

Taxonomic review of phyline tribe Leucophoropterini in Japan (Hemiptera: Heteroptera: Miridae: Phylinae)

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Abstract

The Japanese fauna of the phyline plant bug tribe Leucophoropterini, now represented by ten species in two genera, *Pseudophylus* Yasunaga, 1999 and *Sejanus* Distant, 1909, are updated, including a new species of respective genus, *P. esakii n. sp.* and *S. azumanus n. sp.* The genus *Pseudophylus* is rediagnosed, and *P. stundjuki* (Kulik, 1973) **sp. rev.**, which was incorrectly synonymized with *P. flavipes* (Nitobe, 1906), is herein reinstated as valid. A key is provided to aid in identification of Japanese leucophoropterine taxa. Some terms for the female genitalia are proposed, on the basis of examination on the unnamed microstructures.

Key words: Leucophoropterini, *Pseudophylus*, *Sejanus*, taxonomy, genitalic documentation.

Resumen

Revisión taxonómica de la tribu de filinos Leucophoropterini en Japón (Hemiptera: Heteroptera: Miridae: Phylinae)

Se actualiza la fauna japonesa de la tribu de mirídos filinos Leucophoropterini, representada por diez especies de dos géneros, *Pseudophylus* Yasunaga, 1999 y *Sejanus* Distant, 1909, incluyendo sendas nuevas especies, *P. esakii n. sp.* y *S. azumanus n. sp.* Se ofrece una nueva diagnosis del género *Pseudophylus* y se restaura como válida *P. stundjuki* (Kulik, 1973) **sp. rev.**, que había sido incorrectamente sinonimizada bajo *P. flavipes* (Nitobe, 1906). Se proporciona una clave que ayude en la identificación de los taxones de Leucophoropterini de Japón. Se proponen algunos términos para la genitalia femenina sobre la base del examen de microestructuras previamente innominadas.

Palabras clave: Leucophoropterini, *Pseudophylus*, *Sejanus*, taxonomía, documentación genitálica.

Laburpena

Japoniako Leucophoropterini filinoen tribuaren berrazterte taxonomikoa (Hemiptera: Heteroptera: Miridae: Phylinae)

Leucophoropterini mirido filinoen tribuaren Japoniako fauna eguneratzen da. Bi generori, *Pseudophylus* Yasunaga, 1999 eta *Sejanus* Distant, 1909 hain zuzen, dagozkien hamar espeziez osatuta dago, genero bakoitzeko espezie berri bana barne: *P. esakii n. sp.* eta *S. azumanus n. sp.* *Pseudophylus* generoaren diagnosi berri bat eskaintzen da eta *P. stundjuki* (Kulik, 1973) **sp. rev.** baliozkotzat jo eta berrezartzen da, *P. flavipes* (Nitobe, 1906) espeziearen azpian sinonimizatuta egon ondoren. Klabe bat aurkezten da, Japoniako Leucophoropterini taxoien identifikazioan lagunduko duelakoan. Emeen genitalia dela eta, hitz berri batzuk proposatzen dira, aurrelik izengabe zeuden zenbait mikroegituraren azterketan oinarrituta.

Gako-hitzak: Leucophoropterini, *Pseudophylus*, *Sejanus*, taxonomia, dokumentazio genitalikoa.

Introduction

Leucophoropterini was proposed by Schuh (1974) accommodating five genera, namely *Bilirania* Carvalho, 1956, *Karoocapsus* Schuh, 1974, *Leucophoroptera* Poppius, 1921, *Myrmicopsella* Poppius, 1914 and *Tytthus* Fieber, 1864 (but *Tytthus* is now placed in *Semiini* Knight, 1923, cf. Schuh and Menard, 2013). Subsequent works (e.g. Schuh, 1984; Menard and Schuh, 2011; Yasunaga and Duwal, 2015; Duwal *et al.*, 2017; Oh *et al.*, 2020) have hitherto recognized 24 genera and more than 110 species from the Old World. The Leucophoropterini basically forms an Indo-Australian group and most of members are thermophilic, occurring predominantly in subtropical and tropical zones (cf. Menard and Schuh, 2011). Only a few leucophoropterines are known from temperate and colder climatic zones in the eastern Eurasia (Kerzhner, 1988; Yasunaga, 2001; Duwal and Lee, 2011; Yasunaga *et al.*, 2013; Duwal *et al.*, 2016; Oh *et al.*, 2020).

The present work reviews the Japanese fauna of plant bug tribe Leucophoropterini (Miridae: Phylinae), which has hitherto been represented by eight species in two genera, *Pseudophylus* Yasunaga, 1999 and *Sejanus* Distant, 1910. Two new species occurring in the temperate climatic zone of Japan, *Pseudophylus esakii* n. sp. and *Sejanus azumanus* n. sp., are diagnosed and described. The genus *Pseudophylus* is rediagnosed, and *P. stundjuki* (Kulik, 1973), known from the Korean Peninsula and continental Russian Far East is reinstated as valid based on close examination of the structures. An updated checklist and a key are provided to aid in exact identification of all known Japanese taxa of Leucophoropterini.

Material and methods

The specimens examined in this study are deposited in the following collections:

- AMNH: American Museum of Natural History, New York, USA.
- CNC: Canadian National Collection, Ottawa, Ontario, Canada.
- SCH: T. Shishido collection, Hyogo, Japan.
- SNU: Insect Biosystematics Laboratory, Department of Agricultural Biotechnology, Seoul National University, Republic of Korea.
- TYCN: T. Yasunaga collection, Nagasaki, Japan.

Matrix code labels, which uniquely identify each specimen and are referred to as «unique specimen identifier» (USI), are attached to the holotypes and some representative specimens. The USI codes [e.g. AMNH_PBI 0012345] comprise an institution and project code (AMNH_PBI) and a unique number (0012345). These data were digitized on the Arthropod Easy Capture (formerly the Planetary Biodiversity Inventory) database maintained by the American Museum of Natural History, New York, USA (<http://research.amnh.org/pbi/>) and are also searchable (by species name) on «Heteroptera Species Pages» (<http://research.amnh.org/pbi/heteropteraspecies-page/>).

Terminology mainly follows comprehensive works treating leucophoropterine taxa (e.g. Schuh, 1984; Menard and Schuh, 2011, 2014). Some new terms for the female genitalia (microstructures on the posterior wall of the bursa copulatrix in particular) are provisionally used to indicate unnamed parts or structures. The following abbreviations are used in the text and figures:

- CLM: comb-like scaly microstructure.
- IRL: (undifferentiated) interramal lobe.
- IRS: interramal sclerite (= lateral reduced interramal sclerite, *sensu* Menard and Schuh (2011)).
- PMS: posterior margin sclerite.
- SCR: sclerotized ring.
- SSM: spinulate scale-like microstructure.

The higher classification system of the subfamily Phylinae follows Schuh and Menard (2013), Menard and Woolley (2014) and Menard *et al.* (2014), recognizing two subtribes in the tribe Leucophoropterini (as in checklist below). Only selected references (and almost completely forgotten but important antique Japanese literatures) are cited in the synonymic lists for known taxa, as more than a few comprehensive catalogs are now available (Schuh, 1995; Kerzhner and Josifov, 1999; Schuh, 2002-2013; Aukema *et al.*, 2013; Aukema, 2018).

Scanning Electron Micrographs (SEM) were taken with a Hitachi Tabletop Microscope TM3030; the genitalic structures were also observed using a Nikon Eclipse Ci upright microscope, with a photophase unit. Measurements are given in millimeters; on some of the SEM images, scale bars are shown in micrometers (μm). For SEM documentation of the genitalic structures, the delicate, fragile minute organs (cf. Figs. 7d-o, 8, 10) were dipped and washed in 60–70% ethyl alcohol after dissection under an



FIGURE 1. Habitus images of Japanese *Pseudophylus* and *Sejanus* species, live individuals: (a) *P. flavipes*; (b)-(f) *P. esakii* n. sp.; (g)-(i) *S. azumanus* n. sp.; (j) *S. breviniger*; (k) *S. komabanus*; (l) *S. vivariculus* / (a), (c), (g), (j, right) Adult male; (b), (d), (h), (k), (l) Adult female; (e), (j, left) Final (5th) instar nymph.

Olympus SZX-12 stereoscopic microscope, placed on filter paper until dry, carefully attached to cards (ca. 5 × 15 mm) using water soluble wood glue, and

finally placed in the TM3030 Tabletop SEM chamber for examination (without vapor deposition of metals).

Taxonomy

1. Leucophoropterini of Japan

Checklist of Japanese leucophoropterine taxa:

(including an exotic species that requires (herein) taxonomic change; marked with *)

Tribe **Leucophoropterini** Schuh, 1974

Subtribe **Leucophoropterina** Schuh, 1974

Sejanus Distant, 1910

S. amami Yasunaga, 2001 – Japan (Amami-Oshima Is.).

S. azumanus Yasunaga & Duwal n. sp. – Japan (northern Honshu) (Fig. 11).

S. breviniger Yasunaga, 2001 – Japan (Okinawa Is.).

S. juglandis Yasunaga, 2001 – Japan (Hokkaido, Honshu, Shikoku, Kyushu).

S. komabanus Yasunaga, Ishikawa & Ito, 2013 – Japan (Honshu).

S. neofunereus Schuh, 1984 – Japan (Ryukyu: Okinawa Pref.), Hong Kong, Philippines.

S. potanini (Reuter, 1906) – Japan (Hokkaido, Honshu, Shikoku, Kyushu), Russian Far East, Korea, China.

S. vivariculus Yasunaga & Ishikawa, 2013 – Japan (SW Honshu, Shikoku, Kyushu).

Subtribe **Tuxedoina** Schuh & Menard, 2013

Pseudophylus Yasunaga, 1999

P. esakii Yasunaga & Duwal n. sp. – Japan (Tokyo, SW Honshu, Shikoku) (Fig. 11).

P. flavipes (Nitobe, 1906) – Japan (Hokkaido, N Honshu) (Fig. 11).

**P. stundjuki* (Kulik, 1973) sp. rev. – Korea (Gyeonggi-do), Russian Far East (Khabarovsk and Primorsky Provs.) (Fig. 11).

