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## **Contribution to the knowledge of some Lanternflies of the Philippines (Hemiptera: Fulgoromorpha: Fulgoridae)**

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# Contribution to the knowledge of some Lanternflies of the Philippines (Hemiptera: Fulgoromorpha: Fulgoridae)

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## Abstract

New data based on recent observations are given for 3 species of Fulgoridae of the Philippines: *Penthicodes astraea* (Stål, 1864), *Scamandra hermione* (Stål, 1864) and *Prolepta apicalis* (Westwood, 1838). Host plants are given and/or illustrated for *P. astraea* and *S. hermione* for the first time. Natural history and behaviour notes are provided for the three species. The first record of colour variation in the legs in the family Fulgoridae is reported in *S. hermione* and illustrated. The type of *P. apicalis* is recognized in the collections of the Natural History Museum (London) and illustrated and the male genitalia of the species are described and figured for the first time. Distribution maps are given for *S. hermione* and *P. apicalis*. Present knowledge of Philippines Fulgoridae and advantages of citizen science are discussed.

**Keywords:** Lantern bug, planthopper, Cordillera Administrative Region, Luzon, host plant, citizen science.

## Introduction

A recent collecting trip to Luzon island in the Philippines by the first author in the frame of the project “Exploration of the Entomofauna of the Cordillera Central, Luzon, Philippines” partly sponsored by the Léopold III Funds for Exploration and Protection of Nature, recent accessions in the collections of RBINS and observations by the second author allowed the opportunity to gather new information on three species of Fulgoridae: *Penthicodes astraea* (Stål, 1864), *Prolepta apicalis* (Westwood, 1838) and *Scamandra hermione* (Stål, 1864).

Host plants have been identified for *Penthicodes astraea* for the first time and its distribution and life-history can be implemented.

The first author recently published nomenclatural updates and distribution records for *Scamandra hermione* (CONSTANT, 2013). The distribution of the species is here extended to the western coast of Luzon. Variation in the colour of the legs, behaviour data and host-plants observations are reported.

LALLEMAND (1963) and NAGAI & PORION (1996) stated that the type of *Prolepta apicalis* was lost. It is actually in the collections of BMNH and was illustrated in NAGAI & PORION (1996). The species was known on a single female from “Manilla” and later mentioned “common in

*the Philippines*” by BAKER (1925) without precise data. New distribution records are given, male and female specimens are illustrated and the male genitalia are illustrated and described.

## Material and methods

The material treated in the present study is deposited in the collections of the Royal Belgian Institute of Natural Sciences, Brussels (RBINS), in the collections of the University of the Philippines in Los Baños (UPLB) and in the collections of the Natural History Museum, London, U.K. (BMNH).

The male genitalia were dissected as follows: the pygofer was cut from the abdomen of the softened specimen with a needle blade, and then boiled for about one hour in a 10% solution of potassium hydroxide (KOH) at about 100°C. The phallic complex was dissected with a needle blade and all pieces examined in ethanol, the whole placed in glycerine for preservation. The inflation of the phallus was not done due to the difficulty obtaining good and replicable results. Observations were done with a Leica MZ8 stereomicroscope. Pictures were taken with a Canon EOS 300 D camera with Sigma DG Macro lens and optimized with Photoshop CS3.

## Results

Family **Fulgoridae** Latreille, 1807

Genus *Penthicodes* Blanchard, 1845

*Penthicodes astraea* (Stål, 1864)

(Figs 1-9)

*Aphana astraea* STÅL, 1864: 61.

*Penthicodes astraea* (Stål, 1864): METCALF, 1947: 133 (catalogued); LALLEMAND, 1963: 24 (keyed, described), Pl. 8, Figs 5-10 (head, tegmen and genitalia); NAGAI & PORION, 1996: 20 (catalogued), Pl. 4, Fig. 75 (*habitus*); CONSTANT, 2010: 5 (keyed, diagnostic characters, description of male genitalia, distribution), Figs. 1 A-E (*habitus* and details), 13 B (photograph in nature), 14 A-D (male genitalia), 24 (distribution map).

MATERIAL EXAMINED. Philippines: 8♂, 3♀: Luzon, Benguet province, Baguio, 16°25'N 120°36'E, 1500m, day collecting, on *Alnus japonica*, 7-19.IV.2014, Mission Leopold III Funds, Constant J., Bresseel J. & co. (RBINS; 1♂, 1♀: UPLB); 1♀: Mindoro, Abra de Ilog, 13°27'N 120°44'E, VI.2014, leg. I. Lumawig (RBINS).

OBSERVATIONS IN NATURE. Philippines: 2 ex: Luzon, Benguet province, Baguio, Assumption road, 11.VII.2014, on *Alnus japonica*, L. Alisto; 1 ex: Luzon, Benguet province, Baguio, Botanical Garden, 15.VII.2014, on *Alnus japonica*, L. Alisto; 3 ex: Luzon, Benguet province, Baguio, Teachers' Camp, 18.VII.2014, on *Casuarina equisetifolia*, L. Alisto.

