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A new species of *Anthophilolygus* (Hemiptera: Heteroptera: Miridae: Mirinae) from Yakushima Island, southern Japan

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Abstract

A new species of mirine plant bug, *Anthophilolygus yakushimanus* **sp. nov.** (Mirini), is described, based on a male specimen collected on Yakushima Island, southwestern Japan, now designated as a UNESCO World Natural Heritage site. The new taxon is currently considered endemic to this nature-rich island.

Key words: *Anthophilolygus*, Miridae, new species, Yakushima, SEM documentation.

Resumen

Una nueva especie de* Anthophilolygus (*Hemiptera: Heteroptera: Miridae: Mirinae*) *de la Isla Yakushima, sur de Japón

Se describe una nueva especie de mírido, *Anthophilolygus yakushimanus* **sp. nov.** (Mirini), a partir de un ejemplar macho recolectado en la Isla Yakushima, suroeste de Japón, actualmente declarada lugar Patrimonio Mundial Natural de UNESCO. De momento el nuevo taxón se considera endémico de esta naturalmente rica isla.

Palabras clave: *Anthophilolygus*, Miridae, nueva especie, Yakushima, documentación MEB.

Laburpena

Anthophilolygus *espezie berri bat* (*Hemiptera: Heteroptera: Miridae: Mirinae*) *Yakushima Uhartekoa, Japoniaren hegoaldea*

Miridoen espezie berri bat, *Anthophilolygus yakushimanus* **sp. nov.** (Mirini), deskribatzen da Yakushima Uhartekoa, Japoniaren hegomendebaldea, gaur egun UNESCOren Mundu Ondare Natural lekutzat izendatua. Taxoi berria, naturan aberatsa den uharte honetako endemikotzat jotzen da une honetan.

Gako-hitzak: *Anthophilolygus*, Miridae, espezie berria, Yakushima, EME dokumentazioa.

Introduction

The Japanese mirine plant bug fauna (Mirinae: Mirini) was almost entirely elucidated by recent updates (Yasunaga, 2023; Yasunaga *et al.*, 2023), which reported 212 species in 62 genera. While sorting the dry-preserved materials collected on Yakushima Island, southwestern Japan, in 1990s, a unique male specimen was found to represent an undescribed taxon. At first sight it appears to be a member of *Neolygus* Knight, 1917. However, the genitalic structure is absolutely different from those exhibited in broadly conceived *Neolygus* or its related taxa. After close examination, the specimen was eventually confirmed to be a representative of *Anthophilolygus* Yasunaga, Schwartz & Chérot, 2018, which is described as new in the present paper.

Material and methods

The holotype specimen is deposited in Zoological Reference Collection, Lee Kong Chian Natural History Museum, National University of Singapore (ZRC), with a matrix code label (AMNH_PBI 00380767) uniquely identifying each specimen and is searchable (by species name) on «Heteroptera Species Pages» (http://research.amnh.org/pbi/heteropteraspeciespage/).

Terminology of the genitalia principally follows Yasunaga (2023) and Yasunaga *et al.* (2018). Scanning Electron Micrographs were taken with a Hitachi Miniscope® series (TM-3030 and TM-4000II plus); the genitalic structures were also observed using a Nikon Eclipse Ci upright microscope, with a photophase unit. All measurements are given in millimeters; for some of the SEM images, scale bars are shown in micrometers (µm).

Results

Anthophilolygus yakushimanus sp. nov.

(Figs. 1a-b, 2, 3a-i)

Type material:

HOLOTYPE: ♂, JAPAN: Kyushu, Kagoshima Pref., Yakushima Island, Yakushima Township, Yakusugi-Land (forest park), N30.305 E130.575, 1,000-1,200 m alt., 20.X.1992, Y. Sawada (ZRC) (AMNH_PBI 00380767).

Diagnosis:

Recognized by its elongate-oval body shape; generally pale yellowish basic coloration (supposed to be more greenish when alive), immaculate dorsum with uniformly distributed, simple, short, semierect setae; and male genitalic structures as described below (Figs. 2, 3g-i). These characters enable it to be distinguished readily from other known congeners. Externally very similar to *Neolygus* Knight, 1917, but with the male genitalic structures evidently different (*cf.* Yasunaga *et al.*, 2001; Yasunaga, 2023).

