A new cavernicolous planthopper of the family Meenoplidae from New Caledonia (Hemiptera: Fulgoroidea)

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Abstract - A new troglobitic meenoplid species, *Eponisia hypogaea* sp. nov., is described from a limestone cave in New Caledonia, representing the first known cave-dwelling meenoplid species from the island. Notes on its ecology and generic placement are given.

INTRODUCTION

The Meenoplidae is one of the smaller families of planthoppers (Fulgoroidea) with only about 120 species. Epigean Meenoplidae are widely distributed in the Palaearctic, the Palaeotropics, Australia, and the western Pacific. The first cavernicolous meenoplid species, *Phaconeura piu to*, was described by Fennah (1973) from a cave in Nambung National Park, Western Australia. Subsequently, nine more cavernicolous Meenoplidae have been described from the Canary Islands (Remane and Hoch 1988; Hoch and Asche 1993), Western Samoa (Hoch and Asche 1988), Australia: Queensland (Hoch 1990) and Western Australia (Hoch 1993). Yet another cavernicolous meenoplid species is described here from Grottes d’Adio in New Caledonia and assigned to the genus *Eponisia* Matsumura. A synopsis of the world’s cavernicolous Meenoplidae is given in Table 1.

The epigean meenoplid fauna of New Caledonia was studied by Fennah (1969) who found 8 species in 3 genera (*Eponisia*, *Nisia* Melichar and *Suva* Kirkaldy). Bourgoin (pers. comm.) is currently reviewing the epigean Meenoplidae of New Caledonia, and will assess the generic placement of the new cavernicolous species in due course. The new species described here represents the second cavernicolous planthopper species from New Caledonia; the first was the troglobitic *Notuchus larvalis* Fennah (Delphacidae), described from Taphozous Cave, Hienghène (Fennah 1980).

The specimens are lodged in the Muséum National d’Histoire Naturelle, Paris (MNHN) and the Queensland Museum, Brisbane (QM).

SYSTEMATICS

Family Meenoplidae

Genus *Eponisia* Matsumura

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*Eponisia hypogaea* sp. nov.

Material Examined

Holotype  

Paratypes  
New Caledonia: 1 ♂, 1 ♀, same data as holotype (QM).

Diagnosis  
Cavernicolous. Small species with compound eyes, bodily pigmentation and tegmina reduced. Differing from other New Caledonian meenoplid species by these troglomorphic characters and by the male genital structures.

Description  
Body length (equals distance between apex of head and tip of abdomen; measurements taken from specimens preserved in ethanol). Male: 3.2 – 3.8 mm (n=2). Female: 3.9 mm (n=1).

Body and legs pale yellow; tegmina shallowly tectiform, translucent, pale yellow, venation yellowish with areas of sensory pits white.

Head (Figures 1–3): vertex 1.6 times wider at base than long medially, continually rounded onto frons; posterolateral areolets small, triangular. Compound eyes and ocelli absent. Lateral margins of vertex and frons strongly ridged, directed anterolaterad, each bearing a row of oval sensory pits which ends at level of frontoclypeal suture. Vertex, frons and clypeus smooth, without median carina. Frons in frontal aspect with lateral margins slightly convex (maximum width of frons slightly below level of antennae), frons ca. 1.4 times longer medially than maximally wide, and ca. 1.6 times...
Figures 1–8 Eponisia hypogaea sp. nov.: 1–3, holotype  ♂ ; 4–8, paratype  ♂ ; 1, head and thorax, dorsal aspect; 2, head, ventral aspect; 3, same, lateral aspect; 4, tegmen; 5, wing; 6–8, male genitalia: 6, pygofer, urite X, aedeagus, and gonostyles in situ, left lateral aspect; 7, urite X, dorsal aspect; 8, right gonostyle, ventral aspect. Scale line: 0.5 mm (Figures 1–5), 0.1 mm (Figures 6–8).

longer than post- and anteclypeus together. Lateral carinae of frons continuing onto postclypeus; frontoclypeal suture almost straight. First antennal segment short, second antennal segment cylindrical, length ca. 1.4x width; indistinctly beset with sense organs.

Thorax (Figures 1, 4–5): pronotum smooth, with median carina obsolete. Pronotum medially about
New cavernicolous meenoplid

0.6 times the length of vertex, and ca. 3 times as wide as vertex at base; posterior margin shallowly excavated. Mesonotum nearly planate, median carina absent, lateral carinae very faint. Tegmina wide as vertex at base; posterior margin shallowly apical cells; venation distad of nodal line width slightly proximad of clavus); in repose reduced in length, 2.4 times longer than maximum slightly reduced (anal field). Posttibia as in other Kermesiinae. Hind wings individually variable; arrangements of sensory pits on tegmen as in other Kermesiinae. Hind wings ventrally ca. 5 times longer than second and third posttarsal segments with five, second posttarsal segment with five apical cells; venation distad of nodal line individually variable; arrangements of sensory pits on tegmen as in other Kermesiinae. Hind wings slightly reduced (anal field). Posttibia as in other Meenoplidae laterally devoid of spines, distally with six spines in a row. Postbasitarsus distally with five, second posttarsal segment with five spines in a single row. Postbasitarsus slightly longer than second and third posttarsal segments together. Pretarsal claws present, arolia well developed.