NOTES. Several specimens were found in April 2014 in the Botanical Garden in Baguio (Figs 1-2), on 3 trunks of *Alnus japonica* (Thunb.) Steud., which were growing close to one another. Despite extensive investigation on numerous *Alnus japonica* and other species of trees in the botanical garden, no other specimen was found. Investigation of *Alnus japonica* trees and other tree species in Sagada (Luzon, Mountain province) also failed to provide any *P. astraea* specimens.



Figs 1–9. *Penthicodes astraea* in natura, Luzon, Benguet province, Baguio. 1-2, Botanical Garden, on *Alnus japonica*, 16.IV.2014. 3-4, Botanical Garden, on *Alnus japonica*, 15.VII.2014. 5-6, Assumption Road, on *Alnus japonica*, 11.VII.2014. 7-9, Teachers' Camp, on *Casuarina equisetifolia*, 18.VII.2014 (photographs L. Alisto except 1: J. Constant and 2: N. Bellemans).

The specimens were sitting on trunks densely covered with lichens and mosses at height between 75 cm and 3.5 m from the ground, often in cracks and crevices of the bark or in the shadow of a branch, what made them difficult to spot due to their cryptic colour pattern.

The species was later observed in different places in Baguio in July on *Alnus japonica* (Figs 3-6) and on *Casuarina equisetifolia* L. (Figs 7-9) so the species is very probably polyphagous (*Alnus japonica* and *Casuarina equisetifolia* are in different families, Betulaceae for the first, Casuarinaceae for the second).

It is interesting to note that *Casuarina equisetifolia* also shows a bark with deep cracks and crevices.

The existing records for the species were from July to December (CONSTANT, 2010) and seem to indicate that the species is seasonal. We suspected that this might be an artefact due to a collecting bias because Fulgoridae are usually collected by beetles or butterflies collectors who tend to occur in those periods of the year. Our data confirm that the species is probably present most of the year.

### Genus *Scamandra* Stål, 1863

#### *Scamandra hermione* Stål, 1864

(Figs 10-22)

*Scamandra hermione* STÅL, 1864: 62.

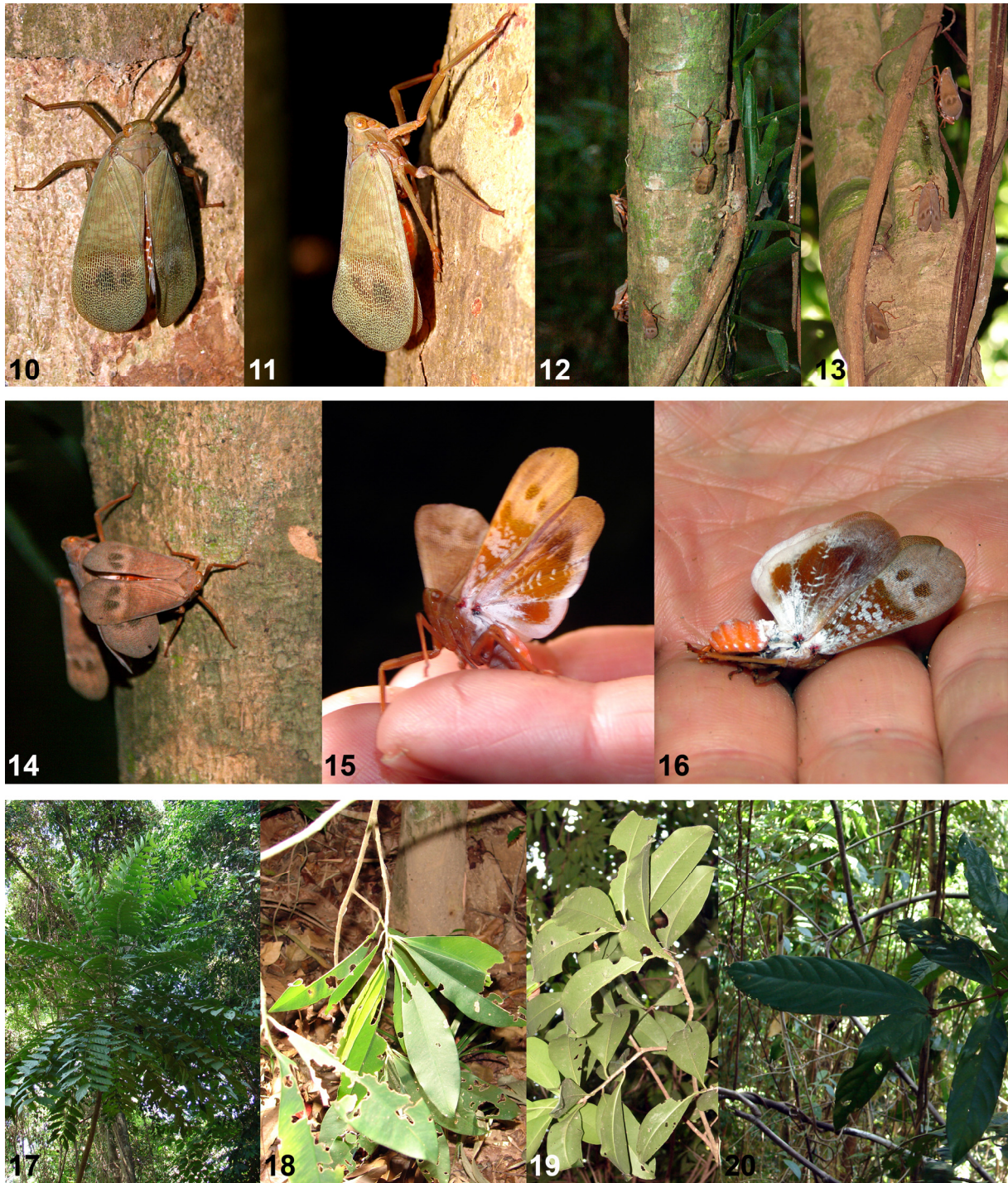
*Scamandra hermione* Stål, 1864: STÅL, 1870: 743 (described), 744 (keyed); METCALF, 1947: 144 (catalogued); LALLEMAND, 1963: 33 (keyed, described), Pl. 4, Fig. 16 (gonostylus), Pl. 5 Figs 8-9 (aedeagus, anal tube); NAGAI & PORION, 1996: 17 (catalogued), Pl. 6, Fig. 95 (*habitus*); CONSTANT, 2013: 139 (taxonomy, type, diagnostic characters, distribution, male genitalia), Figs 4 A-C (male genitalia), 11 A-E (*habitus* and details), 14 (photograph in nature), 16 (distribution map).

