

Hemielisum evansi, a new genus and species of Breddiniolini (Hemiptera: Fulgoromorpha), being the first Australian record of the tribe, with a discussion of the taxonomic position of the Breddiniolini

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Abstract The first Australian record of the planthopper tribe Breddiniolini is established with the description of *Hemielisum evansi* gen. et sp. n. Examination of the male genitalia shows that the Breddiniolini belongs in the subfamily Cedusinae of the family Derbidae and the tribe is therefore transferred from the Achilidae.

Key words Achilidae, Derbidae, planthopper.

INTRODUCTION

The planthopper families Achilidae and Derbidae are distributed through all zoogeographical regions of the World, although they are particularly numerous in the humid tropics. Achilids are recorded up to the forest boundary in the north but the Derbidae is rather more subtropical and temperate. Both families are well represented in Australia and are characterised by mycophagy during nymphal development (particularly of fungi in rotting wood) while imagoes are phytophagous. Some species are known as minor pests of agricultural crops

The tribe Breddiniolini was established by Fennah (1950) for the African genus *Breddiniola* Muir and a newly described Fijian genus *Breddiniolella* Fennah. Members of this tribe are characterised by having the lateral marginal carinae of the pronotum enlarged and rounded to form a circular pit behind the eyes. With only female specimens available to him, Fennah placed the tribe in the family Achilidae on the basis of wing vein morphology alone. During a visit to Australia by AFE in 1997, material of a new Australian genus, providing a link between these two genera, was discovered. This new genus is described here as *Hemielisum* gen. n. The material includes a male specimen, allowing examination of the male genitalia of a member of the Breddiniolini for the first time and allowing reconsideration of the familial placement of the tribe.

MATERIALS AND METHODS

The following abbreviations are used: ANIC, Australian National Insect Collection, Canberra, Australia; ASCU, Agri-

cultural Scientific Collections Unit, Orange Agricultural Institute, Orange, Australia.

TAXONOMY

Hemielisum gen. n.

Type species. *Hemielisum evansi*, sp. n., here designated.

Description. Habitus. Similar to that of *Breddiniola* Muir, body a little dorsoventrally depressed, forewings in repose shallowly rounded over dorsum. Head and pronotum less specialised than in *Breddiniola* (lateral part of pronotum not intruding into hind margin of head and posteroventral part of eye not separated from the main part). **Head.** Head (with eyes) distinctly narrower than pronotum. Vertex nearly square with obtuse-angular concave hind margin, a little broader than transverse diameter of eye. Vertex surface concave without median keel. Frons in profile arcuate, obtuse-angulately meeting with vertex. Upper part of frons (between eyes) nearly parallel-sided, lower part of frons dilated with arcuate convex lateral margins converging to clypeus. Lateral carinae anteriorly foliate, median carina well developed. Junction between frons and clypeus obscure. Clypeus deeply intruding into frons. Postclypeus in midline of about equal length with frons. Postclypeus without medial carina, lateral carinae well developed, converging distally. Anteclypeus tectiform. Lateral carinae of postclypeus reaching anteclypeus and meeting together in its basal third. Lorae inclined and visible behind postclypeus in anterior view. Rostrum extending to hind trochanters (scarcely surpassing hind coxae). Eyes with deep concavity above antennae and similar concavity before lateral margin of pronotum, a narrow long prominence with ommatidia lying between these concavities. Hind margin of head behind eyes nearly straight. Lateral ocelli adjoining eyes. Antennae short, with short annulate first segment and subglobose second seg-