Key to known Japanese taxa of Leucophoropterini:

- (1) Metathoracic scent efferent system with a developed, projected peritreme (Fig. 6g-i); pro- and mesofemora uniformly creamy yellow or pale reddish brown (Figs. 2a-c, e-f) 2 (*Pseudophylus*)
 - Metathoracic scent efferent system with a small, rather flattened peritreme (Fig. 9f, m-n); pro- and mesofemora more or less darkened basally (Fig. 2h) 3 (*Sejanus*)
- (2) Female larger than male; female vertex 0.52–0.53 times as wide as head across eyes; male antennal segment II shorter than metafemur *P. flavipes*
 - Total body length of female almost equal to that of male; female vertex 0.49–0.50 times as wide as head across eyes; male antennal segment II as long as metafemur *P. esakii* n. sp.
- (3) Hemelytron totally shiny fuscous; base of cuneus sometimes with pale (reddish or whitish) fascia or spots which however are faint, narrow, and indistinct (cf. Fig. 1l) 4
 - Base of cuneus with clear, pale or creamy spots, or a confluent fascia 8
- (4) Apex of metafemur clearly yellow, yellowish brown or yellow-orange 5
 - Metafemur entirely darkened, or its extreme apex only slightly pale 7

- (5) Antennal segment II pale brown with darkened apical 1/3–1/2 (♂) / 1/6 (♀) *S. azumanus* n. sp.
 – More than apical 2/3 (♂) / 1/2 (♀) of antennal segment II darkened 6
- (6) Body larger; total body length more than 2.8 mm (♂) / 2.7 mm (♀); length from apex of clypeus to cuneal fracture greater than 2.0 mm *S. potanini*
 – Body smaller; total body length up to 2.6 mm (♂) / 2.5 mm (♀); length from apex of clypeus to cuneal fracture less than 1.9 mm *S. komabanus*
- (7) Ventral cleft of scent efferent system rounded and shallow (Fig. 9n); warm temperate zone inhabitant from western Honshu, Shikoku, Kyushu and Yakushima Island *S. vivariculus*
 – Ventral cleft of scent efferent system elongate (Fig. 9m); currently known only from subtropical Okinawa Island *S. breviniger*
- (8) Body larger; total body length greater than 3.0 mm; apex of metafemur yellow; temperate and cold temperate zone inhabitant associated with a Japanese walnut *S. juglandis*
 – Body tiny; total body length up to 2.8 mm; metafemur almost totally darkened; currently known only from the subtropical Ryukyu Islands, associated with evergreen broadleaved trees 9
- (9) Antennal segment II longer than 0.88 mm (♂) / 0.74 mm (♀); male antennal segment II wholly black; anterior ivory mark of cuneus usually confluent *S. amami*
 – Antennal segment II up to 0.72 mm; base of male antennal segment II pale; anterior ivory mark of cuneus usually divided into two spots or slightly interrupted medially *S. neofunereus*

2. Genus *Pseudophylus* Yasunaga, 1999

Pseudophylus Yasunaga, 1999: 183 (n. gen.), type species by original designation: *Phylus stundjuki* Kulik, 1973; Kerzhner and Josifov, 1999: 255 (cat.); Yasunaga *et al.*, 2001: 139 (diagnosis); Schuh, 2002-2013 (online catalog); Aukema, 2018 (online catalog).

Rediagnosis:

Distinguished from other leucophoropterine genera by the following combination of characters: Body small, parallel-sided (♂) / ovoid (♀); dorsum uniformly shiny fuscous, with uniformly distributed, simple vestiture; thoracic pleura with distinct mesothoracic (or accessory) evaporatorium (*sensu* Yasunaga and Duwal, 2019) (Fig. 7a); metathoracic scent efferent system with developed peritreme (Fig. 6g-i); pretarsus with hair-like parempodia and moderate-sized pulvilli (Fig. 6p-q); and C- or J-shaped, simple endosoma (vesica) (Figs. 3e-h, 7f, j) with narrowed secondary gonopore (Fig. 7g); narrow bursa copulatrix (Figs. 4b, g, 8a, k) with ovoid, rather thick-rimmed sclerotized rings (Figs. 4d, i, 8b, l); elongate posterior wall that is longer than wide (Figs. 4a, f, 8d, m), with

comb-like scaly microstructure (CLM) on interramal sclerite (IRS) and undifferentiated interramal lobe (IRL) as in Fig. 8e-g, n-p; and relatively long ovipositors (gonapophyses I) (Fig. 8i) with somewhat rounded apex (Figs. 4e, j, 8h, j). *Pseudophylus* species are liable to be confused with a certain species of *Plagiognathus* Fieber, 1858 (Phylini: Oncotylina), such as a dark form of sympatric *Pl. amurensis* Reuter, 1883 or *Pl. collaris* (Matsumura, 1911), but the latter have the clearly spotted and/or striped patterns on the metafemora.

Distribution:

Currently restricted to temperate and cold temperate climatic zones in the eastern Palearctic Region (Japan, Korea, and Russian Khabarovsk and Primorsky Provinces).

Discussion:

Pseudophylus was proposed by Yasunaga (1999) to accommodate a single species known from the far eastern Eurasia, *Phylus stundjuki* Kulik, 1973 (= *Heterocordylus flavipes* Nitobe, 1906). However, subsequent

field investigations by the authors and enthusiastic colleagues in southern part of Japan have yielded an undescribed species exactly belonging to the genus from a variety of broadleaf trees (see Type material section below). In addition, we confirmed that the population occurring in southern Japan (newly discovered species), that of northern Japan (= *flavipes*) and those from Korean Peninsula and the continental Russian Far East (corresponding to *stundjuki*) each represents an independent, valid species. Accordingly, the species from Korea and Russian Far East, which was incorrectly synonymized by Yasunaga (1999), is herein reinstated as valid: *Pseudophylus stundjuki* (Kulik, 1973) sp. rev. (see below).

All three *Pseudophylus* congeners are arboreal and associated with broadleaf hosts (cf. Kerzhner, 1988; Yasunaga *et al.*, 2001). One generation per year is assumed for each species. The adults are found only from late spring to early summer, and the eggs are assumed to hibernate. The genus is assumed to be most closely related to *Sejanus*, from which *Pseudophylus* can be readily distinguished by the characters in above key (couplet 1) and the male and female genitalic structures as: Apex of endosoma with some processes; female sclerotized ring clearly-rimmed and ovoid (Fig. 4d, i); ovipositors (gonapophyses) elongate (Figs. 8i vs. 3i); and posterior wall somewhat narrowed, longer than wide (Figs. 4a, f, 8d vs. 3m, 10d).

The female genitalic structures of *Pseudophylus* are herein documented for the first time. Incidentally, the female genitalia of Leucophoropterini, so far as we recognize, were first treated by Menard and Schuh (2011), providing images for seven valid genera, *Aitkenia* Carvalho & Gross, 1982, *Arafuramiris* Schuh, 1984, *Ausejanus* Menard & Schuh, 2011, *Austrodapus* Menard & Schuh, 2011, *Blesingia* Carvalho & Gross, 1982, *Collessicoris* Carvalho & Gross, 1982 and *Leucophoroptera* Poppius, 1921 and suggesting some new terms (e.g. lateral reduced interramal sclerite – we interpret simply to IRS in this study; posterior margin sclerite on the posterior wall, cf. Fig. 10i-j – also present in *Pseudophylus* (Fig. 8f, o) but absent in a new species of *Sejanus* described below).

Based on our examination depending upon a tabletop SEM, the interramal lobes bear «comb-like scaly microstructure (CLM)» (cf. Figs. 8e, n, 10e, n). On the other hand, the anterior median surface of the posterior wall (which at first sight seems simply membranous when observed by compound or stereoscopic

microscopes as in Figs. 3m, 4a, f) is densely covered with «spinulate scale-like microstructure (SSM)» (cf. Fig. 8g, p). Similar shape of the SSM is present in other phytine taxa (cf. Fig. 10h, k) and also recognized on the «interramal lobes» in many taxa of the subfamily Mirinae (Yasunaga, 2019; and personal observation) and Orthotylinae (Yasunaga and Shishido, 2020). Therefore, we provisionally regard the anterior median part with SSM as «undifferentiated» interramal lobe (IRL). Contrastingly, the IRL is distinctly developed and furnished with strong spines in *Campylomma lividum* Reuter, 1885 (Nasocorini) (Fig. 10l) or most species of *Pilophorus* Hahn, 1826 and *Pherolepis* Kulik, 1968 (Pilophorini) (cf. Fig. 10m; Yasunaga *et al.*, 2021), as in other subfamilies (Mirinae, Orthotylinae). In *Sejanus azumanus* n. sp., the IRL and IRS are not clearly demarcated by the posterior margin sclerite (*sensu* Menard and Schuh, 2011) (cf. Fig. 10e).

The posterior margin sclerite (PMS) on the posterior wall was recognized in some taxa of Leucophoropterini (Menard and Schuh, 2011) as well as *Pseudophylus* members (Fig. 8f, o). This structure was also confirmed on the posterior walls of *Europiella artemisiae* (Becker, 1864) (Fig. 10i-j) and *E. decolor* (Uhler, 1893) (Phylini: Oncotylina), *Psallus* (*s. str.*) *nigricornis* Yasunaga & Vinokurov, 2000 (Phylini: Phylina) (Fig. 10k), and *Campylomma lividum* Reuter, 1885 (Nasocorini) (Fig. 10l).

As a side note, *Decomia cephalotes* Poppius, 1915 (Decomiini) has the posterior wall noticeably elongate (Fig. 10n). Its anterior part is densely covered with the spinules of comb-like scaly microstructure and margined laterally by the narrow posterior margin sclerites (PMS). On the posterior wall of a hallopine runner plant bug, *Hallopodus ravenar* (Kirkaldy, 1902) (Hallopodini), known to uniquely prefer epigeic habitat (Tamada *et al.*, 2020), the PMS is not present but the interramal lobe (IRL) is distinctly arising and spinulate (Fig. 10o), reminiscent of those possessed by certain members of the subfamily Orthotylinae. In contrast, *Tytthus chinensis* (Stål, 1859) (Semiini) has the simplest posterior wall that lacks the PMS (Fig. 10p), similar to *Sejanus* species.

Based on available evidence, we currently conclude that some of the above-mentioned characters may be applicable to the suprageneric classification of the Phytinae. However, the taxa we have examined are limited, and much broader survey on the microstructures in the female genitalia are furthermore required.