MATERIAL EXAMINED. Philippines: 12♂, 11♀: Luzon, Zambales province, Subic, 14°45'N 120°13'E, 100 m, day collecting, 19-20.IV.2014, Mission Leopold III Funds, Constant J., Bresseel J. & co. (RBINS; 1♂, 1♀: UPLB).

NOTES. The species was quite common in the forests around Subic and was also found in the small botanical garden. However, due to their cryptic colouration (Figs 10-11) and the fact that they do not move much, our local guides were not aware of their existence. Most of the time several specimens (up to 20) were observed together on the same trunk (Figs 12-13) and several pairs were observed copulating. During copulation, the smaller male follows the larger female if she moves, walking backwards (Fig. 14). The species is polyphagous and was found on *Ailanthus integrifolia* Lam. ex Steud (Simaroubaceae), *Ardisia* sp. (Primulaceae) and one other unidentified species of trees (Figs 17-20), at height of 50 cm to 5 m from the ground.

When disturbed, the following sequence of behaviour was observed:

- Moving laterally around the trunk to the opposite side of the “danger” as do most Fulgoridae.
- Jumping and flying away, usually not at long distance. They jump very powerfully before really flying and it is very difficult for the observer to follow their flight and locate the place that they reach.



Figs 10–20. *Scamandra hermione* in natura, Luzon, Zambales province, Subic, 19.IV.2014. 10-11, female specimen. 12-13, groups. 14, mating pair (male on right). 15, female spreading wings when disturbed. 16, female playing possum when disturbed. 17-20, host trees of *S. hermione*. 17, *Ailanthus integrifolia* Lam. ex Steud (identification Paulo Ortega). 18-19, *Ardisia* sp. (identification Pieter Pelser). 20, unidentified species (photographs J. Constant except 12 and 14: A. Lefèvre).

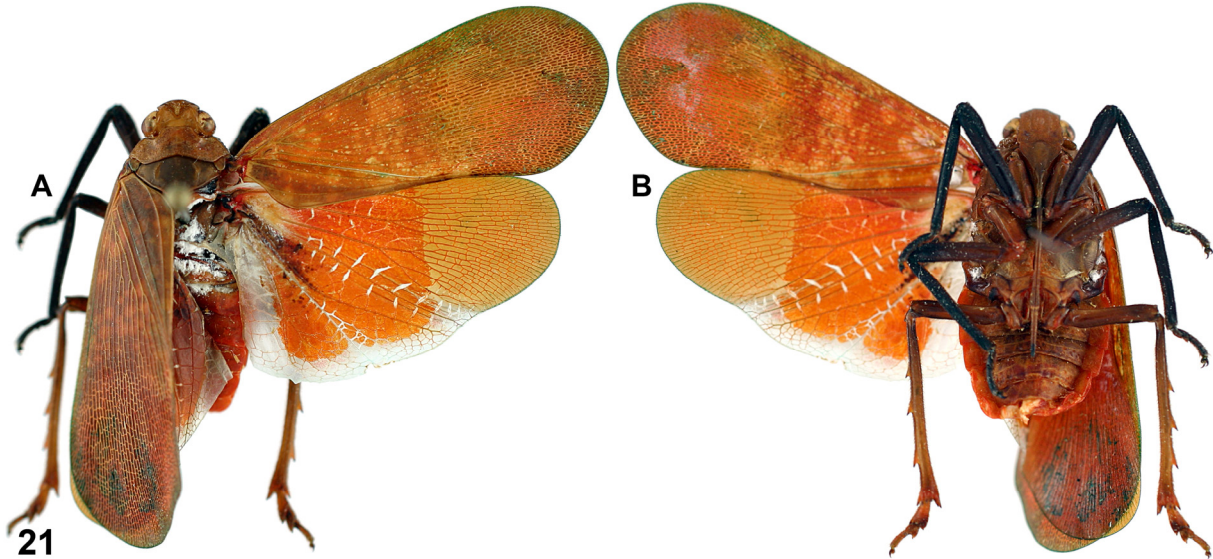


Fig. 21 A-C. *Scamandra hermione* ♂ with black legs. A, habitus, dorsal view. B, habitus, ventral view.