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ment. **Thorax.** Pronotum medially short, longer laterally, margins (upper border of lateral pit) arcuately elevated. Posterior lateral excision of pronotum, characteristic of the tribe, small and shallow. Lateral carinae extending from hind margin of pronotum and meeting together nearly at front of pronotum to delineate a triangle area. Lateral pit occupying more than half length of lateral margin of pronotum, with obscure lateral and collateral carinae visible anterior to pit. Lower margin of paranotal lobes smoothly rounded. Mesonotum diamond shaped, nearly square, lateral carinae distinct, subparallel, slightly bent laterad, median carina weak. Body between bases of fore wings with tegulae much wider than pronotum. Fore wings comparatively narrow, membranes occupying scarcely less than half wing length. Precostal area narrow. ScR and M arising from basal cell with short common stalk, but first bifurcation ScRA and RP + M. RA forking in last quarter before nodus, its hind branch bifurcate. RP emerging from M diverging from arculus in length of basal cell. RA 2-branched, M 4-branched, nearly symmetrically dichotomous, with hind fork a little longer than fore fork. CuA forked approximately at level with fork of claval veins, which unite in last quarter of clavus. Subapical transverse veinlets in wing membrane arranged scalelike, the first ima veinlet is distal. Hind wings generally similar to those of *Breddiniola*. Legs with hind tibiae bearing 3 lateral spines and 7 apical spines. Genicular spine absent. External apical spine much longer than others, which are arranged in oblique row, with 2 external spines situated a little apart from medial 4 spines. First hind tarsomere with 9 denticles (7 inner ones), with subapical seta. Second hind tarsomere with 13 denticles (11 inner ones), with subapical seta. Abdominal tergite VI bearing on each side 1 crater-like wax-pore of derbid type. Sternite VIII completely fused with pygofer and indistinct. Sternite VII large, fused with pleurites, while in VI and preceding segments pleurites are free, Sternite VII bearing large knob on each side. **Genitalia.** Female with oval sclerotized transverse scale-like subgenital plate, attached to body by its anterior margin. Male genitalia of derbid type with tergal and sternal parts of pygofer secondarily separated, anal tube fused with tergal part. Pygofer divided into small tergal and large sternal parts, lateral walls of sternal pygofer part short, ventral wall of pygofer long with lobe-like fore margin protruding forward and with large apically truncate posteroventral lobe. Styles lying lateral to, and shorter than, posteroventral lobe. Anal tube large, spoon-like, with base laterally fused with tergal part of pygofer, medially divided by membranous split. Penis long and acute-angulately bent, with basal part directed anteroventrad in repose, distal part caudad. Phallobase suspended from pair of triangular apophyses on posterodorsal corner of sternal part of pygofer. Endoconnective (Fennah 1945) incomplete, with basal funnel-shaped part fused with aedeagus and short adjoining part of vertical strut bridge-like, fused with ventral border of phallobase, remaining part of strut and crosspiece between styles absent. Distal part of penis divided apically into asymmetrical lobes and processes, one long unpaired process diverging from ventral wall of base of distal part. Left apical lobe ampliate and laterally compressed, with hook-like tip, right lobe divided into two

processes, the lateral one thicker and longer than dorsal one. Styles strongly connected to hind border of pygofer, with long basal apodemes and small external parts. Tips of styles hook-like, bent mediad, bearing lateral hook and dorsal irregular knob on basal section.

Notes. *Hemielissum* differs from *Breddiniola* as follows: angulate junction in profile of the coryphe and metope; complete absence of a medial carina on the postclypeus; absence of an incision in the hind head margin opposite to the fore end of the lateral ridge of the pronotum; eyes not divided into two independent parts but with tongue-like projections only; weakly developed lateral excavations of the hind margin of the pronotum; rounded paranotal lobes of the pronotum; and fore wing venation in which RP forms a distinct common stem with M, the apical transverse veinlets of the membrane are ordered in a scale-like row but not in a straight line and Sc + R is split into two branches nearer to the nodus than to the basal cell. *Hemielissum* differs from *Breddiniolella* as follows: presence of a medial carina on the metope; and lateral carinae of the clypeus converging distally at 30° not at 60°.