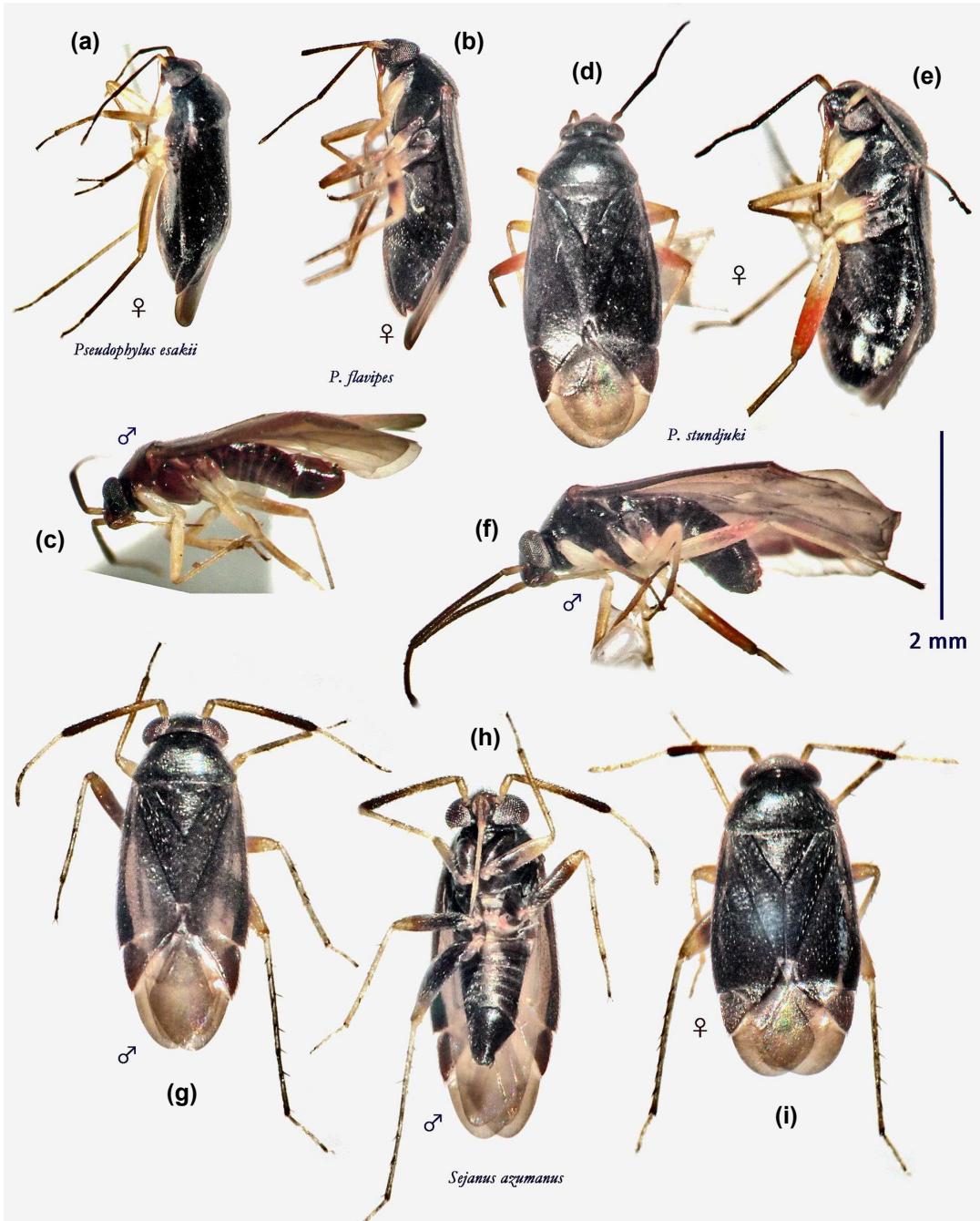


FIGURE 2. Lateral (a-c, e-f), dorsal (d, g, i) and ventral (h) habitus images of *Pseudophylus* and *Sejanus* species, dry-preserved specimens: (a) *P. esakii* n. sp.; (b)-(c) *P. flavipes*; (d) *P. stundjuki* (from Primorsky, Russia); (e)-(f) Ditto (Suwon, Korea); (g)-(i) *S. azumanus* n. sp.

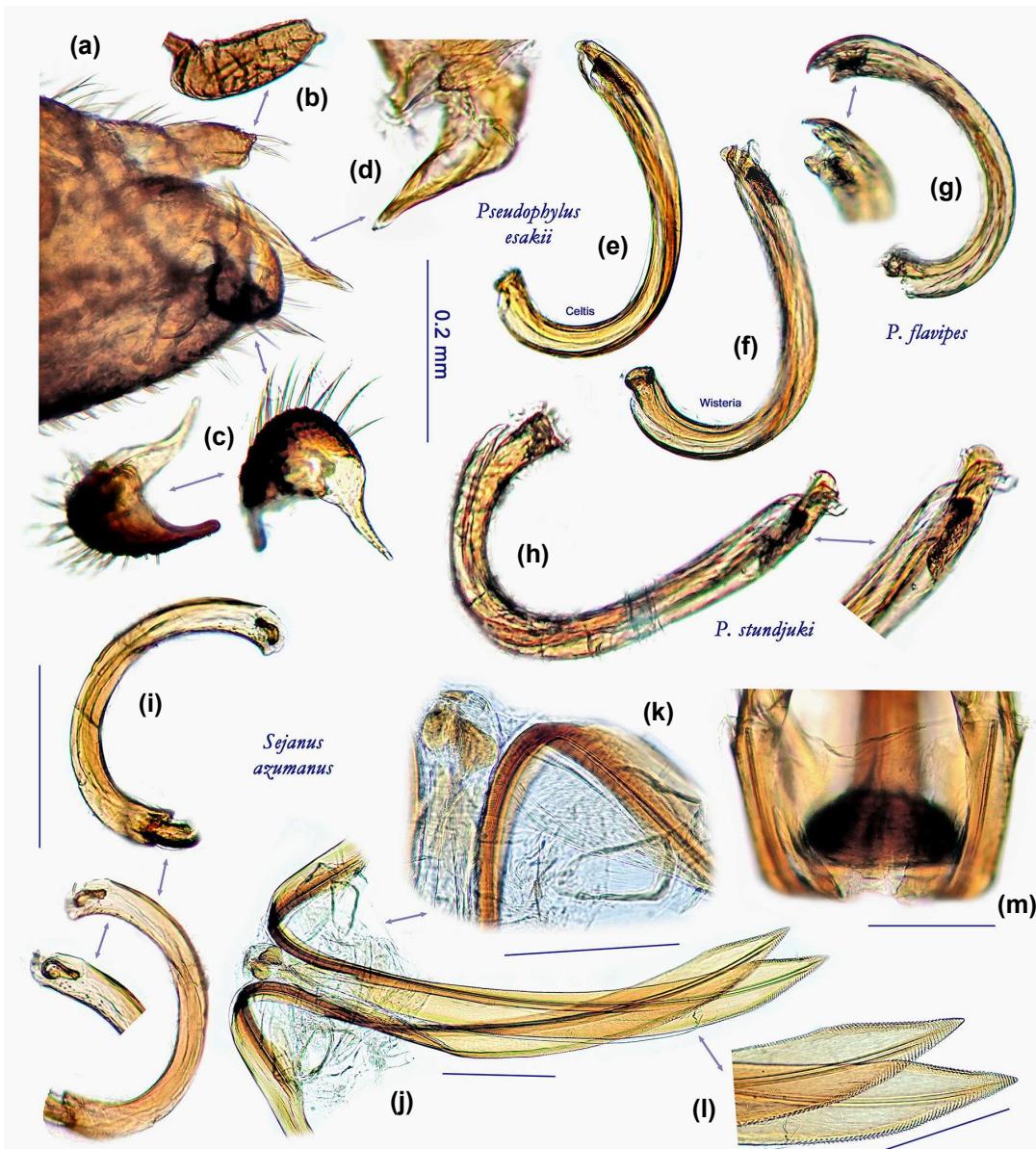


FIGURE 3. Male (a-i) and female (j-m) genitalia of *Pseudophylus* and *Sejanus* species: (a)-(f) *P. esakii* n. sp.; (g) *P. flavipes*; (h) *P. stundjuki*; (i)-(m) *S. azumanus* n. sp. / (a) Pygophore, left-lateral view; (b) Right paramere; (c) Left paramere; (d) Phallotheca; (e-h), (i) Endosoma (vesica); (j) Ramus of gonapophysis I and adjacent structure; (k) Sclerotized ring and vestibular sclerite; (l) Apex of ovipositor; (m) Posterior wall (Scale bars = 0.2 mm).