Description:

Male: Body small (4.3 mm in total length), elongate-oval, subparallel-sided; basic coloration pale yellowish brown (most probably more greenish and fading to brownish in dry-preserved specimen); dorsal surface immaculate, shining, shallowly and minutely punctate, with uniformly distributed, pale, simple, semierect setae, lacking silvery setae (Fig. 1b). **Head:** Nearly vertical in lateral view; eye contiguous to anterior margin of pronotum; vertex narrow, 0.22 times as wide as head across eyes, with a weakly elevated but continuous basal transverse carina (Fig. 3b). **Antenna:** Almost linear; segment II longer than basal width of pronotum, shorter than maximum width across hemelytra. **Labium:** Reddish brown, long, reaching but not surpassing apex of metacoxae, longer than antennal segment II; apex of segment IV darkened. **Thorax:** Pronotum trapezoidal, shining; calli indistinct, narrow; scutellum almost flat; pleura and coxae reddish brown; metathoracic scent efferent system yellowish brown, narrow, comparatively large (Fig. 3b). **Hemelytron:** Uniformly pale yellowish green, immaculate, weakly declivous at cuneal fracture; membrane pale smoky brown, semitransparent. **Legs:** Moderate in length; tibial spines reddish brown, short, rather sparsely distributed; tarsus and pretarsal structure of mesoleg as in Fig. 3c-d; parempodia lamellate, developed (Fig. 3d). **Abdomen:** Pale brown; ventral surface partly reddened (Fig. 1a).

Male genitalia (Figs. 2, 3e-i): Pygophore generally small, trapeziform (Figs. 2a, 3e). Left paramere C-shaped, relatively thick (Figs. 2c, 3h); hypophysis tapered towards apex, with a short, subapical process. Right paramere bulbous (Figs. 2b, 3i); hypophysis narrow and somewhat tapered. Vesica almost entirely membranous as in Figs. 2d and 3g, with short hair-like processes above gonopore (Figs. 2e) and two weakly sclerotized spiculi.

Female: Unknown.

Measurements:

Holotype ♂: Body length 4.35; head width across eyes 0.96; vertex width (interocular space) 0.21; lengths of antennal segments I–IV: 0.44, 1.56, 0.77, ? (missing); labial length 1.77; basal pronotal width 1.48; maximum width across hemelytron 1.69; lengths of profemur, protibia, mesofemur and mesotibia: 0.96, 1.15, 1.15, 1.44 (metaleg missing).

Etymology:

Named for the type locality, Yakushima Island, designated as a UNESCO World Natural Heritage site (see below discussion). The name is a variable adjective.

