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A new species of *Apolygus* China, 1941 (Hemiptera: Heteroptera: Miridae: Mirinae) from Thailand

T. YASUNAGA[1], J. DUANGTHISAN[2]

[1]Research Associate; Division of Invertebrate Zoology; American Museum of Natural History; New York, NY 10024; USA; E-mail: yasunagat.amnh@gmail.com

[2]Insect Collection; Entomology & Zoology Group; Plant Protection Research and Development Office; Department of Agriculture; Chatuchak, Bangkok 10900; Thailand; E-mail: jomsurang99@gmail.com

Abstract

A new species of the mirine plant bug tribe Mirini, *Apolygus takensis* **sp. nov.**, is described from Changwat Tak, Thailand, representing the first record of a genuine member of *Apolygus* China, 1941 from Southeast Asia. This new taxon is most closely related to little known Nepalese *A. costatus* (Distant, 1909) **comb. nov.**, which is herein transferred from *Lygus* Hahn, 1833 *sensu lato*, and also rediagnosed and figured in detail. Scanning electron micrographs are provided for both treated species.

Key words: *Apolygus*, Miridae, new species, Thailand, SEM documentation.

Resumen

Una nueva especie de* Apolygus *China, 1941* (*Hemiptera: Heteroptera: Miridae: Mirinae*) *de Tailandia

Se describe una nueva especie de mírido de la tribu Mirini, *Apolygus takensis* **sp. nov.**, de Changwat Tak, Tailandia, que representa el primer registro de un miembro de *Apolygus* China, 1941 en el sureste de Asia. El nuevo taxón está estrechamente relacionado con el poco conocido *A. costatus* (Distant, 1909) **comb. nov.**, de Nepal, el cual es ahora transferido desde el género *Lygus* Hahn, 1833 *sensu lato*, ofreciéndose una nueva diagnosis del mismo, así como imágenes detalladas. Para ambas especies se presentan micrografías electrónicas de barrido.

Palabras clave: *Apolygus*, Miridae, nueva especie, Tailandia, documentación MEB.

Laburpena

Apolygus *China, 1941 espezie berri bat* (*Hemiptera: Heteroptera: Miridae: Mirinae*) *Thailandiakoa*

Miridoen Mirini tribuko espezie berri bat, *Apolygus takensis* **sp. nov.**, deskribatzen da Changwat Tak-ekoa, Thailandia, *Apolygus* China, 1941-ren kideren baten lehenengo aipua izanik Asiako hegoekialdean. Taxoi berriak erlazio estua du Nepaleko *A. costatus* (Distant, 1909) **comb. nov.**-rekin, gutxi ezagutua eta *Lygus* Hahn, 1833 *sensu lato* generotik orain transferitua; haren diagnosi berri bat eskaintzen da, bai eta detailezko irudiak ere. Ekorketa-mikrografia elektronikoak aurkezten dira, bi espezierenak.

Gako-hitzak: *Apolygus*, Miridae, espezie berria, Thailandia, EME dokumentazioa.

Introduction

Apolygus China, 1941 is one of the most speciose genus-groups in the Old World, with approximately 70 described species. The majority of congeners are known to occur in temperate and warm temperate zones of eastern Asia; the Nearctic population of *A. lucorum* (Meyer-Dur, 1843) is considered to have been introduced from Europe (Schuh, 2002-2013; Zheng *et al.*, 2004; Aukema, 2018; Oh *et al.*, 2018; Yasunaga, 2023). In Southeast Asia, or the tropical Oriental Region, the species currently placed in *Apolygus*, *e.g.* *A. bruneiensis* (Carvalho, 1980), *A. longirostris* (Poppius, 1914) and *A. umbratus* (Poppius, 1914) from Indonesia, most probably belong to *Apolygopsis* Yasunaga, Schwartz & Chérot, 2002 and require further reassessment of characters (*cf.* Yasunaga *et al.*, 2002; Schwartz and Chérot, 2005; Yasunaga, 2023).

During examining of an old collection of Thai heteropterans deposited in Bangkok, we found three specimens undoubtedly representing a species of *Apolygus* and closely related to *Lygus costatus* Distant, 1909 (herein transferred to *Apolygus*) known only from Nepal or the southern slope of the Himalayas. The present paper describes the first genuine member of *Apolygus* from Southeast Asia, namely *A. takensis* **sp. nov.** A new combination, *A. costatus* (Distant, 1909) **comb. nov.**, is also established.

Material and methods

The type specimens are deposited in the Insect Collection, Entomology and Zoology Group, Plant Protection Research and Development Office, Department of Agriculture, Bangkok, Thailand (DOAT). A matrix code label (*e.g.* AMNH_PBI 00378806) uniquely identifying each specimen is attached to the holotype, which is searchable (by species name) on «Heteroptera Species Pages (= HSP)» (http://research.amnh.org/pbi/heteropteraspeciespage/). All other non-type materials are kept in the collection of the first author (TYCN).