Male genitalia (Figures 6–8): pygofer in lateral aspect (Figure 6) ventrally ca. 5 times longer than dorsally, in caudal aspect figure-eight-shaped. Urite X (Figures 6, 7) in dorsal aspect longish ovate, distal portion mediadly deeply incised. Gonostyles (Figures 6, 8) moderately long, slender, subapically and mediadly with stout processes creating a claw-like impression. Aedeagus (Figure 6) in basal half ventrally with an unpaired, darkly pigmented, compressed, beak-shaped process (a) directed ventrad, dorsally with a rounded cap-like structure (b), triangular in dorsal aspect, extending lateral to margins of genital segment. Apical half of aedeagus consisting of a compressed, spatulate process (c) which is supported on each side by an integrated spine-shaped sclerite (d) (terminology of male genitalia sensu Bourgojn and Huang 1990)

Female genitalia strongly reduced as in other Meenoplidae. Ventral valvifer distally angulate, ventral valvula globular, without any processes (terminology of female genitalia sensu Woodward 1957).

**Table 1** Synopsis of cavernicolous Meenoplidae.

<table>
<thead>
<tr>
<th>Region</th>
<th>Genus</th>
<th>Species</th>
<th>Year</th>
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<tbody>
<tr>
<td>Canary Islands</td>
<td><em>Meenoplus canavus</em></td>
<td>Remane and Hoch, 1988</td>
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<td></td>
<td><em>Meenoplus charon</em></td>
<td>Hoch and Asche, 1993</td>
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<tr>
<td>Western Samoa</td>
<td><em>Suca olomoa</em></td>
<td>Hoch and Asche, 1988</td>
<td></td>
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<tr>
<td>Western Australia</td>
<td><em>Phaconeura pluto</em></td>
<td>Fennah, 1973</td>
<td></td>
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<td></td>
<td><em>Phaconeura prosperina</em></td>
<td>Hoch, 1993</td>
<td></td>
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<tr>
<td>Queensland</td>
<td><em>Phaconeura minyamea</em></td>
<td>Hoch, 1990</td>
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<td></td>
<td><em>Phaconeura mopamea</em></td>
<td>Hoch, 1990</td>
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<td></td>
<td><em>Phaconeura crescota</em></td>
<td>Hoch, 1990</td>
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<td></td>
<td><em>Phaconeura capricornia</em></td>
<td>Hoch, 1990</td>
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<tr>
<td>New Caledonia</td>
<td><em>Eponisia hypogaea</em></td>
<td>sp. nov.</td>
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</table>

**Distribution and Ecology**

*Eponisia hypogaea* is known only from the Grottes d’Adio, New Caledonia. All specimens were collected "on tree roots well into the dark zone of the cave" (M.S. Harvey, pers. comm.). This observation and the well-developed troglomorphies (reduction of compound eyes, ocelli, bodily pigmentation, and, even if to a lesser extent, the tegmina) support the assumption that *E. hypogaea* is restricted to the deep cave zone (sensu Howarth 1981) and is therefore ecologically classified as troglobitic (obligate cavernicolous), although "they were able to hop or fly with remarkable speed and were difficult to catch" (M.S. Harvey, pers. comm.).

**Remarks**

Using Fennah’s key (Fennah 1969), the new cavernicolous meenoplid species would run to the genus *Eponisia* Matsumura which is based on the type species *E. guttula* Matsumura from Taiwan. However, according to Bourgojn (pers. comm.), *Eponisia sensu* Fennah (1969) is polyphyletic, thus the cavernicolous meenoplid species cannot be placed into *Eponisia sensu strictu*, but should be placed in a separate genus, to be named by Dr Bourgojn in due course. In the configuration of the male genitalia, the cavernicolous meenoplid species resembles the epigean *E. matuta* Fennah from New Caledonia which is probably a close relative. On mere morphological evidence, however, it cannot be decided yet, whether or not *E. matuta* is even ancestral to *E. hypogaea*. Similar cases, i.e., the parapatric existence of apparently closely related epigean and troglobitic species on the same island, as observed for example in Hawaii (Howarth 1980, 1981) have been fundamental to the development of a model to explain the evolution of terrestrial troglobites by adaptive shifts to novel habitats (adaptive shift model: Howarth 1980, 1986) rather than by adaptive events subsequent to the extinction of surface populations in the course of climatic changes (relict hypothesis: e.g. Barr 1968).

**Etymology**

The species name is derived from its subterranean habitat.

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REFERENCES

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