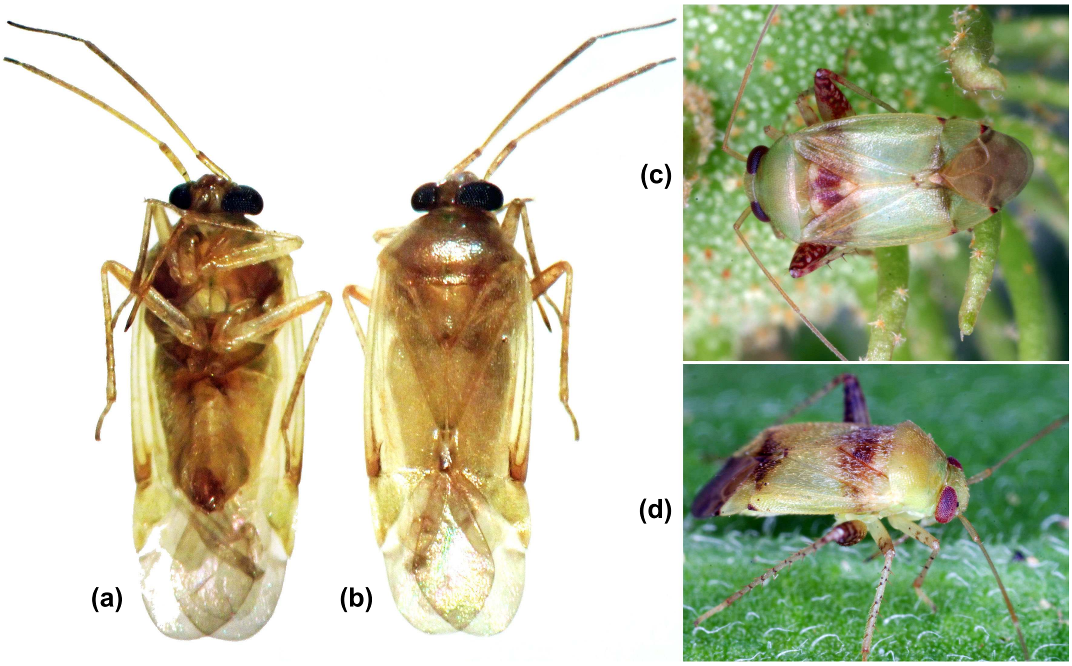

FIGURE 1. Habitus images of: (a)-(b) *Anthophilolygus yakushimanus* **sp. nov.**, holotype male: (a) Ventral view; (b) Dorsal view; (c)-(d) *A. bakeri* (Poppius, 1915), live individuals: (c) Male; (d) Female.

Distribution:

Japan (Kagoshima Prefecture: Yakushima Island).

Biology:

Unknown. The collection record suggests that this new species appears in late October, unlike other related taxa inhabiting temperate forest zone.

Discussion

Anthophilolygus was proposed by Yasunaga *et al.* (2018) to accommodate two Oriental elements, *A. bakeri* (Poppius, 1915) (Figs. 1c-d, 3j-l) and *A. alaneylesi* Yasunaga, Schwartz & Chérot, 2018. The genus superficially resembles some tropical genera, such as *Dagbertus* Distant, 1904, *Micromimetus* Eyles, 1999, *Miyamotolygus* Yasunaga, Schwartz & Chérot, 2018 or *Prolygus* Carvalho, 1987, but *Anthophilolygus* is distinct in having the following diagnostic characters: Generally pale greenish, ovoid body; long, uniformly

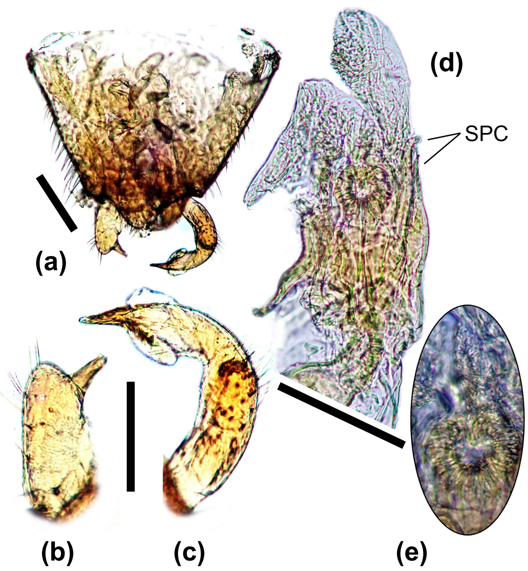

FIGURE 2. Male genitalia of *Anthophilolygus yakushimanus* **sp. nov.**, holotype male: (a) Genital segment (pygophore); (b) Right paramere; (c) Left paramere; (d) Vesica (SPC = spiculi); (e) Secondary gonopore and adjacent structures (Scale bars = 0.2 mm).