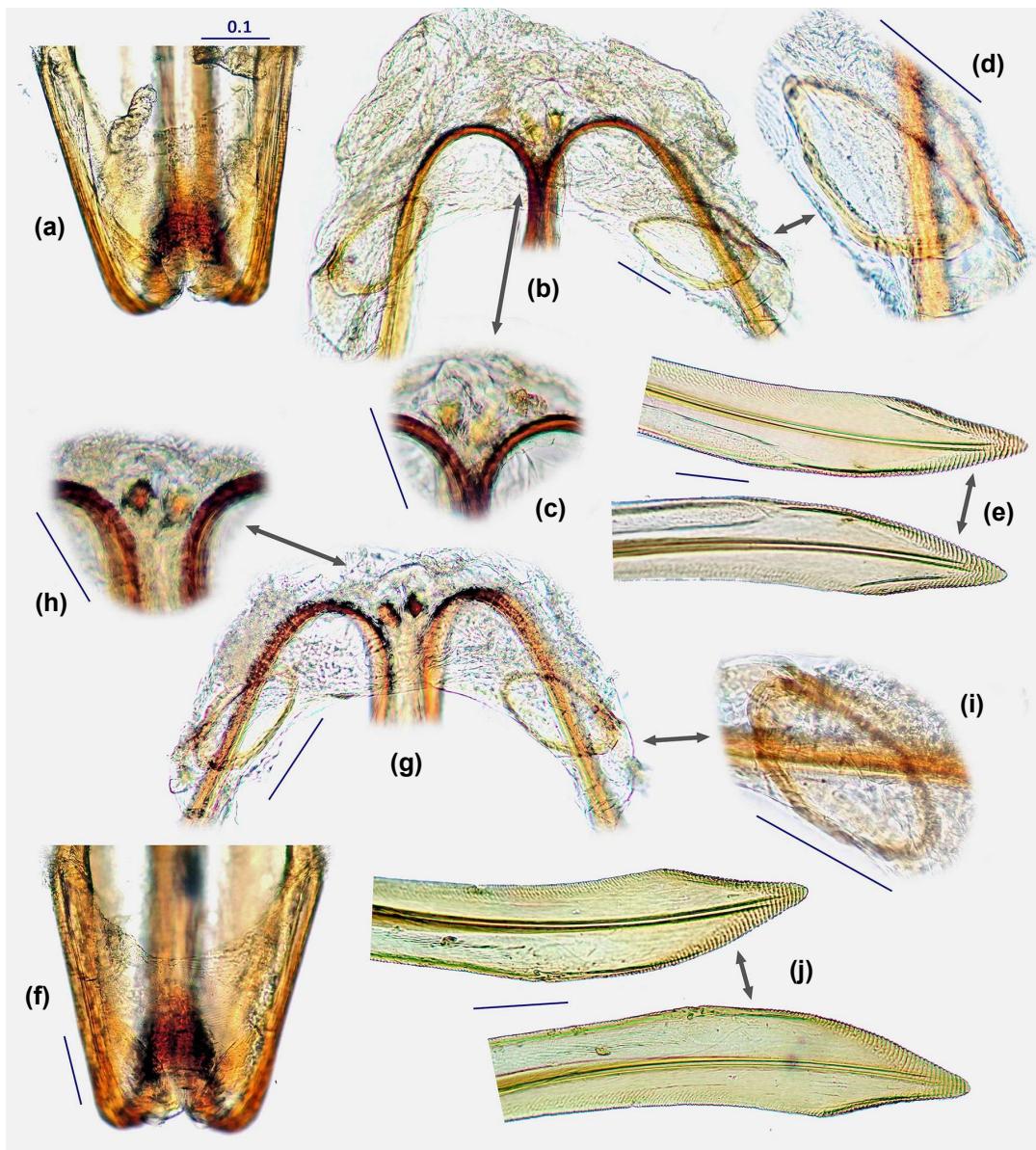


FIGURE 4. Female genitalia of *Pseudophylus esakii* n. sp. (a-e) and *P. flavipes* (f-j): (a), (f) Posterior wall of bursae, anterior view; (b), (g) Bursa copulatrix, dorsal view; (c), (h) Vestibular sclerites, ventral view; (d), (i) Sclerotized ring; (e), (j) Ovipositor (gonapophysis I) (Scale bars = 0.1 mm).

***Pseudophylus esakii* n. sp.**

(Figs. 1b-f, 2a, 3a-f, 4a-e, 6a, d, g, j, m, p, 7a-b, d-g, 8a-h, 11)

Pseudophylus sp.: Schuh and Menard, 2013: 24 (classification); Menard *et al.*, 2014: 398, figs. 3-5 (phylogenetic position).

Type material:

HOLOTYPE: ♂, JAPAN: Shikoku, Kochi Pref., Towa Village [= current Shimanto Town, Showa], Mishima, along Simanto River, 33.22, 132.90, on *Celtis sinensis* Pers., 3-4 May 2011, M. Takai (AMNH) (AMNH_PBI 00380683).

PARATYPES: 56 ♂♂ + 140 ♀♀:

1 ♂: JAPAN: Honshu, Tokyo, Mitaka City, Inokashira Park, 35.700, 139.577, no host data, 11 May 1997, T. Shimada (TYCN).

1 ♂ + 3 ♀♀: Honshu, Osaka Pref., Taisho-ku, Chidori Park, 34.6488, 135.4744, on *Machilus thunbergii* Siebold & Zucc. with aphids, 5 May 2020, A. Ichikawa (TYCN) (1 ♂ with USI: 00380684).

3 ♂ + 3 ♀♀: Honshu, Hyogo Pref., Himeji City, Tadera, Yasumuro Park, 34.8544, 134.6745, on *Aphananthe aspera* (Thunb.) Planch. (Cannabaceae), 12 May 2009, B. Shishido (SCH).

2 ♂♂ + 61 ♀♀: Honshu, Okayama Pref., Okayama City, Tsushima, 34.69, 133.92, *Wisteria floribunda* planted for landscaping (wisteria-trellis), 14 May 2002, T. Yasunaga (TYCN) (2 ♀♀ with USI: 00380685).

1 ♂ + 2 ♀♀: Same locality and plant, 9 May 2003, B. Shishido (SCH).

1 ♂ + 1 ♀: Honshu, Hiroshima Pref., Onomichi City, In'noshima Is., Obama, 34.35, 133.17, *Daphniphyllum macropodum* Miq. (Daphniphyllaceae), 3 May 2009, B. Shishido (SCH).

25 ♂♂ + 13 ♀♀: Shikoku, same data as for holotype (CNC).

22 ♂♂ + 21 ♀♀: Shikoku, same data as for holotype, except for date 27 Apr 2002 (CNC).

35 ♀♀: Shikoku, same data as for holotype, except for date 11 May 2021 (TYCN).

1 ♀: Shikoku, Kagawa Pref., Takamatsu City, Kinbuchi Park, 34.24, 134.11, *Wisteria floribunda* planted for landscaping (wisteria-trellis), 5 May 2003, B. Shishido (SCH).

Diagnosis:

Recognized by its moderate size; body length of male as long as that of female; relatively narrow orifice of scent efferent system; sometimes obscured metafemur; tapered apex of right paramere; and J-shaped, simple endosoma (vesica) with a small process at apex. The final instar nymph (Fig. 1e) has shiny reddish brown general coloration; almost glabrous dorsum;

darker head, pronotum and wing-pads; and creamy yellow antennae and legs, except for reddish basal part of metafemur.

Distinguished from its closest congener, *P. flavipes* (Nitobe, 1906), by the characters mentioned in the key, in addition to the narrower scent gland orifice (Fig. 7b *vs.* 7c), tapered apex of right paramere (Fig. 7e *vs.* 7i) and simpler apical structure of endosoma (Fig. 7g *vs.* 7k).

Description:

Male: Macropterous. Body elongate, nearly parallel-sided, moderate in size; dorsal surface uniformly fuscous, shining, with uniformly distributed, brownish, simple, semierect setae, lacking additional vestiture (Figs. 1b-d, 6d). Head weakly produced anteriorly; vertex carinate basally. Antenna chocolate-brown; segment I pale orange brown, about as thick as II; segment II about as long as labium, basal width of pronotum or metafemur, somewhat incrassate; segment III filiform. Labium shiny reddish brown, apex reaching but not exceeding apex of mesocoxa. Pronotum rather polished, minutely punctate; scutellum flat; pleura dark brown, partly tinged with red, with sparsely distributed, simple, reclining setae (Fig. 6d); mesothoracic (accessory) evaporatorium as in Fig. 6g; metathoracic scent efferent system grayish brown, with rather narrow orifice and peritreme (Figs. 6g, 7b). Hemelytron shining, uniformly fuscous; membrane grayish brown, with slightly darkened veins. Legs pale brown, each femur sometimes tinged with orange (*cf.* Fig. 1c-d); metafemur more or less darkened, or faintly striped (*cf.* Fig. 2a); meta-tarsomere II slightly longer than III (Fig. 6j); pretarsal structure as in Fig. 6p; parempodia setiform, rather short. Abdomen shiny dark brown, in male sometimes reddish brown.

Male genitalia (Figs. 3a-f, 6m, 7d-g): Phallotheca developed, with sharpened apical part (Figs. 3d, 7d); right paramere rather short, tapered apically, with tiny hypophysis (Figs. 3b, 7d-e); left paramere with somewhat bulbous sensory lobe and sharp hypophysis (Fig. 3c); endosoma (vesica) J-shaped (Fig. 3e-f), with narrowed secondary gonopore and small apical appendage (Fig. 7g).

Female: As in male, but body oval, wider than male (Fig. 1b, d). Antennal segment II rather slender, shorter than basal width of pronotum, labium or metafemur.

Female genitalia (Figs. 4a-e, 8a-h): As mentioned in generic diagnosis; sclerotized ring ovoid, somewhat narrowed inward (Figs. 4d, 8b); spinules of comb-like scaly microstructure (CLM) rather short (Fig. 8e);

spinulate scale-like microstructure (SSM) on interramal lobe (IRL) narrow (Fig. 8g).

Measurements:

See Table 1. Holotype male: Total length of body 3.45; head width across eyes 0.71; vertex width 0.29; lengths of antennal segments I–IV 0.24, 1.05, 0.48, 0.41; length of labium 1.02; basal width of pronotum 1.05; maximum width across hemelytron 1.29; and length of metafemur 1.08, tibia 1.64 and tarsus 0.42.

Etymology:

Named in honor of Dr. Teizo Esaki (1899–1957), professor of Kyushu University, Fukuoka, who was the first Japanese contributor to many heteropteran groups. A noun in genitive, invariable.

Biology:

Both adults and immature forms of this new species were found from a variety of broadleaf trees. *Celtis sinensis* Pers. (Cannabaceae), *Machilus thunbergii* Siebold & Zucc. (Lauraceae) and *Wisteria floribunda* (Willd.) DC. (Fabaceae), which yielded immature forms, were confirmed as the breeding hosts and, therefore, the mirid does not appear host plant specific but positive predation on aphids was observed on *Celtis sinensis* and *Machilus thunbergii* (Takai and Ichikawa, pers. comm.). The adults of this univoltine mirid appear only in a short period between late April and mid-May. The newly emerged adult has bright red general coloration (Fig. 1f).

The gregarious adults and late instar nymphs of *Pseudophylus esakii* were collected at parks or school campuses in urbanized environments and sometimes induce curly and/or punctate host leaves, although the species is considered to be a Satoyama-element (cf. Berglund, 2008). This bug appears to be expanding its habitats from the Satoyama to city zones as in many heteropterans utilizing a Japanese Sakura-cherry, *Prunus × yedoensis* Matsum. (Rosaceae) or a Japanese elm, *Zelkova serrata* (Thunb.) Makino (Ulmaceae), broadly planted everywhere (cf. Yasunaga et al., 2018).

Pseudophylus flavipes (Nitobe, 1906)

(Figs. 1a, 2b–c, 3g, 4f–j, 5, 6b, e, h, k, n, q, 7c, h–k, 8i–p, 11)

Heterocordylus flavipes Nitobe, 1906: 19 (n. sp., as *Heterocordylus flavipes* Mats.); Mitsuhashi, 1909: 337 (list); Munakata, 1909: 363, pl. 18 (diag, as *H. flavipes* Mats.); Nawa, 1916:

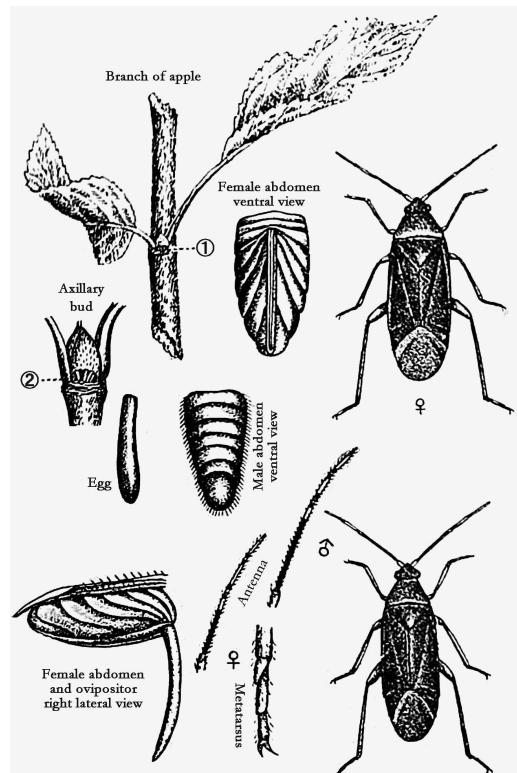


FIGURE 5. *Pseudophylus flavipes*, illustrated by Munakata (1909, plate 18), named on the figure (translated from Japanese): (1) Oviposited point; (2) New immature form moving to this position after hatch and hiding under base of newly developed leaf.

