

## 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. Epigeal Meenoplidae are widely distributed in the Palaearctic, the Palaeotropics, Australia, and the western Pacific. The first cavernicolous meenoplid species, *Phaconeura pluto*, 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 epigeal meenoplid fauna of New Caledonia was studied by Fennah (1969) who found 8 species in 3 genera (*Eponisia*, *Nisia* Melichar and *Suva* Kirkaldy). Bourgoïn (pers. comm.) is currently reviewing the epigeal 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

#### *Eponisia hypogaea* sp. nov.

Figures 1-8

#### Material Examined

##### *Holotype*

♂, Grottes d'Adio, New Caledonia, 21°15'S 165°15'E, dark zone, 21 February 1993, M.S. Harvey, N.I. Platnick, R.J. Raven (MNHN).

##### *Paratypes*

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

#### Diagnosis

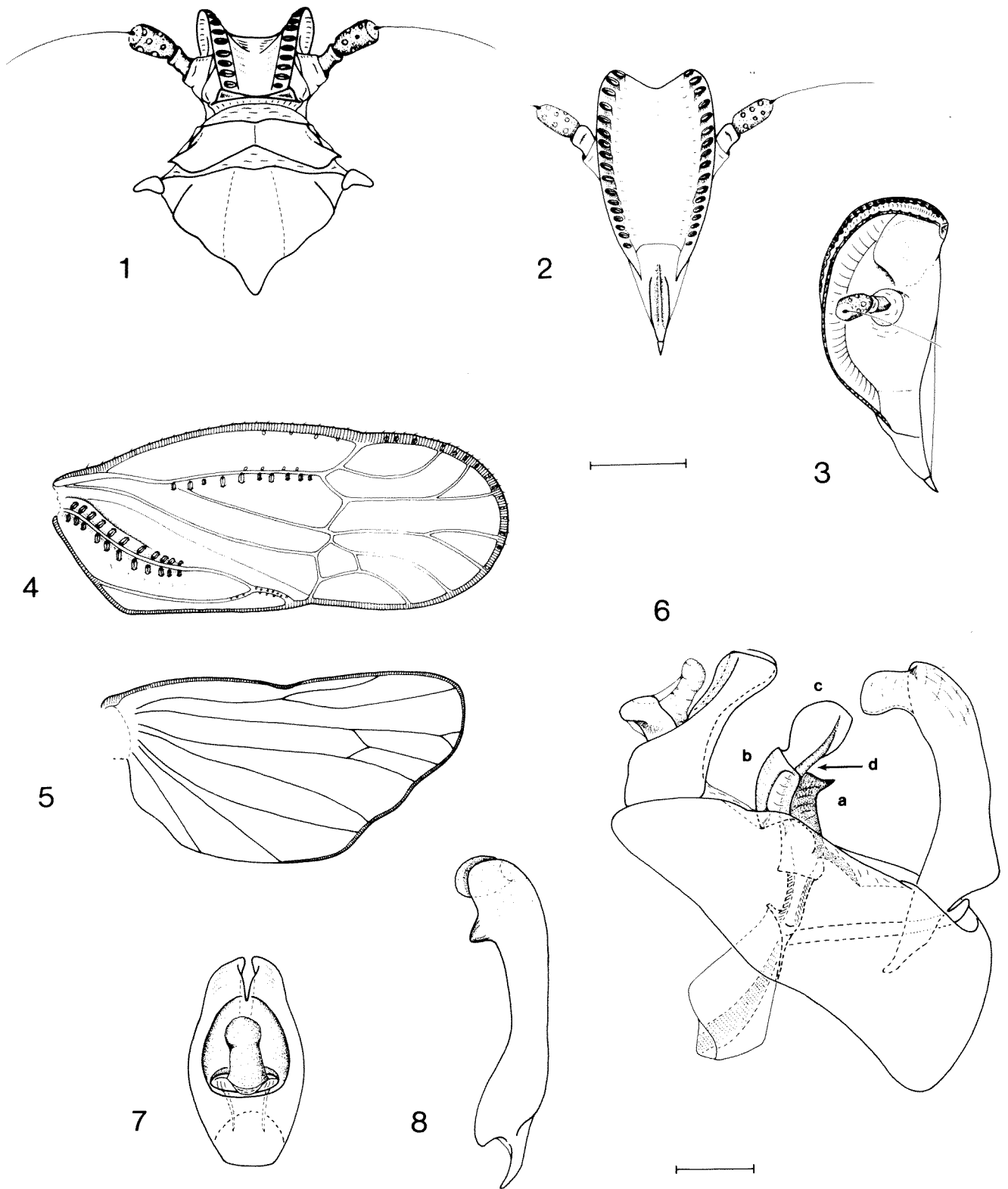
Cavernicolous. Small species with compound eyes, bodily pigmentation and tegmina reduced. Differing from other New Caledonian meenoplid species by these troglomorphic characters and by the male genital structures.