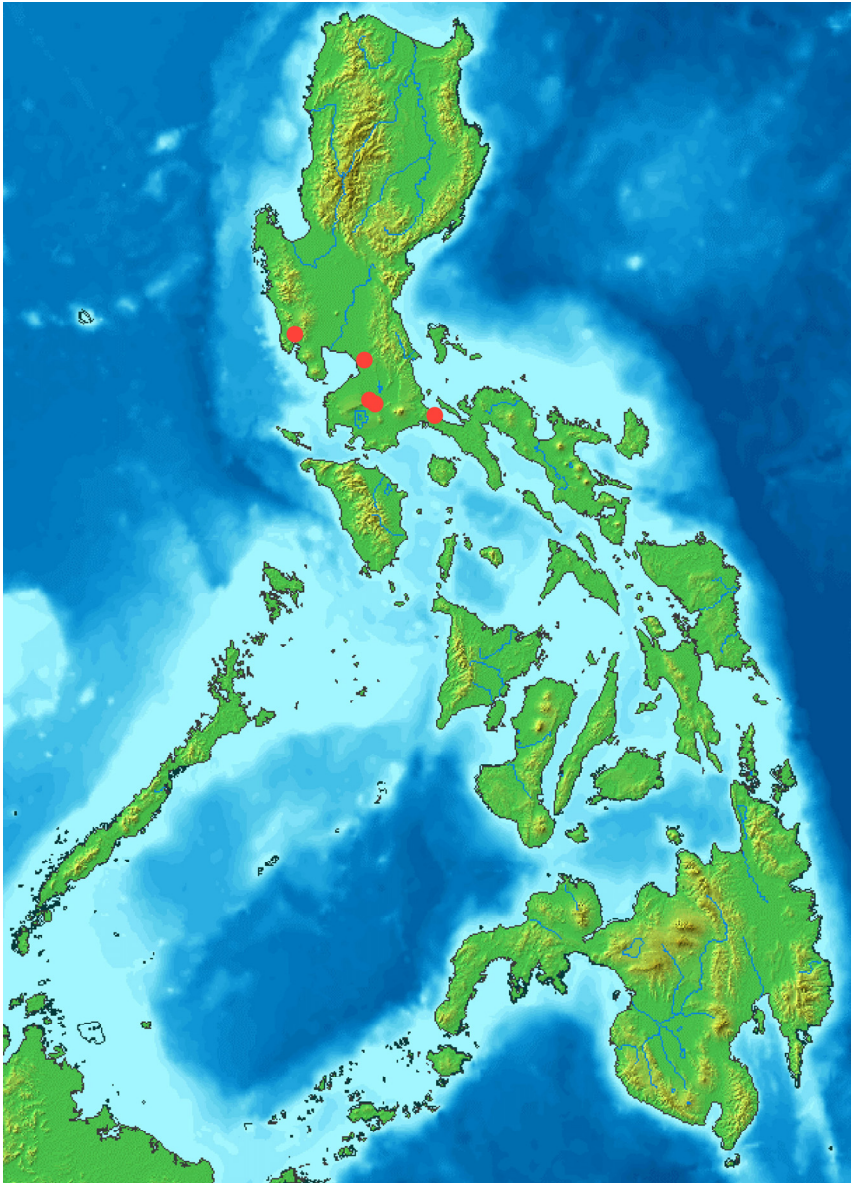


Fig. 22. *Scamandra hermione*, distribution map.



- Spreading the wings over the body and slowly walking in this posture (Fig. 15). If the disturbance goes on, letting themselves fall on the ground and play possum with the wings spread and the legs folded (Fig. 16).

Even if brightly coloured, they are difficult to locate among the dead leaves on the ground.

Among the ~60 specimens observed, 3 males showed black anterior and median legs (Fig. 21) while the species was known only from orange legged specimens. It is the first record of intraspecific colour variation in the legs of Fulgoridae. The genitalia of those black-legged specimens were checked to confirm species identification.

DISTRIBUTION. The species was known from a few locations around Manilla. The present data extends its range to the western coast of Luzon. Fig. 22 (see CONSTANT 2013 for full data).

### Genus *Prolepta* Walker, 1851

#### *Prolepta apicalis* (Westwood, 1838)

(Figs 23-29)

*Fulgora apicalis* WESTWOOD, 1838: xxxviii.

*Fulgora apicalis* Westwood, 1838: WESTWOOD, 1837: 130 (listed, *nomen nudum*); WESTWOOD, 1839: 141 (described), Tab. XII, Figs 3, 3a (*habitus*, head); WESTWOOD, 1840: 427, Fig. 115-1 (notes, illustrated).