324 (record from central Honshu, as *H. flavipes* Mats.); Yasunaga et al., 1996: 92 (lectotype designation) [Mats. = Matsumura: Nitobe (1906) and some subsequent works ascribed the authorship to Prof. S. Matsumura (who had identified it and suggested the new name); however, Nitobe should be the author of the species (Yasunaga et al., 1996)].

Phylus stundjuki Kulik, 1973: Yasunaga et al., 1996: 93 (syn. n.) [new combination resulted in a junior secondary homonym of *Phylus flavipes* (Scopoli, 1763)].

Pseudophylus stundjuki (Kulik, 1973): Yasunaga, 1999: 183 (comb. n., diag.).

Pseudophylus flavipes (Nitobe, 1906): Yasunaga et al., 2001: 179 (diagnosis); Aukema et al. (2013): 329 (cat.); Aukema, 2018 (online catalog) [as stated by Aukema et al. (2013), after transfer of the species from *Phylus* to *Pseudophylus* (Yasunaga 1999), the secondary homonym *flavipes* Nitobe is no longer congeneric with *Phylus flavipes* (Scopoli, 1763) and the specific name is regarded as valid].

Material examined:

JAPAN: Hokkaido, Asahikawa City, Etanbetsu, Kyowa-Nakazono, 43.841, 142.267, on *Maackia amurensis*, 5 Jul 1999, T. Yasunaga, 2 ♂♂ + 1 ♀ (TYCN); Hokkaido, Asahikawa City, Etanbetsu, Kasuga near Mt. Inoh, 43.77, 142.26, on *Ulmus davidiana*, 19 Jul 1998, T. Yasunaga, 1 ♀ (TYCN) (AMNH_PBI 00380686); Hokkaido, Tomakomai City, Takaoka, Hokkaido Univ. Exp. Forest, 42.6767, 141.5988, on *Malus toringo*, 13 Jul 1998, S. Yamashita, 1 ♂ (TYCN) (00380687); same locality and plant, 16 Jul 1998, T. Yasunaga, 2 ♀♀ (TYCN).

Diagnosis:

Distinguished from other congeners by the characters mentioned in above key, and the following features: Short right paramere with broadened hypophysis (Fig. 7i); metathoracic scent efferent system with widely opened orifice and developed peritreme (Figs. 6h, 7c); slightly or obscurely darkened basal part of metafemur (Fig. 2b-c); nearly C-shaped endosoma (vesica) (Figs. 3g, 7j) with a sharp, slender process at apex and two broader processes (Fig. 7k); oval sclerotized ring (Fig. 4i); and broad apical part of gonapophysis I (Fig. 4j).

Munakata (1909) diagnosed and illustrated the adults in detail (Fig. 5), on the basis of observation of samples associated with apple trees. Some useful taxonomic characters provided by him are herein translated from Japanese: Total body length 3.0–3.6 mm; general coloration blackish brown (male somewhat paler); antenna dark brown, except for segment I pale; labium yellowish brown; coxae and trochanters whitish; legs pale yellow; abdomen fuscous; and egg slender, slightly curved, with length about 0.6 mm / diameter 0.12 mm.

Measurements:

See Table 1.

Biology:

Nitobe (1909) and Munakata (1909) documented that: (1) this mirid has a univoltine life cycle and hibernates in the egg stage; (2) the first instar immature forms usually hatch from late April to early May; (3) the adults emerge between early and middle June and disappear after middle July; and (4) not only apples but also pears may be damaged by aggregation of the bug. Nitobe (1909) also described and illustrated the late instar nymphs (the illustrations are quite schematic and cannot be applicable to identification, however). The observations and figures by Munakata (1909) were more detailed (cf. Fig. 5).

In late 1990s, a few specimens of this rare species were rediscovered from several deciduous trees, such as *Maackia amurensis* Rupr. & Maxim. (Fabaceae), *Malus toringo* (Sieb.) Sieb. (Rosaceae) and *Ulmus davidiana* Planch. (Ulmaceae) in Hokkaido, the northernmost part of Japan. Nonetheless, our field investigations have not confirmed any immature forms, possibly due to very low population density of *P. flavipes*.

Remarks:

Although *Pseudophylus flavipes* was known as one of the most serious pests injurious to apple in early 20th century (Munakata, 1909; Nishitani, 1913, 1917; Nawa, 1916), subsequent pest management using chemical pesticides appears to cause excessive reduction of the mirid population. Nishitani (1913) recommended to knock off or use pyrethroid-soap solution or pyrethroid-petroleum emulsion for controlling the bug. Ironically, this species was eventually categorized as NT (near threatened) by Japanese Ministry of the Environment (cf. <http://jpnrdb.com/index.html>) in the early 21st century.

***Pseudophylus stundjuki* (Kulik, 1973) sp. rev.**

(Figs. 2d-f, 3h, 6c, f, i, l, 7l-o, 11)

Phylus stundjuki Kulik, 1973: 22 (n. sp.).

Pseudophylus stundjuki: Yasunaga, 1999: 183 (comb. n., syn. n., diag.); Duwal and Lee, 2011: 56 (diagnosis).

Pseudophylus flavipes (Nitobe, 1906) (part): Yasunaga *et al.*, 2001: 179 (n. syn.); Aukema *et al.*, 2013: 329 (cat.); Schuh and Menard, 2013: 24 (classification); Menard *et al.*, 2014: 398, figs. 3-5 (phylogenetic position); Aukema, 2018 (online catalog).

Material examined:

KOREA: Gyeonggi-do, Suwon City, SNU Arboretum, 37.167, 127.056, on *Pyrus ussuriensis*, 20 May 2009, R.K. Duwal, 3 ♂♂ 2 ♀♀ (SNU) (1 ♂ with USI: 00380688).

RUSSIA: Primorsky Kray, 10 km E of Novaya Moskva, 43.339, 132.905, on *Artemisia* sp., 20 Jul 1993, T. Yasunaga, 1 ♀ (TYCN) (00380689).

Diagnosis:

Distinguished from the other two congeners by the following distinctive characters: Male longer than female (Fig. 2d-e) due to elongate wings (Fig. 2f); apical half of metafemur bright orange-red; metathoracic scent efferent system with comparatively

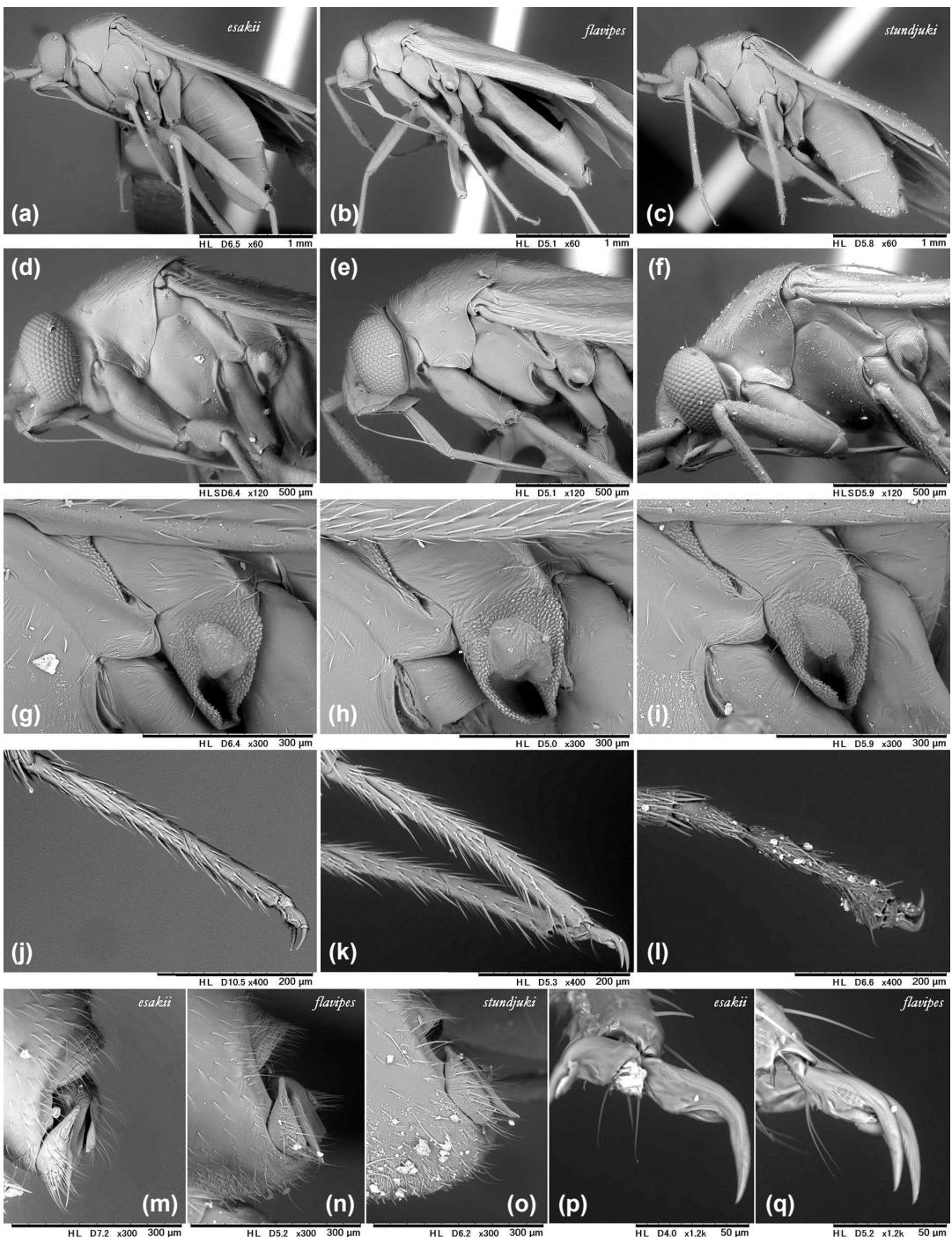


FIGURE 6. Scanning electron micrographs for *Pseudophylus esakii* n. sp. (a, d, g, j, m, p), *P. flavipes* (b, e, h, k, n, q) and *P. stundjuki* (c, f, i, o): (a)-(c) Left lateral habitus; (d)-(f) Anterior body, left lateral view; (g)-(i) Pleurites and scent efferent system; (j)-(l) Metatarsus; (m)-(o) Male genital segment, left lateral view; (p)-(q) Pretarsal structure of metaleg.

narrow orifice and ovoid peritreme (Fig. 6i); long right paramere (Fig. 7n); and J-shaped, broad endosoma (vesica) with larger apical elaboration (Figs. 3h, 7o).