#### 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

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 reduced in length, 2.4 times longer than maximum width (= slightly proximad of clavus); in repose reaching anterior margin of genital segment; 8–9 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 medially deeply incised. Gonostyles (Figures 6, 8) moderately long, slender, subapically and medially 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 laterad 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* Bourgoin 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).

### 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 Bourgoin (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 Bourgoin in due course. In the configuration of the male genitalia, the cavernicolous meenoplid species resembles the epigeal *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 epigeal 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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**Table 1** Synopsis of cavernicolous Meenoplidae.

Canary Islands	<i>Meenoplus cancavus</i> Remane and Hoch, 1988 <i>Meenoplus charon</i> Hoch and Asche, 1993 <i>Meenoplus claustrophilus</i> Hoch and Asche, 1993
Western Samoa	<i>Suva oloimoa</i> Hoch and Asche, 1988
Western Australia	<i>Phaconeura pluto</i> Fennah, 1973 <i>Phaconeura proserpina</i> Hoch, 1993
Queensland	<i>Phaconeura minyamea</i> Hoch, 1990 <i>Phaconeura mopamea</i> Hoch, 1990 <i>Phaconeura crevicola</i> Hoch, 1990 <i>Phaconeura capricornia</i> Hoch, 1990
New Caledonia	<i>Eponisia hypogaea</i> sp. nov.

## REFERENCES

- Barr, T.C. (1968). Cave ecology and the evolution of troglobites. *Evolutionary Biology* **2**: 35–102.
- Bourgoin, T. and Huang, J. (1990). Morphologie comparée des genitalia mâles des Trypetimorphini at remarques phylogénétiques (Hemiptera: Fulgoromorpha: Tropiduchidae). *Annales de la Société entomologique Française (n.s.)* **26**: 555–564.
- Fennah, R.G. (1969). Fulgoroidea (Homoptera) from New Caledonia and the Loyalty Islands. *Pacific Insects Monograph* **21**: 1–116.
- Fennah, R.G. (1973). Three new cavernicolous species of Fulgoroidea (Homoptera) from Mexico and Western Australia. *Proceedings of the Biological Society of Washington* **86**: 439–446.
- Fennah, R.G. (1980). A cavernicolous new species of *Notuchus* from New Caledonia (Homoptera: Fulgoroidea: Delphacidae). *Revue Suisse de Zoologie* **87**: 757–759.
- Hoch, H. (1990). Cavernicolous Meenoplidae of the genus *Phaconeura* (Homoptera: Fulgoroidea) from Australia. *Bishop Museum Occasional Papers* **30**: 188–203.
- Hoch, H. (1993). A new troglobitic planthopper species from Western Australia. *Records of the Western Australian Museum* **16**: 393–398.
- Hoch, H. and Asche, M. (1988). A new troglobitic meenoplid from lava tubes in Western Samoa (Homoptera Fulgoroidea Meenoplidae). *Journal of Natural History* **22**: 1489–1494.
- Hoch, H. and Asche, M. (1993). Evolution and speciation of cave-dwelling Fulgoroidea in the Canary Islands (Homoptera: Cixiidae and Meenoplidae). *Zoological Journal of the Linnean Society* **109**: 53–101.
- Howarth, F.G. (1980). The zoogeography of specialized cave animals: a bioclimatic model. *Evolution* **34**: 394–406.
- Howarth, F.G. (1981). Bioclimatic and geologic factors governing the evolution and distribution of Hawaiian cave insects. *Entomologia Generalis* **8**: 17–26.
- Howarth, F.G. (1986). The tropical cave environment and the evolution of troglobites. In *Proceedings of the 9th International Congress of Speleology, Barcelona, Spain, 1986*, vol. II: 153–155.
- Remane, R. and Hoch, H. (1988). Cave-dwelling Fulgoroidea (Homoptera: Auchenorrhyncha) from the Canary Islands. *Journal of Natural History* **22**: 403–412.
- Woodward, T.E. (1957). Studies on Queensland Hemiptera. Part II. Meenoplidae (Fulgoroidea). *University of Queensland Papers, Department of Entomology* **1**: 57–70.

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