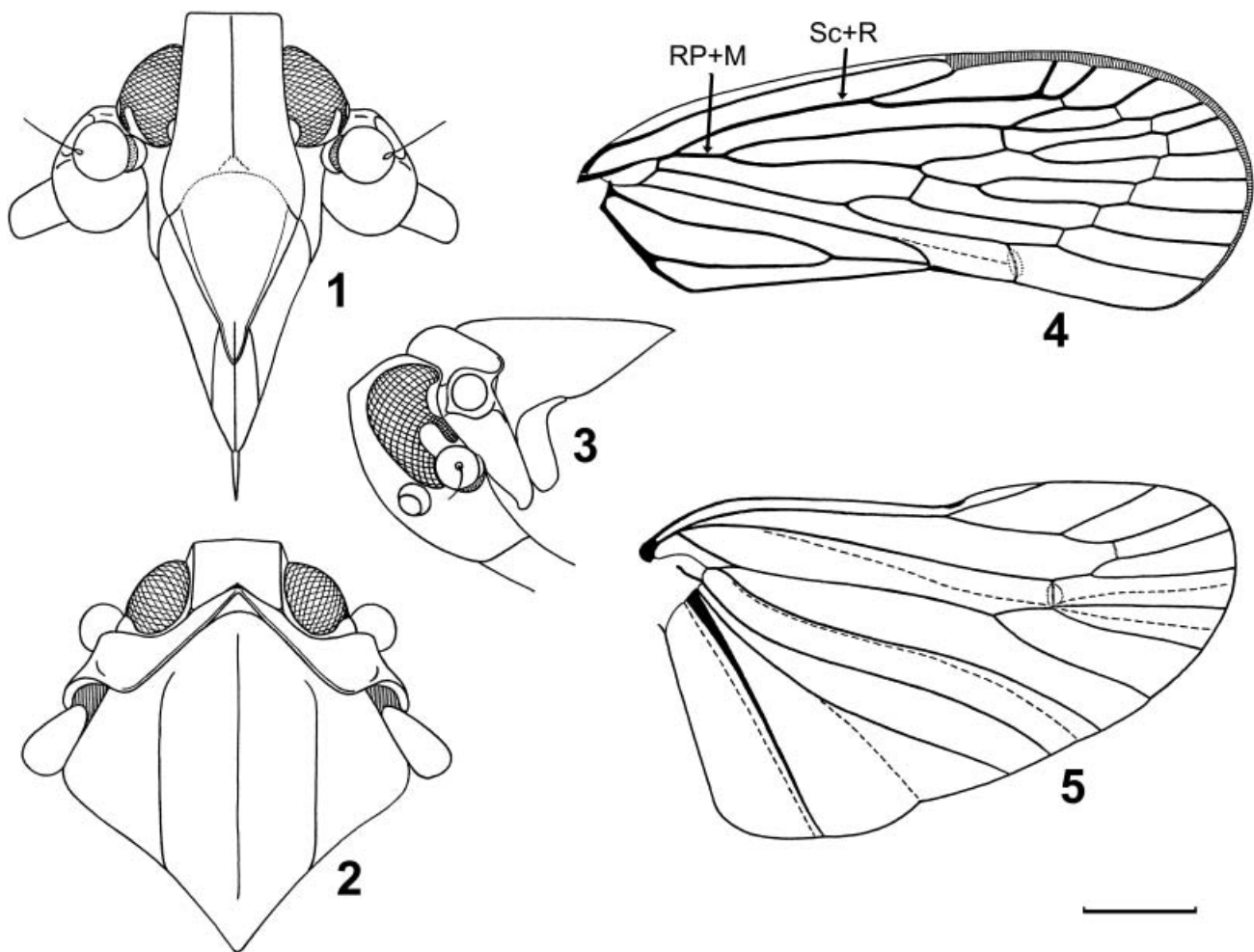
Hemielissum evansi sp. n. (Figs 1–14)

Types. *Northern Territory.* Holotype male, Maningrida, 4.i.1976, J. Grigg (ASCU). Paratype: 1 female, 12°51'S, 132°47'E, 10 km E by N of Mt Cahill, 22.v.1973, Upton & McInnes (ANIC).

Description. Black with carinae and some other details reddish light brown. Integument with irregular white wax powdering. Head black with light brown lateral keels of metope, marginal keels of coryphe, lateral parts between lorae and coryphe (genae, preocular and supraocular areas), lateral keels of postclypeus and medial keel of anteclypeus lightened. Antennae dark brown. Rostrum light brown with darkened tip. Holotype also with black median keel of metope and darkening under antennae. Margins and carinae on pronotum light brown. Mesonotum, including carinae, entirely black. Tegulae widely lightened posteriorly. Tegmina black brown to black, cells in membrane lightened marginally to brownish grey, veins dark; precostal area light brown gradually widening in distal third to occupy the fore part of adjacent costal area and entire pterostigmal cell. Thorax ventrally black except metathorax, fore coxae, tibiae and tarsi dark brown, middle coxae black, femora brown, tibiae and tarsi light brown. Hind femora brown, tibiae and tarsi light brown. Abdomen brownish black with lateral and hind margins of sclerites light brown. Length of male with wings 7.1 mm, to apex of abdomen 4.7 mm. Length of female with wings 7.5 mm, to apex of abdomen 4.9 mm.

