



### The rediscovery of the holotype of *Kotonisia kanoi* Matsumura, 1938 with notes on Matsumura's type specimens of Fulgoroidea (Insecta: Hemiptera: Fulgoromorpha)

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Shonen Matsumura (1872–1960), the founder of entomology in Japan, is no doubt among the most influential and prolific entomologists. He produced a series of works, illustrated lists of the insects and described as many as 1200 new species. Unfortunately, most of the types he named and collected from Taiwan were brought to Japan in the late 1940s, and were hard to access by foreign students until relatively recently. Matsumura's type depositions contain brief descriptions and, sometimes, only female specimens were available for his types. This prevented sound revisionary work in Taiwan. In addition, Matsumura did not designate holotypes in his early works but simply indicated how many specimens he had.

Twelve out of 14 Fulgoroidea families have been revised by C.T. Yang's group in the past two decades (eg. Yang & Yang 1986; Yang 1989, Chan & Yang 1993; Wu & Yang 1994). While this represents nearly a three-fold increase in numbers of species, the major species determinations were not based on direct comparison with Matsumura's type specimens. This leaves some of the recorded species in doubt and occasionally misidentified (Tsaaur 2005). Liang and Suwa (1998) designated 87 lectotypes for Matsumura's collection in 10 Fulgoroidea families with a few gender misidentifications (Tsaaur, unpublished data). Validation of Liang and Suwa's (1998) efforts needs a more comprehensive, descriptive investigation. This study is hereby the first attempt to re-visit Matsumura's type collections in Fulgoroidea and is part of a larger revision matching Matsumura's collections with his original descriptions.

The Meenoplidae comprises a small, distinct and interesting group of insects with 157 described species mainly distributed in the Old World. Prior to this study six genera and 11 species have been recorded from Taiwan (Tsaaur *et al.* 1986; Tsaaur 1989). They may be identified by the following combination of characters: One or both claval veins tuberculate; second hind tarsomere with apical spines, and abdominal terga divided medially into two plates (O'Brien & Wilson 1985).

The Cixiidae has a worldwide distribution and is one of the largest families of Fulgoroidea with 172 genera and more than 2048 species presently described. The cixiids can be identified by a membranous tegmen, usually bearing tubercles set with small setae along the veins, long and sword-shaped ovipositor, or slender, ventral to caudally directed wax plate on the ninth segment (O'Brien & Wilson 1985).

The genus *Kotonisia* was erected by Matsumura in 1938 to include the irreconcilable *Kotonisia kanoi* Matsumura within Meenoplidae. It was then excluded from the Meenoplidae based on Matsumura's original description (Emeljanov 1985; Tsaaur *et al.* 1986). Yet, no certain family was assigned to accommodate this species due to the failure in identifying the original material in its presumed depository. In order to verify the identity, unsuccessful efforts have been made to locate the type specimen (Tsaaur *et al.* 1986; Liang & Suwa, 1998). It was only after a recent trip to Hokkaido University, that the author had the chance to look for this mysterious specimen in person and herein assign the species to the proper status.