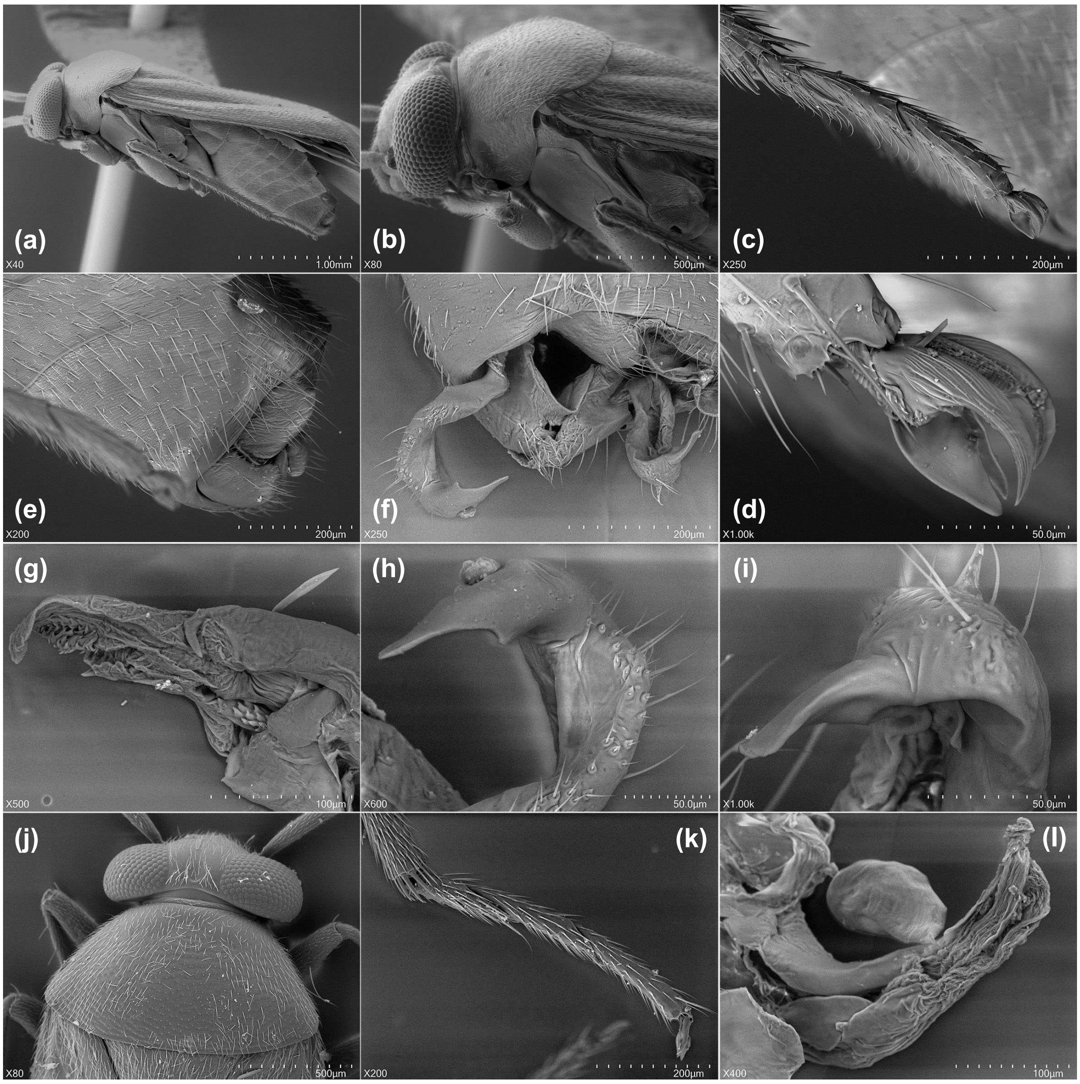

FIGURE 3. Scanning electron micrographs of: (a)-(i) *Anthophilolygus yakushimanus* **sp. nov.**, holotype male; (j)-(l) *A. bakeri* (Poppius, 1915), male / (a) Whole body, left lateral view; (b) Anterior body, left lateral view; (c) Mesotarsus; (d) Same, pretarsal structure; (e) Genital segment (pygophore), left lateral view; (f) Same, dorsal view; (g) Vesica; (h) Left paramere; (i) Right paramere; (j) Head and pronotum, dorsal view; (k) Metatarsus; (l) Vesica.

