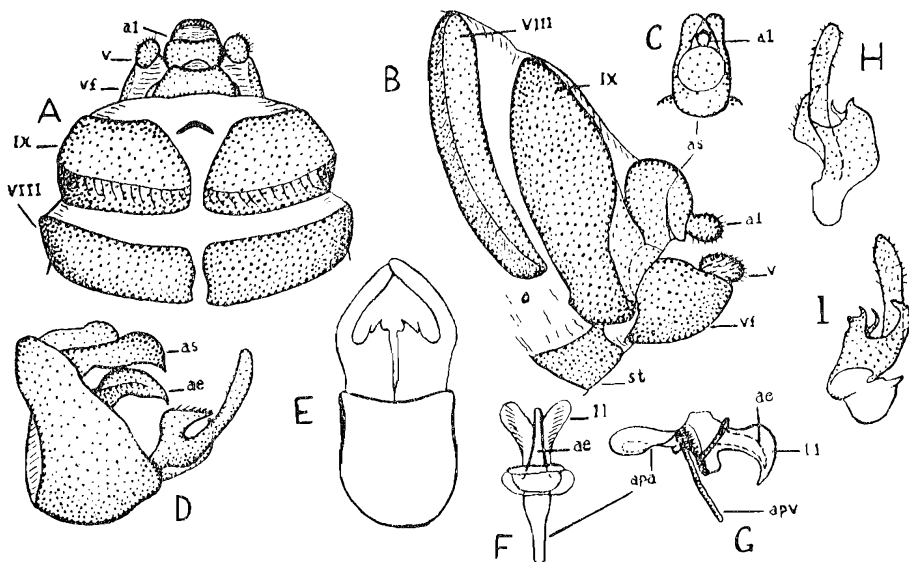


FIG. 7.—*Nisia atrovenosa* (Lethierry) *australiensis* subsp. n. A-B, female terminalia; A, dorsal; B, lateral. C-I, male terminalia; C, anal segment, dorsal; D, terminalia, lateral; E, pygophor and harpagones, posterior; F, aedeagus and lateral lobes of perianthium, dorsal; G, aedeagus and perianthium, lateral; H, left clasper, posterior and slightly lateral; I, left clasper, anterior. Labelling as in Fig. 1. All X 47.

Types.—Holotype male (T 5559), allotype female (T 5558), paratype male and female (T 5560-61), all from Brisbane, in Queensland Museum; paratype male in Dept. of Agriculture and Stock, Brisbane.

In the possession of basal processes on the harpagones, subspecies *australiensis* resembles *atrovenosa* from Kerevat (New Britain), Ceres (South Africa), and from W. Samoa. The New Britain specimens to hand differ only slightly in male terminalia from *australiensis* but the Samoan and South African forms display differences that warrant subspecific separation.

Members of the *atrovenosa* complex lacking these basal lobes are *N. dammermani* Muir (1930) from Sebesi (Malay Archipelago) and *N. atrovenosa levuana* Fennah (1950) from Fiji. The related species *grandiceps* Kirkaldy, discussed below, also has this simple type of harpagones, as does *N. langleyi* Muir (1921) (Samoa) and the specimen of *atrovenosa* figured by Singh-Pruthi (1925) (locality not stated).

As yet, the terminalia neither of the type specimen nor of topotypic material of *atrovenosa* have been studied. Moreover, the female terminalia of the species and subspecies of *Nisia* (except *australiensis* and *grandiceps*) remain to be described. However, it may be stated here that the female terminalia of the New Britain and Samoan material of *atrovenosa* are very similar to those of the subspecies *australiensis* and differ from *grandiceps* in all the features described above.

Nisia grandiceps Kirkaldy (Fig. 8)

Nisia grandiceps Kirkaldy, 1906, *Bull. Hawaii. Sugar Pl. Assoc., Div. Ent.* 1 (9): 427.

Length (to apex of tegmina): males, 4.7-5.2 mm.; females, 5.7-6.2 mm. Length of body: males, 2.5-2.8 mm.; females, 3.1-4.1 mm. Width of head across eyes: males, 0.76-0.85 mm.; females, 0.83-0.91 mm. Width of mesonotum across tegulae: males, 1.31-1.40 mm.; females, 1.45-1.70 mm.

Tegmina.—This species is much more variable in venation than *atrovenosa*. Rs usually 2-branched (3-branched in 12 of 39 tegmina examined). M1 and M2 usually fused (apically separate in 12 of 39 tegmina). Cula and M3+4 apically separate. M3 and M4 usually fused (apically separate in 11 of 39 tegmina). In each of these characters the one individual commonly differs from the two tegmina. Both sexes are variable.

Male terminalia.—Anal segment with its two posterior processes deflexed at apex, appearing subacuminate in side view. Pygophor with posterior margin nearly straight; dorso-lateral angles rounded, produced upward but not back. Harpagones apposed or nearly so throughout length, simple, curved near base, thence nearly straight; apex rounded, shortly deflexed cephalad; without basal lobes. Aedeagus rod-like, straight, with a deep dorsal membrane extending entire length; a sclerotized ventral lobe on basal half, a narrow ventral lobe on apical half.