#### Family Cixiidae Spinola 1839

#### Tribe Bennini Metcalf 1938

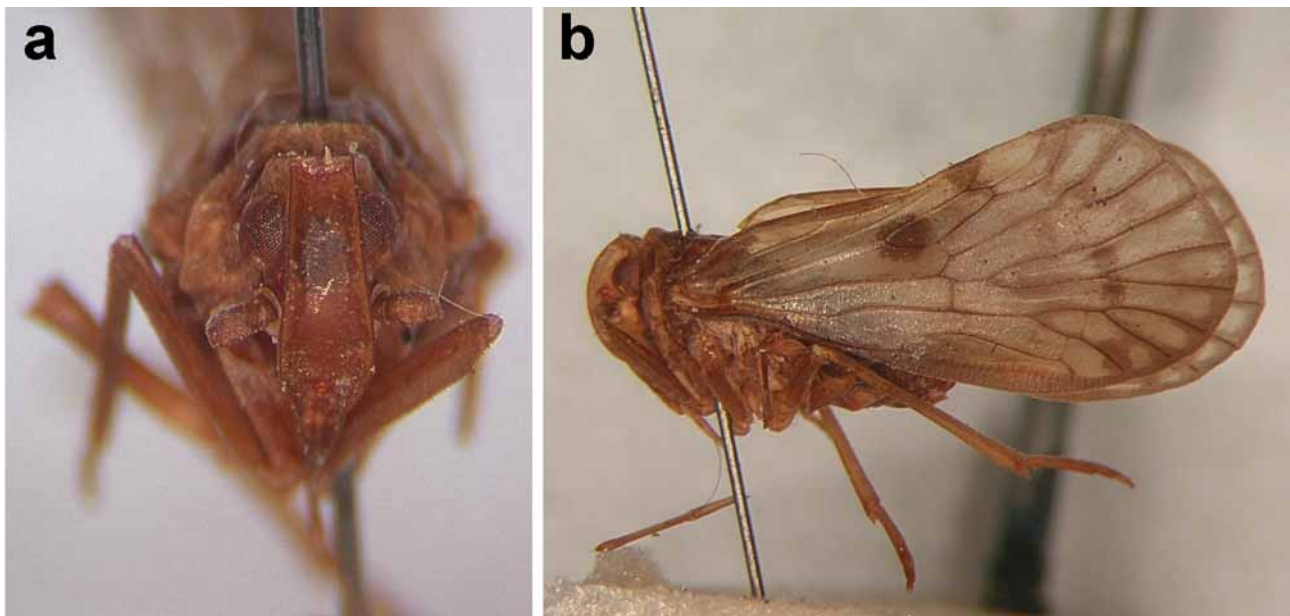
#### Genus *Benna* Walker 1857

*Benna* Walker 1857, 90; Tsaaur 1988, 76

*Bennaria* Melichar 1914, 175, synonymised by Fennah 1970, 46

*Kotonisia* Matsumura 1938, 153. **n. syn.**

Type species: *Benna capitulata* Walker (by monotypy)



**FIGURE 1.** a. *Benna kanoi* (Matsumura). Head, frontal view; b. Lateral view.

**Remarks.** The genus *Kotonisia* is transferred from Meenoplidae to Cixiidae based on the following combination of characteristics: the absence of heavy granulations on the claval veins; more than 8 terminal branches on the tegmen; the presence of a carina separating the frons from the vertex, far removed from the posterior margin of the head.

The type specimen examined is not in good condition but, even though the characteristic lateral processes on the fourth abdominal segment were broken at the tip (left hand side) or lost altogether (right hand side), it was sufficient to determine the tribal status and place the genus in synonymy with *Benna* Walker.

***Benna kanoi* (Matsumura 1938) n. comb.**

*Kotonisia kanoi* Matsumura 1938, 152

*Bennaria formosana* Nast 1950: 179. **n. syn.**

*Benna formosana* (Nast), Tsaour 1988, 76

Length of body (including tegmen): Male: 8.96mm

Length of tegmen: Male: 7.42mm

**Material examined:** Male (not female as Matsumura stated in the original description) Taiwan, labelled: Formosa (handwritten), Matsumura (printed), Koto (in Japanese, handwritten on reverse), *Kotonisia kanoi* M. (handwritten), a red label attached above (dissected, examined by Tsaour). Distribution: Taiwan (Orchid Island).

**Remarks:** The fuscous spots at the end of clavus and at the branching of  $Cu_1$ , the numbers and orientation of the spinose processes on aedeagus all further match *Kotonisia kanoi* to *Benna formosana* (Nast). *Kotonisia kanoi* is here synonymized with *Benna formosana* as the new combination *Benna kanoi* (Matsumura).

**Discussion**

Orchid Island, also known as Botel Tobago, was named after the indigenous butterfly orchids, *Phalaenopsis aphrodite*. The 45 km<sup>2</sup> volcanic island is situated 62 km off the southeastern coast of Taiwan, with its flora and fauna sharing characteristics with subtropical Taiwan and tropical Philippines (Liu 1989). While most of Taiwan belongs to the Eurasian plate, Orchid Island is located on the edge of the Philippine Sea plate. It did not become the subject of serious faunistic studies until the decade preceding World War II and was not open to tourism until 1967. Tadao Kano made eight

trips to Orchid Island between 1934 and 1937, and spent a total of 12 months on the island. Serious photography and intensive insect collections were made to conclude that the Wallace line should be drawn between Taiwan and Orchid Island.

Kano contributed two of his hemipteran collections in 1937 to Matsumura for publication in *Insecta Matsumurana* (Matsumura 1938; Matsumura 1940). Species diversity of these two collections (21 and 58) and endemism (ca. 70%) are high. Five species were present in both collections and 23 have no male specimens which are of vital importance for the identification in fulgoroidea. Given the opportunity to visit Hokkaido University again in the near future and user-friendly accessibility to the digitized museum for the collections of the Systematic Entomology Department, Hokkaido University (SEHU), it is possible to assess the magnitude of the faunal discontinuity between Taiwan proper and nearby islands. This will also contribute towards a coordinated biodiversity information framework in Taiwan through feeble flying fulgoroidea.

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