Measurements:

See Table 1.

Biology:

Kerzhner (1988) reported its host association with a Chinese pear, *Pyrus ussuriensis* Maxim. (Rosaceae) in Russia. The second author also collected several individuals from same plant at an arboretum in Suwon, South Korea. The tree was seriously damaged and was observed with an abundant sticky substance. Due to significant damage, it was hard to say whether it was blooming or fruiting season but damaged flowers and early fruits were observed in the sweeping net. Currently the immature forms are still unknown. One adult female was found from *Artemisia* sp. in Russian Primorsky Territory, but was probably occasional.

Remarks:

Pseudophylus stundjuki was described by Kulik (1973) from Khabarovsk, Russia, and Yasunaga (1999) subsequently synonymized it with the Japanese *P. flavipes* (Nitobe). As mentioned above, however, the populations of Korea and Russia are evidently distinct from *P. flavipes*, and Kulik's species is herein restored as valid.

3. Genus *Sejanus* Distant, 1910

This speciose genus has been well defined by several comprehensive works; Schuh (1984) and Menard and Schuh (2014) provided detailed information (synonymic lists, diagnostic characters including male and female genitalia, redescriptions and discussions).

Sejanus azumanus n. sp.

(Figs. 1g-i, 2g-i, 3i-m, 9a-l, 10a-g, 11)

Type material:

HOLOTYPE: ♂, JAPAN: Honshu, Akita Pref., Shin'ya Town, Omono River estuary, 39.69, 140.07, *Elaeagnus umbellata*, 19 Aug 2019, Y. Nakagawa (AMNH) (AMNH_PBI 00380690).

PARATYPES: 12 ♂♂ + 12 ♀♀:

6 ♂♂ + 5 ♀♀: Same data as for holotype (CNC, TYCN).

2 ♂♂ + 3 ♀♀: Same data, except for date, 4 Aug 2017 (AMNH, TYCN).

4 ♂♂ + 4 ♀♀: JAPAN: Honshu, Tochigi Pref., Nikko City, Shichiri, 36.73, 139.63, *Elaeagnus umbellata*, 18 Jun 2020, S. Machara (TYCN) (1 ♂ with USI: 00380691).

Diagnosis:

Recognized by its small size; totally fuscous dorsum; female antennal segment II narrowly darkened at apical 1/5–1/4; and darkened meso- and metafemora with yellowish apices (Fig. 2h). The final (5th) instar nymph (Fig. 1i) has reddish brown general coloration; creamy yellow antenna with slightly darkened apex of segment II; darkened meso- and metanota including wing-pads; and uniformly yellow legs.

Distinguished from its assumed closest congener, *S. komabanus* Yasunaga, Ishikawa & Ito, 2013 by narrower body shape (Fig. 1h vs. 1k); narrowly darkened apical part of antennal segment II (*cf.* Fig. 1k); almost uniformly pale brown profemur; and slightly darkened apex of antennal segment II and almost entirely creamy yellow femora of 5th instar immature (Fig. 1i).

Description:

Male: Macropterous. Body elongate oval, subparallel-sided, small; dorsal surface totally fuscous, shining, with uniformly distributed, pale, simple, semierect setae, lacking additional vestiture (Figs. 1g-h, 2g, i). Head weakly rounded anteriorly; vertex carinate basally. Antenna creamy yellow, rather short; segment I about as thick as II; apical 1/3–2/5 of segment II dark reddish brown. Labium pale brown, reaching apex of metacoxa (Fig. 9c); apical half of segment IV darkened. Pronotum polished, minutely punctate; scutellum flat; pleura dark brown, with sparsely distributed, simple, reclining setae (Fig. 9f); metathoracic scent efferent system grayish brown, with rounded orifice and ear-like peritreme (Fig. 9f). Hemelytron shining, uniformly fuscous; basal margin of cuneus sometimes faintly pale; membrane including veins pale grayish brown. Legs dark brown; profemur pale brown (Fig. 2h); apex of meso- and metafemora and all tibiae pale brown; metafemur tumid (Fig. 9g); apical half of each tarsomere III brown; meta-tarsomere II about as long as III (Fig. 9h); pretarsal structure as in Fig. 9i; parempodia setiform, short; pulvilli somewhat rectangular. Abdomen shiny dark brown.

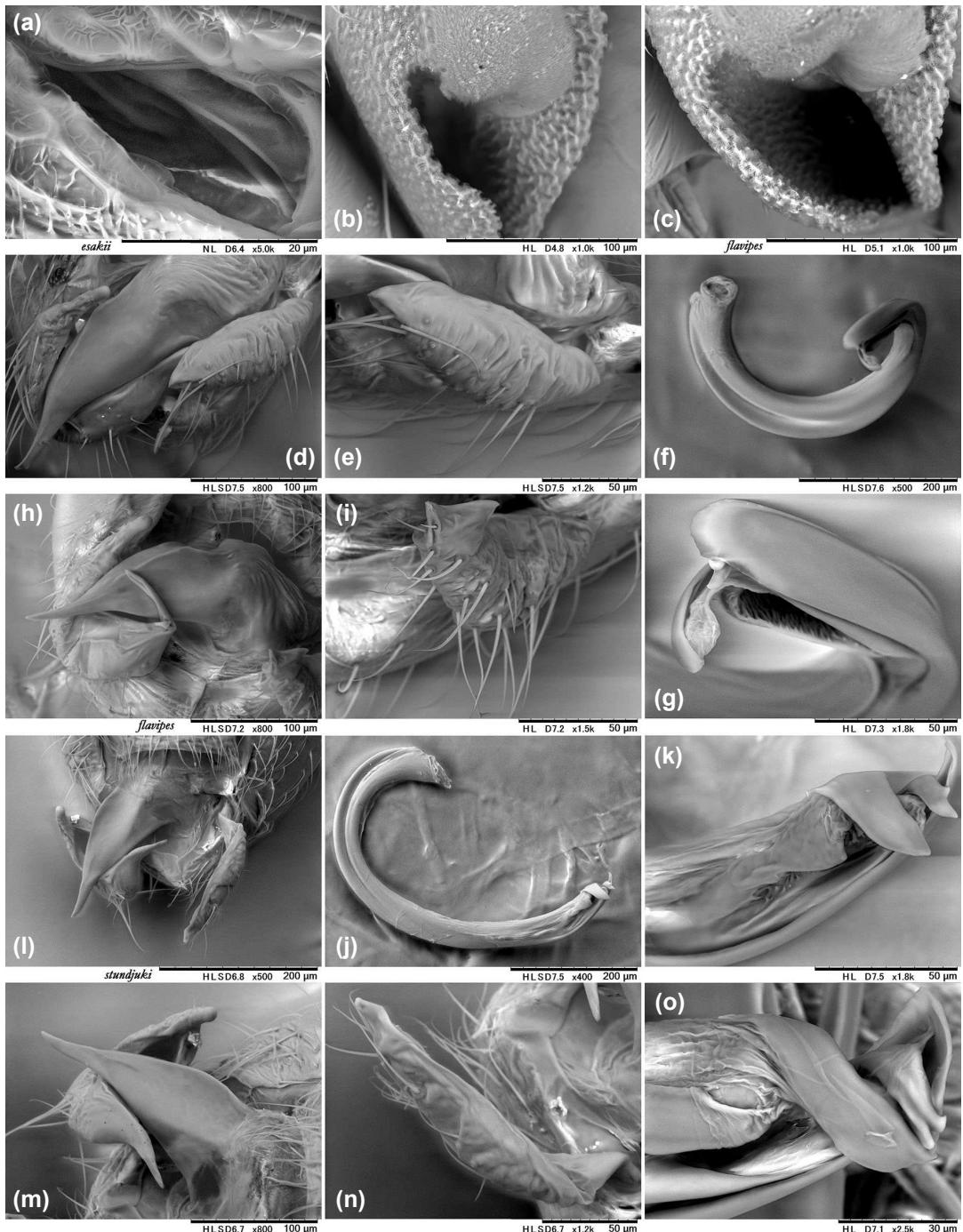


FIGURE 7. Scanning electron micrographs for *Pseudophylus esakii* n. sp. (a-b, d-g), *P. flavipes* (c, h-k) and *P. stundjuki* (l-o): (a) Mesothoracic (or accessory) evaporatorium (*sensu* Yasunaga and Duwal, 2019); (b)-(c) Metathoracic scent efferent system; (d), (h), (l), (m) Apical part of pygophore; (e), (i), (n) Right paramere; (f), (g), (j), (k), (o) Endosoma (vesica).