Female terminalia.—Seen from above, the two separated plates of the last abdominal tergum (IX) narrower than the plates of either of the two preceding terga. The last sternum long and narrow, much longer than wide, very weakly sclerotized. The valvulae much longer than broad at base; the ventral (first) pair basally broad and ensheathing the dorsal, apically much narrowed and produced, subacuminate; the dorsal (second) pair slender, style-like.

Localities of specimens examined.—S.E. QUEENSLAND: Brisbane (2 males, 1 female, 3.iii.1914, H. Hacker (Q.M.)); 2 females, at light, 25.iv.1922, H. Hacker (Q.M.); 1 male, 4 females, 8.v.1922, H. Hacker (Q.M.); 6 males, 4 females, 8.iii.1926, H. Hacker (Q.M.); 1 female, 19.iv.1926, H. Hacker (Q.M.); Lota (2 females, light trap, tea-tree scrub, 16.ii.1955 (R.A/21), E. J. Reye). N. QUEENSLAND: Dunk I. (1 female, 21-23.v.1927, A. J. Turner (Q.M.)).

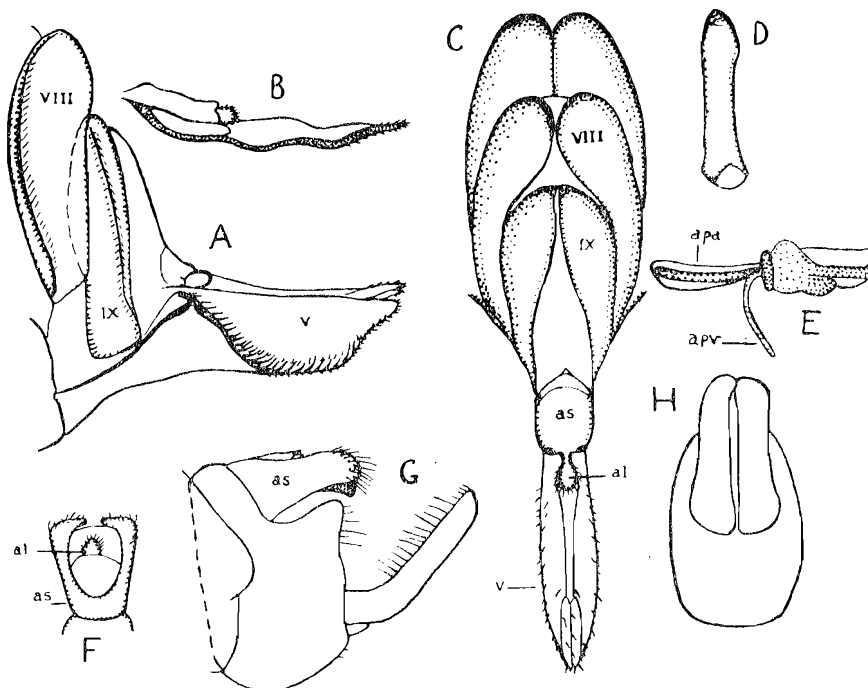


FIG. 8.—*Nisia grandiceps* Kirkaldy. A-C, female terminalia; A, lateral; B, left dorsal (second) valvula, removed with anal lobe, lateral; C, terminalia, dorsal. D-I, male terminalia; D, right clasper, anterior aspect; E, aedeagus, lateral; F, anal segment, dorsal; G, terminalia, lateral; H, pygophor and harpagones, posterior. Labelling as in Fig. 1. All X 47.

This species was originally described from Kuranda and Cairns (N. Queensland).

N. grandiceps must be considered a good species. It differs from *atrovenosa* in several major features of both male and female terminalia, as well as in size. Moreover, it is sympatric with *atrovenosa*, without intergradation, over a wide area of Queensland. The two species have been caught together in the same series of sweepings and in the same light trap catch.

The females are very readily distinguished from *atrovenosa* without dissection; the long valvulae are most conspicuous. The possession of two pairs of elongate valvulae is apparently exceptional in the Meenoplidae. The males can also be identified without dissection by their harpagones (as seen from behind) being apposed throughout their length, whereas in *atrovenosa* they are outwardly curved and widely separated for the greater part of their length, converging only apically (figs. 7E, 8H). These are the most certain characters for separation, but in addition as noted by Kirkaldy (1906, above), *grandiceps* is larger and has the lateral carinae of the vertex higher. The latter character, though difficult to express numerically, is a fairly reliable one after experience with a series of specimens of both species. *N. atrovenosa* is commonly paler than *grandiceps*, and the more lightly coloured specimens of the former can be reliably spotted, but the darker specimens are more difficult to separate on colour. However, as noted by Kirkaldy, *froggatti* has a pale, yellowish brown median line on head and dorsum of thorax, lacking in *atrovenosa*.

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