*Prolepta apicalis* (Westwood, 1838): WALKER, 1851: 270 (transferred to *Prolepta*); WALKER, 1862: 305 (compared with *Zamilia* Walker, 1862); KIRKALDY, 1906: 388 (taxonomical note); BAKER, 1925: 360, Pl. 7 Fig. 7, Pl. 8 Fig. 9 (notes, illustration of *habitus*); METCALF, 1947: 168 (catalogued); LALLEMAND, 1963: 59 (described, keyed, catalogued); NAGAI & PORION, 1996: 15 (catalogued), Pl. 9 Fig. 126 (*habitus* illustrated).

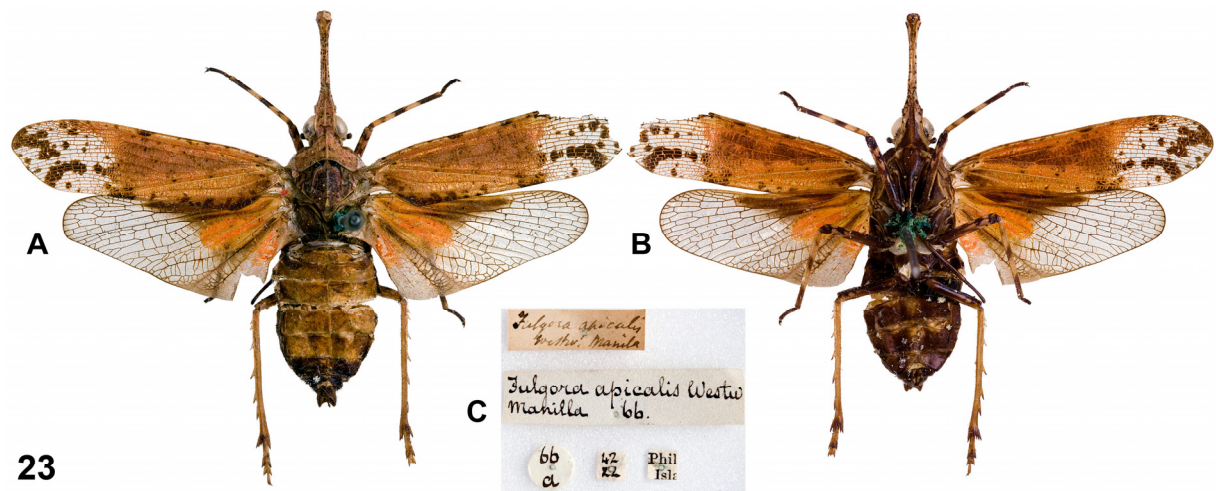
NOTE. LALLEMAND (1963) erroneously considered *Cynthila ferocula* Stål, 1863, *C. viridimaculata* Distant, 1892 and *Prolepta dultitana* Lallemand, 1939 as subspecies of *Prolepta apicalis* and proposed the following combinations: *P. apicalis ferocula* (Stål, 1863), *P. apicalis viridimaculata* (Distant, 1892) and *P. apicalis dultitana* Lallemand, 1939. This view was not shared by NAGAI & PORION (1996) who revalidated *P. ferocula* as a good species with *P. viridimaculata* and *P. dultitana* as junior synonyms, leaving two species in the genus.

TYPE MATERIAL EXAMINED. Philippines: Holotype ♀: [*Fulgora apicalis*, Westw. Manila] [*Fulgora apicalis* Westw Manilla 66.] [66 a] [42 22] [Phil Isla] (BMNH).

Note: the specimen (Fig. 23) matches the illustration given by WESTWOOD (1839) and it is from Cuming's collection (Mick Webb, *pers. com.*, September 2014). For those reasons it is here recognized as the holotype of the species.

MATERIAL EXAMINED. Philippines: 1♂, 1♀: Luzon, Zambales province, Subic, 14°45'N 120°13'E, 100 m, day collecting, 19-20.IV.2014, Mission Leopold III Funds, Constant J., Bresseel J. & co. (RBINS).

MATERIAL EXAMINED ON PHOTOGRAPH. Philippines: 1 ex: Luzon, Quirino, IX.2014, Ismael Lumawig.



23



24



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Figs 23–25. *Prolepta apicalis*. 23 A-C, holotype ♀; A, *habitus*, dorsal view; B, *habitus*, ventral view; C, labels (photographs M. Webb, BMNH). 24-25, male *in natura*, Luzon, Zambales province, Subic, 19.IV.2014 (photographs J. Constant).



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Fig. 26. *Prolepta apicalis*, male. A, habitus, dorsal view; B, habitus, ventral view; C, head and thorax, left lateral view; D, head and thorax, dorsal view; E, habitus, left lateral view; F, frons, normal view.

NOTES. This species was described from a single female from Manilla, the type which was mentioned as lost by LALLEMAND (1963) and NAGAI & PORION (1996). It is actually in the collections of BMNH and was illustrated in NAGAI & PORION (1996) but those authors ignored the possibility that the specimen was the type as it did not bear any specific type label. The species was later illustrated by BAKER (1925) who mentioned that it was “*common in the Philippines*” but did not give any precise data.