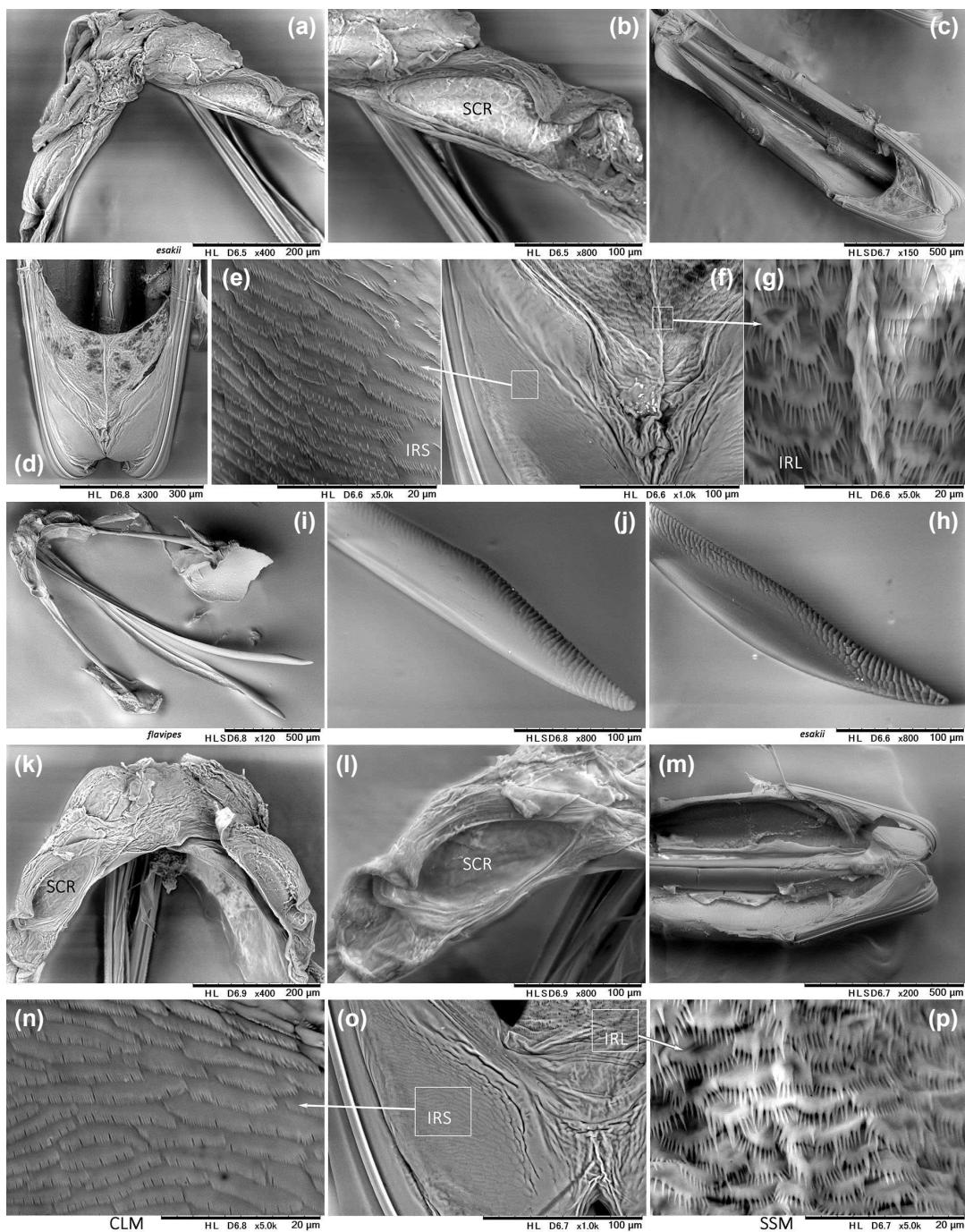


FIGURE 8. Scanning electron micrographs of the female genitalia for *Pseudophylus esakii* n. sp. (a-h) and *P. flavipes* (i-p): (a), (k) Bursa copulatrix with sclerotized rings, dorsal view; (b), (l) Sclerotized ring; (c)-(g), (m)-(p) Posterior wall; (e), (n) Interramal sclerite; (g), (p) Undifferentiated interramal lobe; (h), (j) Apex of ovipositor (gonapophysis I); (i) Bursa copulatrix with gonapophysis I.

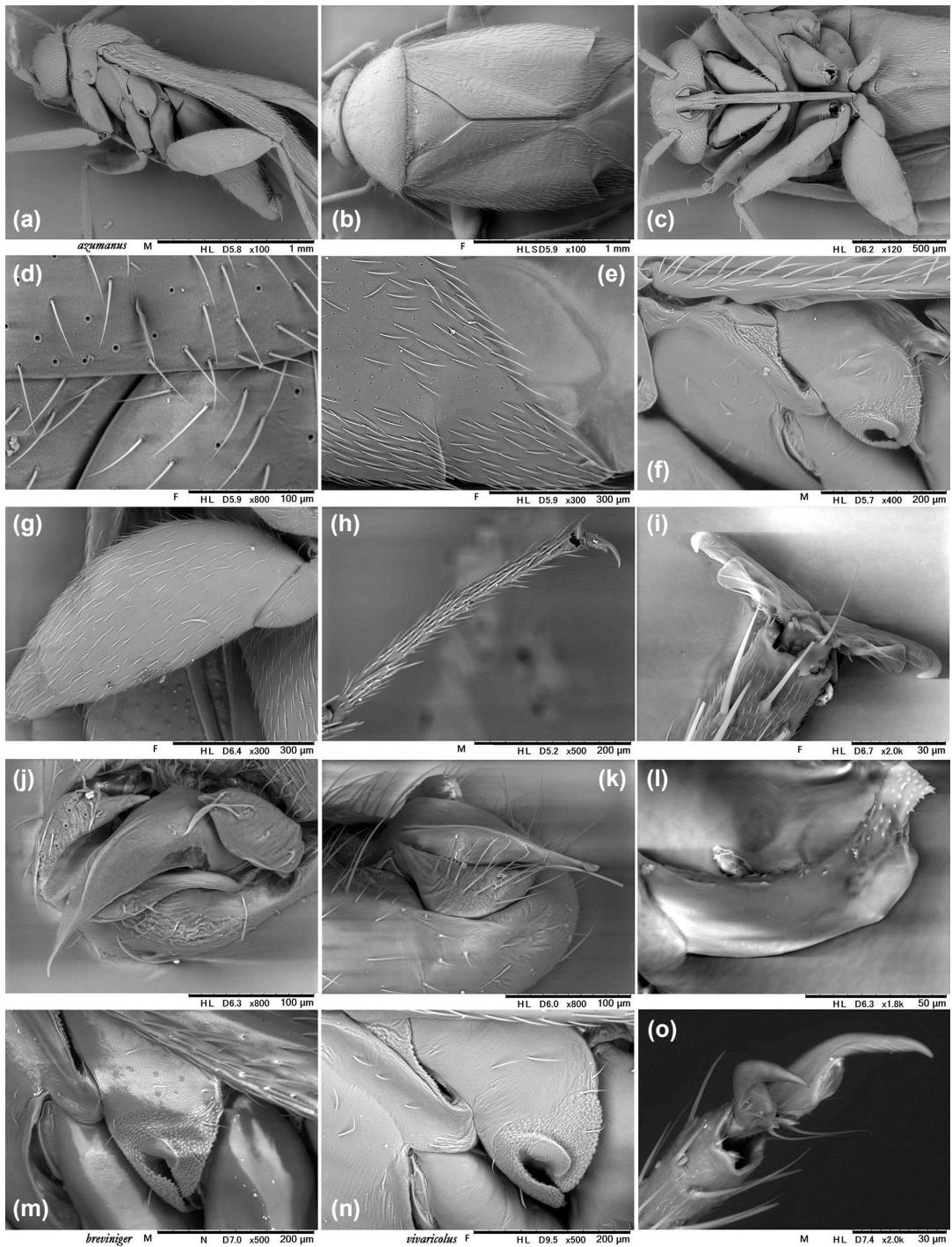


FIGURE 9. Scanning electron micrographs for *Sejanus azumanus* n. sp. (a-l), *S. breviniger* (m) and *S. vivariculus* (n-o): (a) Left lateral habitus; (b) Dorsal habitus; (c) Ventral habitus; (d) Pronotum, scutellum and corium; (e) Posterior forewing; (f), (m)-(n) Thoracic pleurites; (g) Metafemur; (h) Metatarsus; (i), (o) Pretarsal structure of metaleg; (j)-(k) Apex of pygophore; (l) Apex of endosoma (M = male; F = female).

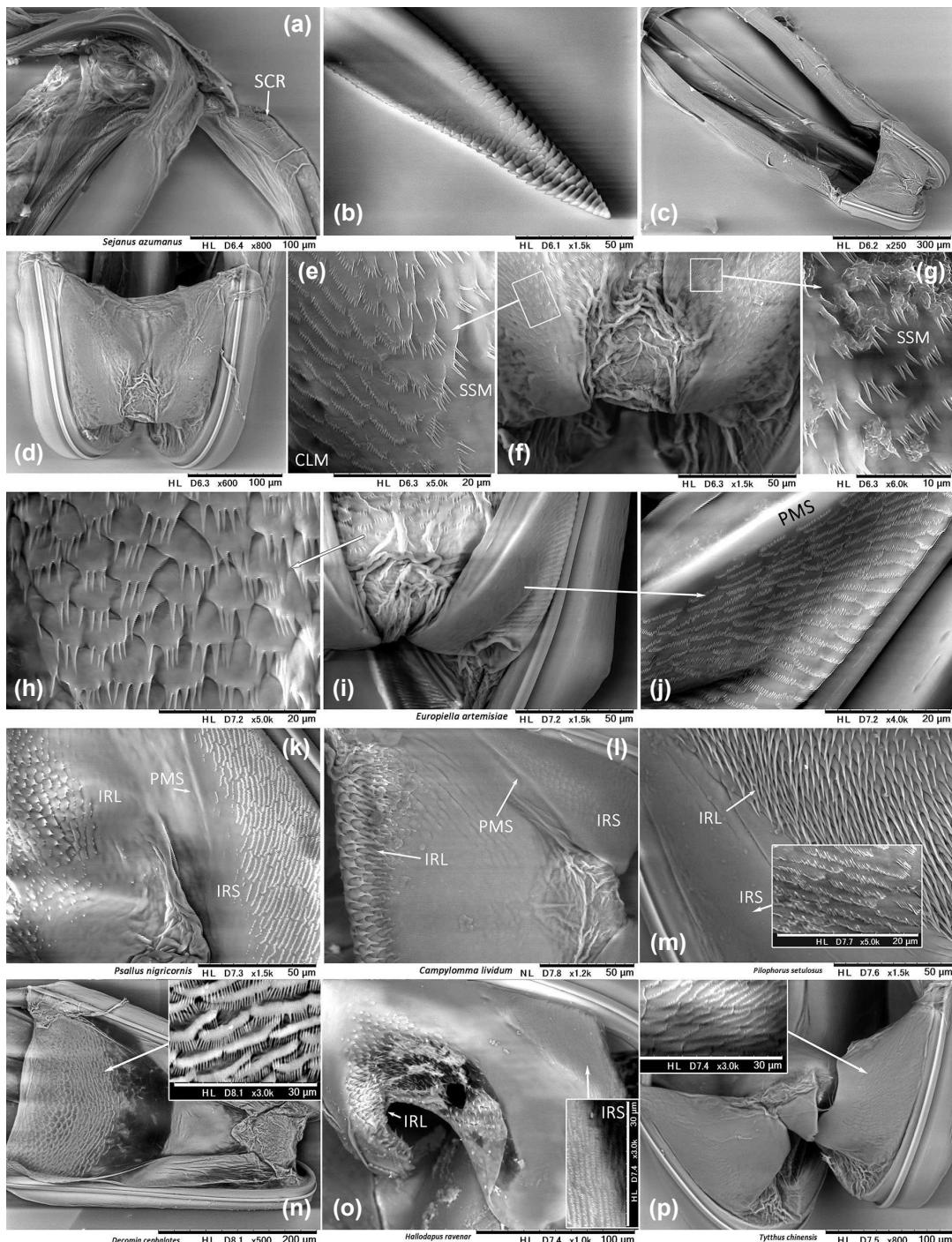


FIGURE 10. Scanning electron micrographs of the female genitalia for *Sejanus azumanus* n. sp. (a-g), *Europiella artemisiae* (Becker, 1864) (h-j), *Psallus nigricornis* Yasunaga & Vinokurov, 2000 (k), *Campylomma lividum* Reuter, 1885 (l), *Pilophorus setulosus* Horváth, 1905 (m), *Decomia cephalotes* Poppius, 1915 (n), *Hallodapus ravenar* (Kirkaldy, 1902) (o) and *Tytthus chinensis* (Stål, 1859) (p): (a) Bursa copulatrix with sclerotized ring, dorsal view; (b) Ovipositor (gonapophysis II); (c) Gonapophyses I with posterior wall; (d), (f), (i), (k)-(p) Posterior wall, dorsal view; (e) Border zone between interramal sclerite and undifferentiated interramal lobe; (g), (h) Undifferentiated interramal lobe; (j) Interramal sclerite (Abbreviations: IL = (undifferentiated) interramal lobe; IS = interramal sclerite; SR = sclerotized ring).