Terminology of the genitalia principally follows Yasunaga (1991, 2023). Scanning Electron Micrographs were taken with a Hitachi Miniscope® (TM-4000 plus II); 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). In the synonymic list of known species, only selected references are cited, as comprehensive catalogs are available (*e.g.* Schuh, 1995, 2002-2013; Kerzhner and Josifov, 1999; Aukema, 2018).

Results

Apolygus takensis Yasunaga & Duangthisan sp. nov. (Figs. 1, 3a-d, h, 4g-l, 5g-l)

Type material:

HOLOTYPE: ♂, THAILAND: Changwat Tak, Sam Ngao [17°19'N 99°00'E], 8.VI.1959, Chuea (DOAT) (AMNH_PBI 00378806).

PARATYPES: 2 ♀♀: THAILAND: Same data as for holotype (DOAT).

Diagnosis:

Recognized by its moderate size; oval body shape; generally pale brown basic coloration; comparatively polished, shiny dorsum with uniformly distributed, simple, pale semierect setae; darkened mesal scutellum, exocorium, clavus, posterior corium and apex of cuneus; uniformly pale basal half of antennomere II; and uniformly pale thoracic pleura. This new species is considered to be most closely related to *Apolygus costatus* (Distant, 1909), currently known only from Kathmandu Valley, Nepal, but *A. takensis* **sp. nov.** can be distinguished from the Nepalese sibling species by the following characters: basal half of antennomere II uniformly pale; thoracic pleurites uniformly pale; scutellum with a clear, dark, mesal stripe; hypophysis of right paramere short, blunt-tipped (Fig. 5i); vesica with wing-shaped sclerite lacking indentation apically, needle-shaped sclerite short and slender and sublateral sclerite developed (Figs. 3c-d, 5g-h); and female posterior wall with narrower lateral lobe and smaller interramal lobe (Fig. 5j-k).

Description:

Body moderate in size (4.1–4.7 mm in total length), ovoid; basic coloration pale brown; dorsal surface shining, shallowly and minutely punctate, with uniformly distributed, simple, pale, semierect setae. **Head:** Vertical in lateral view; eye contiguous to anterior margin of pronotum; vertex with narrow but continuous basal transverse carina; clypeus wholly darkened. **Antenna:** Dark brown; basal half of segments II uniformly pale, not darkened at base; segments III-IV missing in all available specimens. **Labium:** Pale reddish brown, reaching middle of mesocoxae. **Thorax:** Pronotum uniformly pale brown, shining, stout; scutellum weakly arched (Fig. 4k);

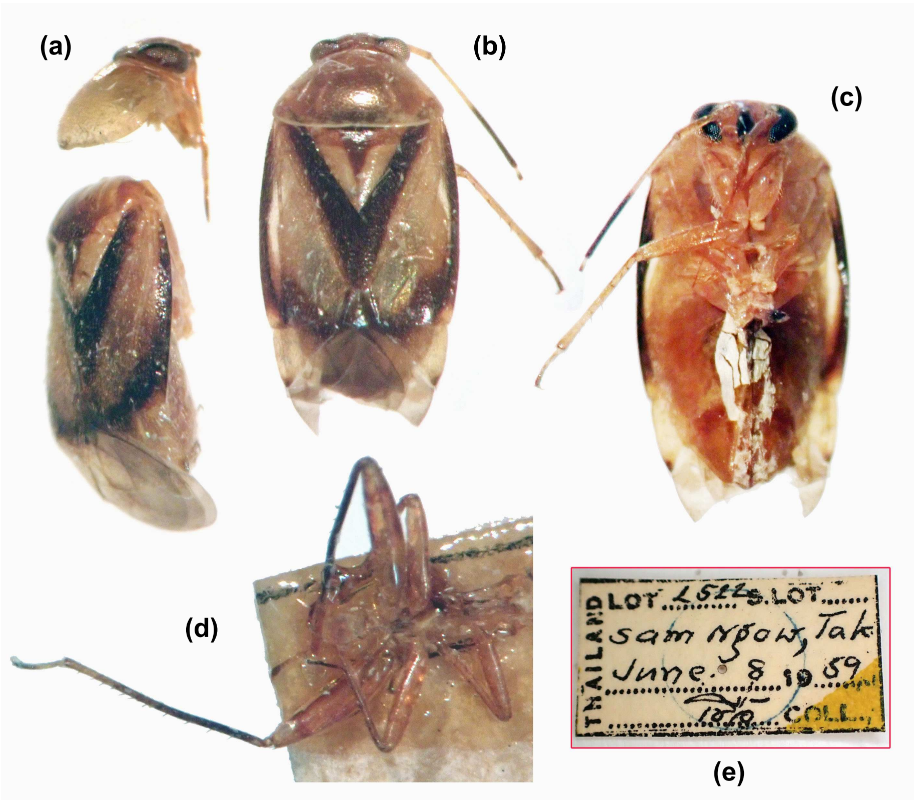

Figure 1. Habitus images of *Apolygus takensis* **sp. nov.**: (a), (d) Holotype male (d = legs fixed on card); (b)-(c), (e) Paratype female (e = its label) / (a) Lateral view; (b) Dorsal view; (c) Ventral view.