One male (Fig. 26) and one female (Fig. 27) were found solitary on two different species of tree. Both were about 1.5 m high on large trunks. The male we collected is smaller and has more contrasted colouration than the female. Due to their cryptic colour pattern (Figs 24-25), the specimens were difficult to spot on the trunks.

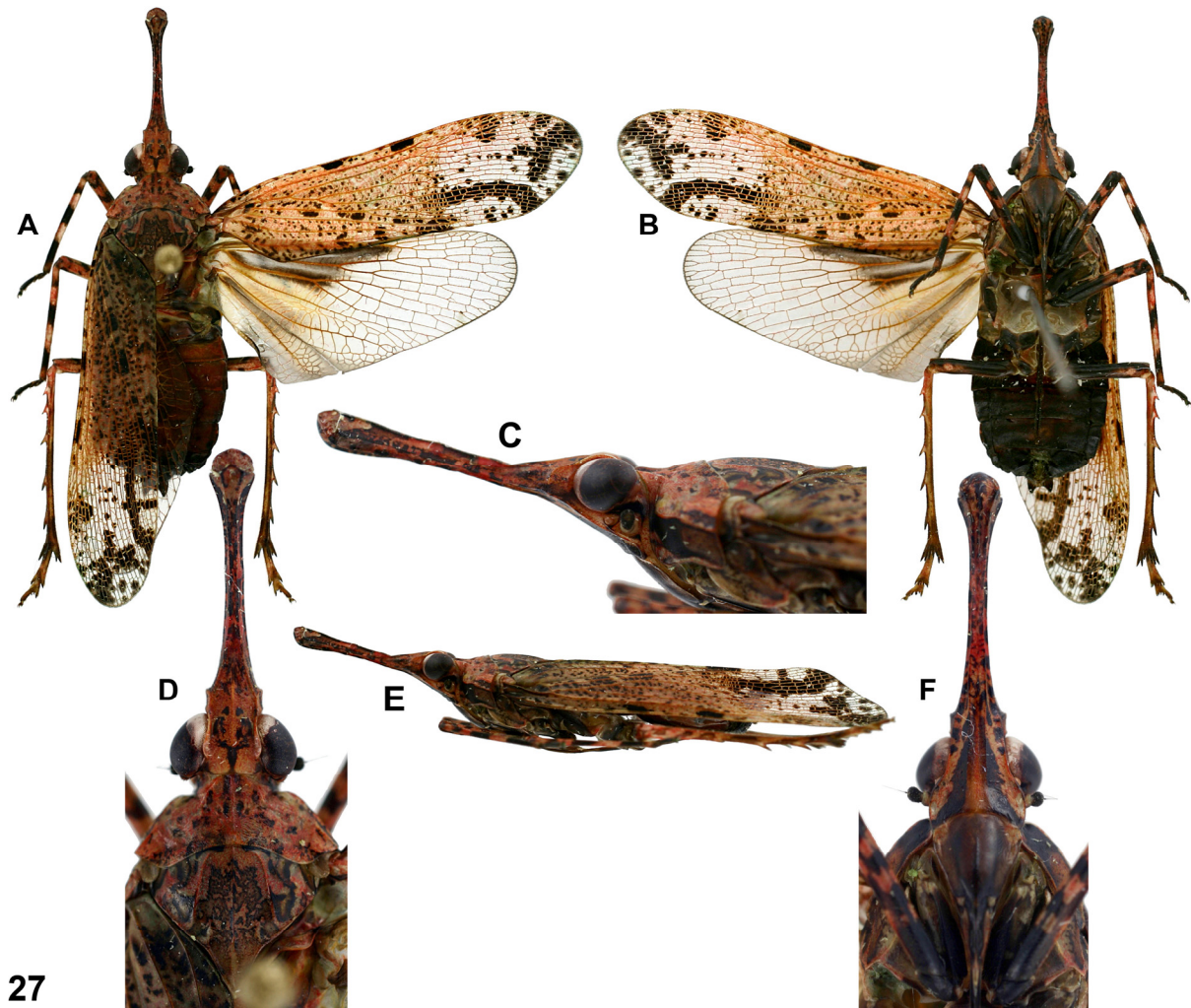


Fig. 27. *Prolepta apicalis*, female. A, *habitus*, dorsal view; B, *habitus*, ventral view; C, head and thorax, left lateral view; D, head and thorax, dorsal view; E, *habitus*, left lateral view; F, frons, normal view.

#### DESCRIPTION OF THE MALE GENITALIA.

Pygofer higher than long in lateral view (Fig. 28 A). Dorso-lateral process on each side projecting dorso-posteriorly (Fig. 28 A-B). Processes compressed antero-posteriorly, apically pointed in lateral view (Fig. 28 A), rounded in antero-dorsal view (Fig. 28 B). Dorsally very narrow and concave behind anal tube (Fig. 28 A).