Male genitalia (Figs. 3i, 9j-l): Phallotheca sharply tapered towards apex (Fig. 9j-k); right paramere with small, pointed hypophysis (Fig. 9j); endosoma (vesica) C-shaped, with spirally sigmoid secondary gonopore (Fig. 3i) and minute spines apically (Fig. 9l).

Female: As in male, but body slightly shorter, oval, wider than male (Figs. 1h, 2i). Antennal segment II slenderer and shorter, with apical 1/5–1/4 narrowly darkened.

Female genitalia (Figs. 3j-m, 10a-g): Generally simple in form; sclerotized ring thin-rimmed, rather rectangular (Figs. 3k, 10a); vestibular sclerite somewhat bulbous (Fig. 3k); posterior wall almost simply membranous when observed by compound microscope (Fig. 3m), but surface of interramal sclerite and undifferentiated interramal lobe covered with microstructures as in Fig. 10e-g.

Measurements:

See Table 1. Holotype male: Total length of body 2.52; head width across eyes 0.69; vertex width 0.27; lengths of antennal segments I–IV 0.20, 0.80, 0.42, 0.27; length of labium 0.90; basal width of pronotum 0.87; maximum width across hemelytron 1.05; and length of metafemur 0.81, tibia 1.37 and tarsus 0.39.

Etymology:

Named for Azuma, ancient name of northern Honshu, where this new species occurs. A Latinized adjective.

Biology:

Both adults (Fig. 1g, h) and immature forms (Fig. 1i) of this new species were confirmed to be associated with Japanese silverberry, *Elaeagnus umbellata* Thunb. (Elaeagnaceae), in Akita and Tochigi Prefectures (Nakagawa and Maehara, pers. obs.). This mirid is currently considered to be a specialist of silverberry, based on its restricted distribution. Collection records suggest a univoltine life cycle for *Sejanus azumanus* n. sp. The adults were found to occur in mid-summer (from mid-June to mid-August) and the eggs are assumed to overwinter.

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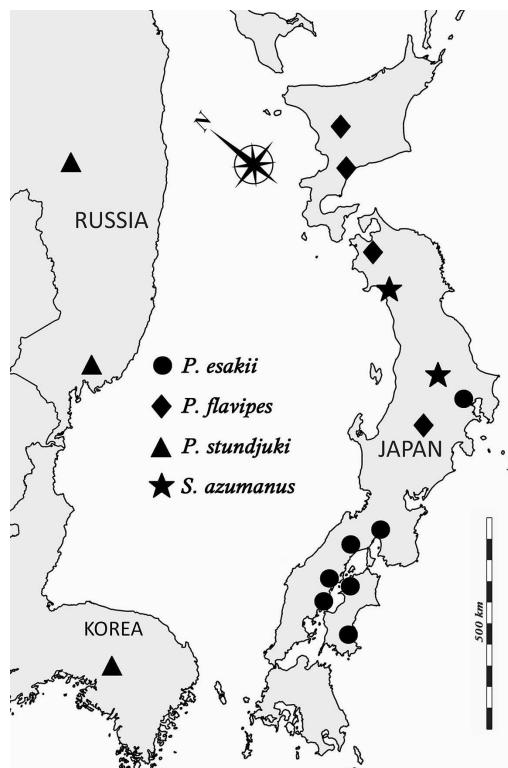


FIGURE 11. Map showing distributions of four leucophoropterine species.

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| | Body L | Head W | VTX W | PRN W | HEM W | Antennomere L | | | | LBM L | Metaleg L | |
|---|-------------|-------------|-------------|-------------|-------------|---------------|-------------|-------------|-------------|-------------|-------------|-------------|
| | | | | | | I | II | III | IV | | FM | TB |
| <i>Pseudophylus esakii</i> sp. n. ♂♂ (n = 4) | | | | | | | | | | | | |
| Max | 3.50 | 0.75 | 0.30 | 1.08 | 1.34 | 0.26 | 1.16 | 0.59 | 0.42 | 1.04 | 1.16 | 1.65 |
| Min | 3.31 | 0.68 | 0.29 | 0.93 | 1.20 | 0.21 | 1.05 | 0.48 | 0.35 | 0.96 | 1.01 | 1.55 |
| Mean | 3.44 | 0.71 | 0.29 | 1.03 | 1.29 | 0.23 | 1.08 | 0.52 | 0.39 | 1.00 | 1.08 | 1.62 |
| Range | 0.20 | 0.08 | 0.02 | 0.15 | 0.14 | 0.05 | 0.11 | 0.11 | 0.08 | 0.08 | 0.15 | 0.11 |
| <i>Pseudophylus esakii</i> sp. n. ♀♀ (n = 5) | | | | | | | | | | | | |
| Max | 3.48 | 0.72 | 0.36 | 1.16 | 1.49 | 0.23 | 0.87 | 0.51 | 0.39 | 1.08 | 1.10 | 1.52 |
| Min | 3.26 | 0.68 | 0.33 | 1.08 | 1.40 | 0.18 | 0.81 | 0.48 | 0.35 | 0.95 | 1.04 | 1.46 |
| Mean | 3.34 | 0.70 | 0.35 | 1.11 | 1.45 | 0.20 | 0.85 | 0.49 | 0.37 | 1.03 | 1.06 | 1.49 |
| Range | 0.22 | 0.05 | 0.03 | 0.08 | 0.09 | 0.05 | 0.06 | 0.03 | 0.05 | 0.14 | 0.06 | 0.06 |
| <i>Pseudophylus flavipes</i> | | | | | | | | | | | | |
| Tomakomai ♂ | 3.23 | 0.68 | 0.29 | 0.96 | 1.23 | 0.24 | 0.95 | 0.50 | 0.36 | 1.08 | 1.05 | 1.50 |
| Asahikawa ♂ | 3.23 | 0.65 | 0.30 | 0.92 | 1.31 | 0.21 | 0.93 | 0.45 | 0.39 | 1.04 | 1.05 | 1.50 |
| Tomokomai ♀ | 3.48 | 0.69 | 0.36 | 1.16 | 1.41 | 0.23 | 0.86 | 0.51 | 0.41 | 1.13 | 1.07 | 1.52 |
| Asahikawa ♀ | 3.43 | 0.68 | 0.36 | 1.08 | 1.47 | 0.21 | 0.83 | 0.48 | 0.42 | 1.20 | 1.07 | 1.55 |
| Asahikawa ♀ | 3.43 | 0.66 | 0.35 | 1.02 | 1.35 | 0.21 | 0.77 | 0.47 | 0.39 | 1.20 | 1.04 | 1.50 |
| <i>Pseudophylus stundjuki</i> | | | | | | | | | | | | |
| Korea ♂ | 3.75 | 0.72 | 0.29 | 1.10 | 1.38 | 0.24 | 1.14 | 0.56 | 0.45 | 0.96 | 1.11 | 1.64 |
| Korea ♀ | 3.33 | 0.69 | 0.36 | 1.14 | 1.50 | 0.26 | 0.78 | 0.45 | 0.32 | 1.16 | 1.11 | 1.49 |
| Primorsky ♀ | 3.50 | 0.69 | 0.33 | 1.08 | 1.49 | 0.24 | 0.80 | 0.48 | 0.39 | 1.10 | 1.10 | 1.47 |
| <i>Sejanus azumanus</i> sp. n. ♂♂ (n = 5) | | | | | | | | | | | | |
| Max | 2.89 | 0.75 | 0.30 | 0.96 | 1.20 | 0.23 | 0.96 | 0.51 | 0.33 | 1.04 | 0.98 | 1.64 |
| Min | 2.52 | 0.69 | 0.27 | 0.83 | 1.02 | 0.18 | 0.80 | 0.42 | 0.27 | 0.90 | 0.81 | 1.37 |
| Mean | 2.65 | 0.71 | 0.28 | 0.89 | 1.09 | 0.20 | 0.88 | 0.46 | 0.30 | 0.94 | 0.91 | 1.46 |
| Range | 0.37 | 0.06 | 0.03 | 0.14 | 0.18 | 0.05 | 0.17 | 0.09 | 0.06 | 0.14 | 0.17 | 0.27 |
| <i>Sejanus azumanus</i> sp. n. ♀♀ (n = 4) | | | | | | | | | | | | |
| Max | 2.82 | 0.69 | 0.35 | 1.02 | 1.44 | 0.20 | 0.77 | 0.45 | 0.32 | 1.05 | 1.02 | 1.37 |
| Min | 2.28 | 0.63 | 0.32 | 0.93 | 1.16 | 0.18 | 0.68 | 0.38 | 0.27 | 0.93 | 0.90 | 1.22 |
| Mean | 2.58 | 0.66 | 0.33 | 0.96 | 1.27 | 0.19 | 0.74 | 0.41 | 0.29 | 0.98 | 0.96 | 1.29 |
| Range | 0.54 | 0.06 | 0.03 | 0.09 | 0.29 | 0.02 | 0.09 | 0.08 | 0.05 | 0.12 | 0.12 | 0.15 |

TABLE 1. Measurements of *Pseudophylus* and *Sejanus* species (Abbreviations: FM = femur; HEM = hemelytra; L = length; LBM = labium; PRN = pronotum; TB = tibia; VTX = vertex; W = width).

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