linear antennae that are subequal in length to body; shiny, finely punctate dorsum that is uniformly covered with simple setae; reddish fasciae often present on hemelytron; more or less darkened apex of cuneus; pretarsus with developed, elongate parempodia; reduced dark spots at bases of tibial spines; and presence of hair-like process on largely membranous vesica, etc. There still remain several undescribed congeners in the Oriental Region (Yasunaga *et al.*, 2018). *Anthophilolygus bakeri* (Fig. 1c-d) is known to be distributed widely in Kyushu, Ogasawara (Bonin) Islands, Ryukyu Islands, Taiwan and almost all SE Asian countries. The populations in Kyushu and the lowland (coastal subtropical zones) on Yakushima are considered to be non-indigenous, due to recent colonization from the Ryukyus (*cf.* Yasunaga and Takai, 2014).

The present new species is very similar in external appearance to certain members of *Neolygus* Knight, 1917 (*cf.* Yasunaga, 2023). In the keys to Japanese related genera provided by Yasunaga *et al.* (2002) and Yasunaga (2023), this taxon will equally key out to *Neolygus* instead of *Anthophilolygus*. Although some of the features (*e.g.*, uniformly pale dorsum, general body shape, structure of parameres) do not perfectly match the diagnostic characters of *Anthophilolygus*, the unique structures of pretarsus (with developed parempodia) and vesica (widely membranous and bearing hair-like process) may support the placement of *yakushimanus* **sp. nov.** in *Anthophilolygus* rather than *Neolygus*.

A single male specimen of *Anthophilolygus yakushimanus* **sp. nov.** was collected from Yakushima Island (Fig. 4), designated as a UNESCO World Natural Heritage site (UNESCO World Heritage Centre, 1992-2023). This island is well-known by its primeval rainforest with 10,000 mm annual precipitation as well as by Yakusugi, or ancient (more than 1,000 years old) Japanese cedar trees (*Cryptomeria japonica*). Due to the unique natural environment, Yakushima harbors approximately 100 endemic organisms (Ministry of the Environment, 2006), but no heteropteran insect endemic to the island has been reported. Currently, endemism of *A. yakushimanus* **sp. nov.** is conceivable but in need of further verification. *Anthophilolygus* congeners are known to inhabit inflorescences of a variety of broadleaf trees (*cf.* Yasunaga *et al.*, 2001). Field investigation targeting the broadleaf inflorescences is encouraged to acquire additional samples and biological information.

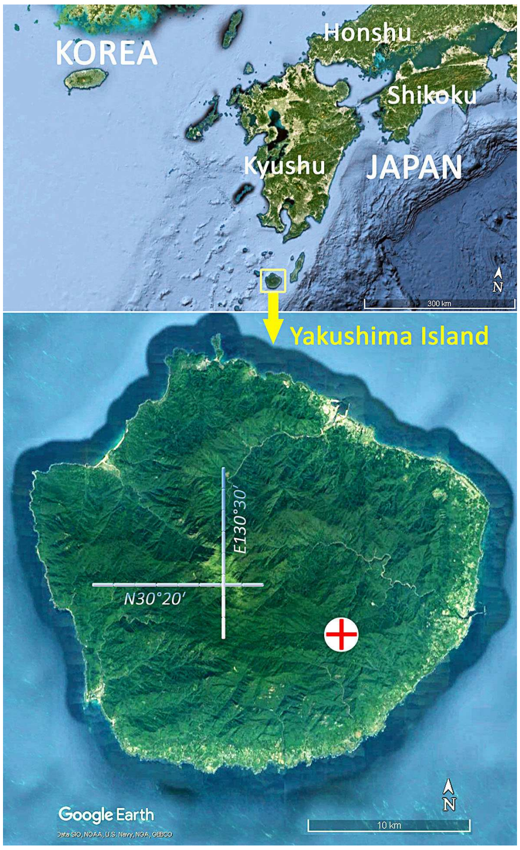

Figure 4. Map of Yakushima Island and collecting site (+) of *Anthophilolygus yakushimanus* **sp. nov.**

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