DISCUSSION

Monophyly of the tribe Breddiniolini is confirmed by at least two reliable synapomorphies: cup-like depressions on the sides of the pronotum and configuration of the margin of the eyes that has two deep concavities with a narrow or isolated part of the eye extending between them (from this study).



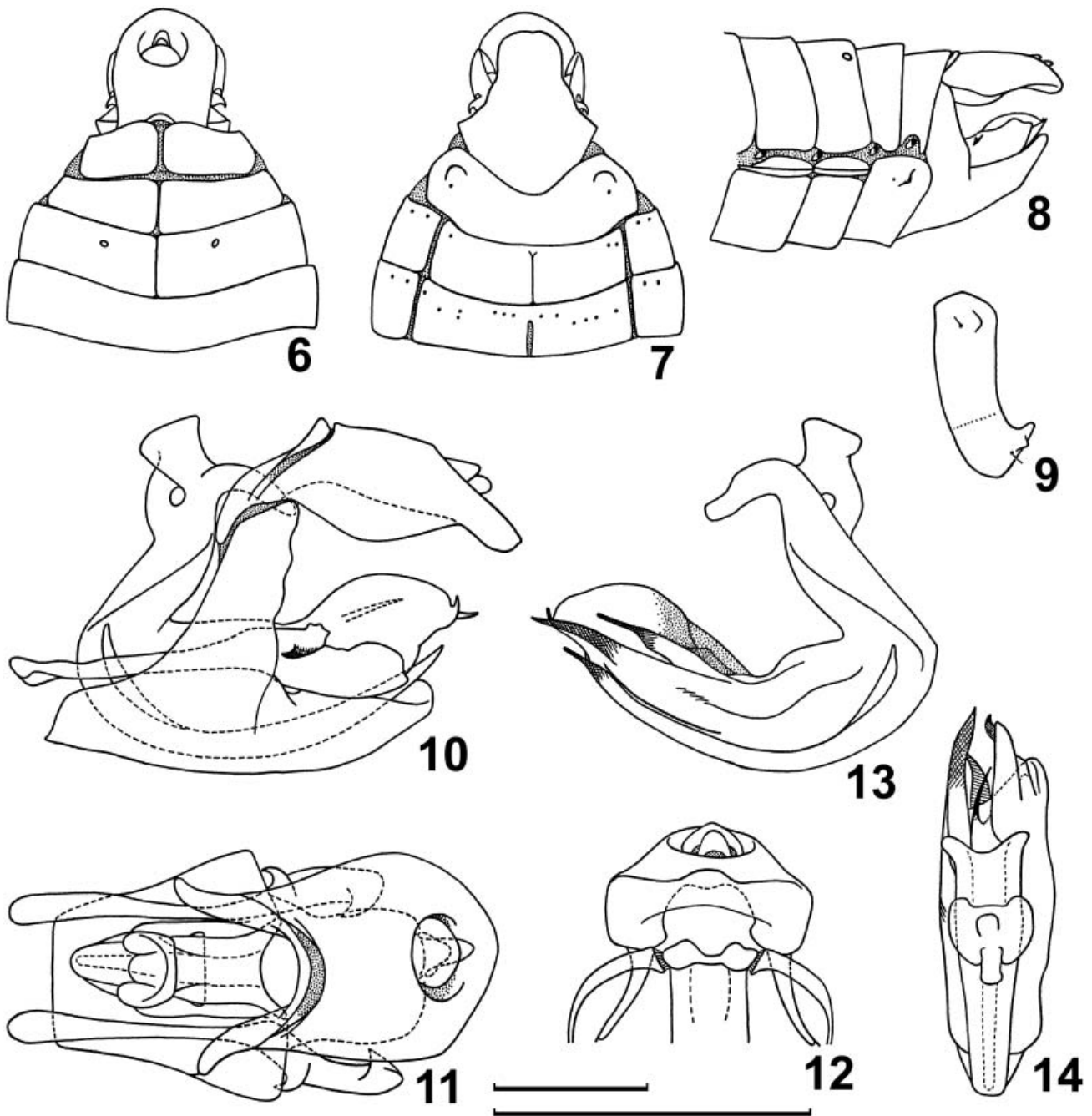
Figs 1–5. *Hemiellissum evansi* sp. n. (1–3) fore part of body: (1) facial view; (2) dorsal view; (3) left-side view; (4–5) wings: (4) fore wing (tegmen); (5) hind wing.