Anal tube in lateral view elongate, slightly curved ventrally, with dorsal margin humped near base and ventral margin sinuate (Fig. 28 A); in dorsal view, elongate with lateral margins slightly curved, more strongly so basally and apical margin strongly concave (Fig. 28 B).

Gonostyli elongate, strongly convex (Fig. 28 A) and separated basally; in lateral view, dorsal margin curved, strongly rounded in middle, apical margin rounded and ventral margin sinuate (Fig. 28 A). Ventral margin narrowly laminate ventrally on apical half (Fig. 28 A, C). At basal 1/3 under dorsal margin, pointed tooth projecting latero-ventrally (Fig. 28 A, C).

Aedeagus (Fig. 28 D-F) with phallus membranous, at rest slightly elongate and dorsoventrally depressed; lateral extensions visible on each side (Fig. 28 D, F); endosomal processes of aedeagus (Fig. 28 D-F) elongate and slender, sclerotized on basal half (Fig. 28 E-F) and slightly surpassing phallus.

DISTRIBUTION. Fig. 29.

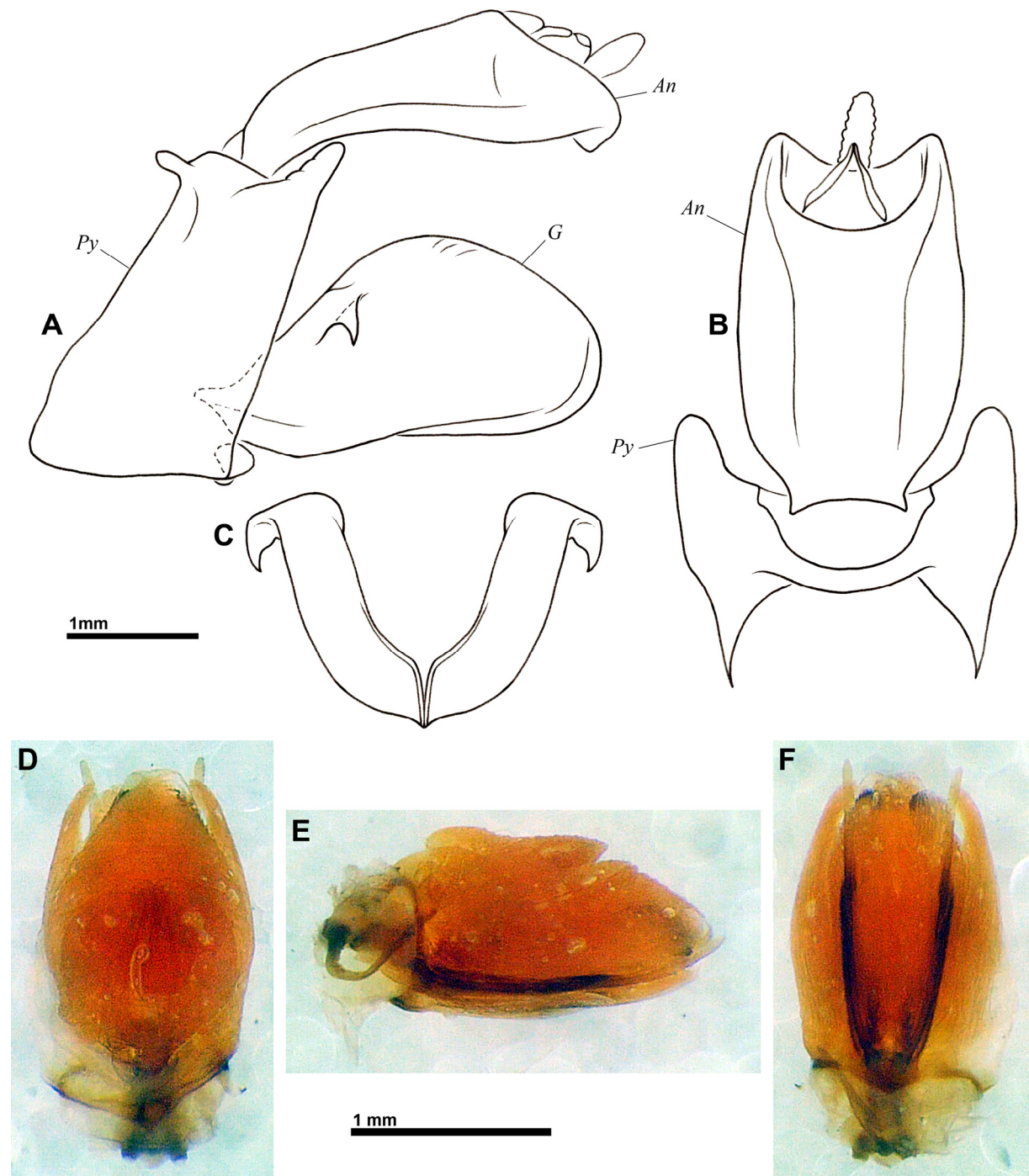


Fig. 28 A-C. *Prolepta apicalis*, male genitalia. A, pygofer, anal tube and gonostylus, left lateral view; B, pygofer and anal tube, dorsal view; C, gonostyli, posterior view. D, *aedeagus*, dorsal view. E, *aedeagus*, left lateral view. F, *aedeagus*, ventral view. An: anal tube – G: gonostylus – Py: pygofer.