All previous authors have referred members of the tribe Breddiniolini to the family Achilidae (Haglund 1899; Muir 1934; Fennah 1950; Emeljanov 1991; Emeljanov 1992). However, this was based entirely on females since no male has ever been described. Our investigation of the first male specimen of Breddiniolini shows, however, that this tribe belongs to the family Derbidae. As shown by Muir (1930), the male pygofer of Derbidae is divided into tergal and sternal parts, the anal tube is fused with the tergal parts of pygofer and the sclerotized strut between the penis and the styles is absent or reduced. All of these unique character states for Derbidae are present in the male holotype of *Hemiellissum evansi* (see Figs 10,11). Another and independent attribute of Derbidae is the presence of crater-like wax pores on the male abdomen. One or two pairs of these pores are present in nymphs and imago on one or both of tergites VI–VII. Crater-like abdominal wax pores were described first in numerous nymphs of Derbidae by Yang & Yeh (1994) and were observed later in adults (Emeljanov 1995a). One pair of these pores is present also on tergite VI in *Hemiellissum*. The attributes shared between the Breddiniolini and the Derbidae provide justifica-

tion for transfer of the Breddiniolini from the Achilidae to the Derbidae.

More primitive members of the Derbidae (such as *Ipsnola* Signoret, *Goneokarella* Fennah, *Phrygia* Stål, *Vinata* Distant) are similar to Achilidae in many respects, particularly in the forewing venational pattern. These genera have an achiloid clavus and some also have an achiloid configuration of the hind part of the membrane, as exemplified by *Goneokarella*, *Cedochrea* Emeljanov and *Eocenchrea* Muir. On the other hand, the more or less symmetrical, four-branched M of the Breddiniolini occurs in *Melusa dardanus* Fennah (= *Eocenchrea dardanus*) but otherwise is uncommon in the Achilidae. Branching of the radial area in the Breddiniolini is similar to the less advanced part of the Derbidae. Basal branching of R and the Rp + M common stem in the forewing is known also only in the Derbidae (*Mysidioides* Matsumura, *Heronax* Kirkaldy and related genera).

Emeljanov (1995b) provided a key to the subfamilies of the Derbidae. The Breddiniolini clearly belongs in the subfamily Cedusinae, based on the lack of sensory pits on the head and forewings (these being present at least on the fore-



Figs 6–14. *Hemiellissum evansi* sp. n., male abdomen and genitalia. (6–8) hind part of abdomen: (6) dorsal view; (7) ventral view; (8) left side view; (9) VII sternite of abdomen, oblique lateroventral view; (10) genitalia, left side view; (11–12) upper part of pygofer and anal tube: (11) dorsal view; (12) ventrocaudal view; (13–14) penis: (13) right-side view; (14) dorsal view.

ings in the subfamily Derbinae) together with the branches of CuA in the forewing not anastomosing and a lack of a stridulatory plate on the jugal margin of the hindwing (features of the subfamily Otiocerinae). We assume that these attributes are the result of the retention of non-derived character states, rather than homoplasy, and that the subfamily Cedusinae may therefore be paraphyletic *sensu* Hennig. However, the paucity of material of the Cedusinae, particularly of the Breddiniolini, has precluded any analysis of these relationships at this stage.

The current distribution of the Breddiniolini in tropical Africa, Australia and Fiji suggests a remnant Indian Ocean tropical distribution despite the absence of records from the Indian subcontinent. As records of the tribe are indeed sparse, other explanations for the origins of the tribe may be just as valid. The absence of records from north-eastern Asia and South America may well be due to insufficient collecting from those regions. The most derived genus of the tribe is the African *Breddiniola*, implying that the tribe may have arrived in Africa from Asia.

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