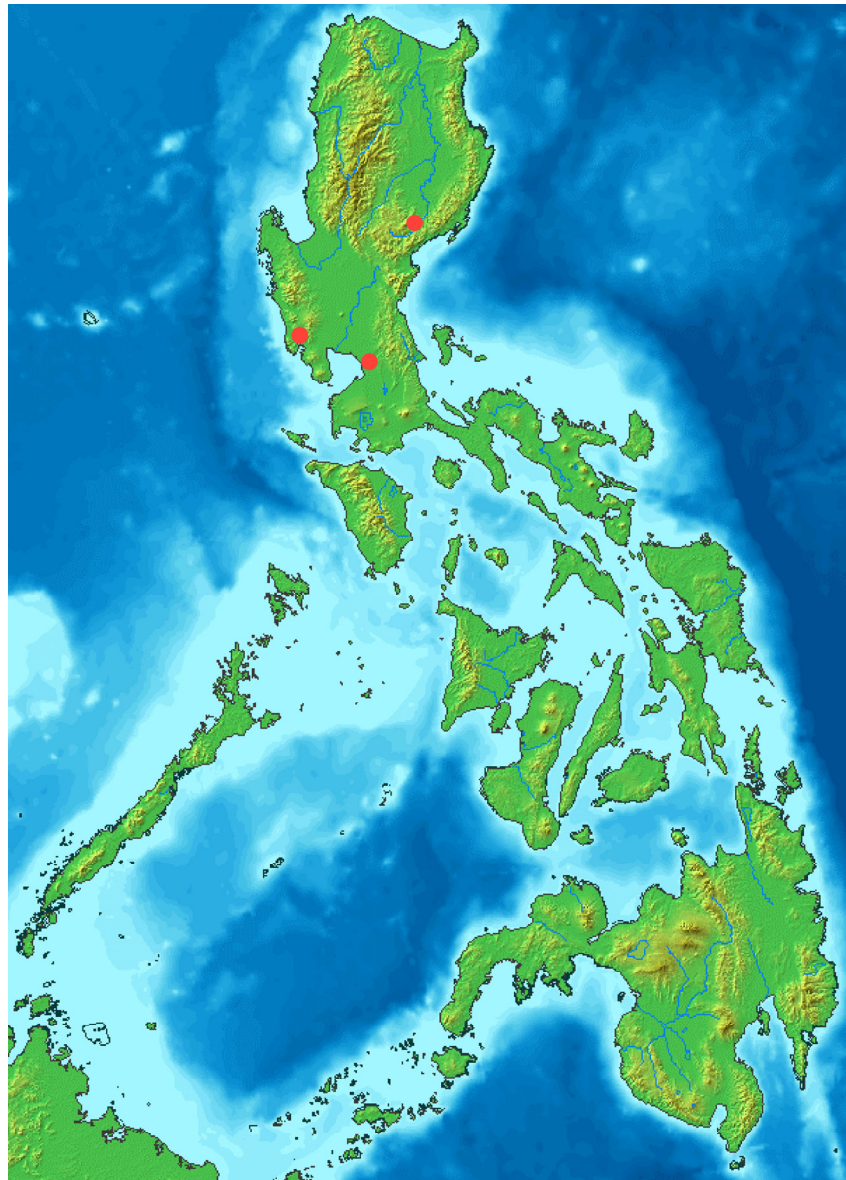


Fig. 29. *Prolepta apicalis*, distribution map.

## Discussion

The present paper provides a set of original data on some previously very poorly documented species of Fulgoridae of the Philippines. Those data were gathered during a short collecting trip in Luzon by the first author and colleagues and by multiple field observations by the second author who is an amateur naturalist, proving again the benefits of collaboration with interested local people (“citizen science”).

The Philippines fauna comprises 18 described species of Fulgoridae in 4 genera (1 *Prolepta*, 5 *Scamandra*, 3 *Penthicodes* and 9 *Pyrops*). Many of them remain known from a few specimens and the data available are usually restricted to the collecting location(s), and several species remain undescribed (CONSTANT, unpublished data). Only BAKER (1925) provided some other data for some species of *Pyrops*, mainly a short description of the habitat and the fact that the species was common or not.

The three species treated above are polyphagous and do not seem much disturbed by human activity: they have all been found, among others, in botanical gardens and all reported observations of *Penthicodes astraea* were done in urban environment, often along roads. According to those data, those species cannot be regarded as indicators of well-preserved forests but, as they do not move or fly much unless disturbed, their presence is probably associated with long lasting uninterrupted presence of big or rather old trees.

A vast field of research remains open on the Philippines Fulgoridae to document their distribution, life-history and phenology. In this scope, we strongly encourage the collaboration with local scientists and amateur naturalists whenever possible, as the critical key for observation of Fulgoridae is the amount of time spent in the field. Many areas and even Islands of the Philippines archipelago remain unexplored in terms of Fulgoridae and more field work would probably also reveal more undescribed species.

### Acknowledgements

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