pleura and coxae pale brown, partly tinged with red; metathoracic scent efferent system pale brown, relatively wide (Fig. 4i, l); scutellum shiny pale brown, with a dark stripe mesally. **Hemelytron:** Shiny pale brown, immaculate; exocorium, clavus, posterior corium and apex of cuneus darkened as in Fig. 1a-b, weakly declivous at cuneal fracture; membrane pale smoky brown, semitransparent. **Legs:** Pale brown; each femur more or less reddish; tibial spines fuscous; metatarsus and pretarsal structure of metaleg as in Fig. 5l; parempodia relatively narrow and short. **Abdomen:** Pale brown. **Male genitalia** (Figs. 3a-d, 5g-i): Left paramere with triangular sensory lobe (Fig. 3a-b); hypophysis of right paramere short, blunt-tipped (Fig. 5i); vesical wing-shaped sclerite narrow; needle-shaped sclerite short and slender; sublateral sclerite developed, bulbous (Fig. 3c-d, 5g-h).

Female genitalia (Figs. 3h, 5j-k): Genital chamber with ribbon-like sclerite behind sclerotized ring (Fig. 3h); posterior wall with narrow lateral lobe and small interramal lobe (Fig. 5j-k).

Measurements:

See Table 1.

Etymology:

Named for the type locality, Changwat Tak.

Distribution:

Thailand (Tak).

Biology:

Unknown.

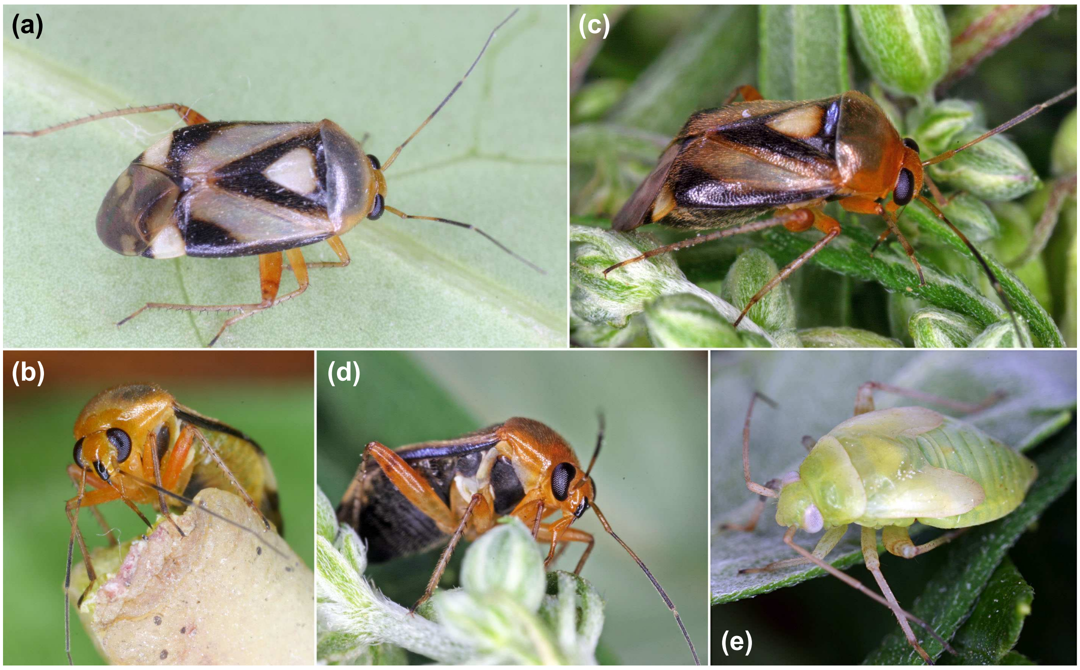

FIGURE 2. Habitus images of *Apolygus costatus* (Distant, 1909) **comb. nov.**: Live individuals from Kathmandu Valley, Nepal: (a)-(b) Male adult; (c)-(d) Female adult; (e) 5th instar nymph.

Apolygus costatus (Distant, 1909) comb. nov.

(Figs. 2, 3e-g, i, 4a-f, 5a-f)

Lygus costatus Distant, 1909: 512 (new species); Distant, 1911: 255 (description); Schuh, 2002-2013 (online catalog).

Material examined:

HOLOTYPE, ♀: NEPAL: Kathmandu, Chonebal (without further collecting data; deposited in Natural History Museum, London, UK) (AMNH_PBI 00085661, image available on HSP).

15 ♂♂ + 12 ♀♀: NEPAL: Kathmandu, Samakhusi, Gongabu, 27°43'59.5"N, 85°18'49"E, 1300 m, UV light trap, 27.V.-19.VI.2005, T. Yasunaga (TYCN).

3 ♂♂ + 2 ♀♀: NEPAL: Kirtipur, National Horticulture Center Experimental Farm, 27°40'22"N, 85°17'11"E, on *Cannabis sativa*, 26.VII.2006, T. Yasunaga (TYCN).

Diagnosis:

Recognized by its general color pattern similar to that of *A. takensis* **sp. nov.**; pale basal half of antennomere II with darkened base (Fig. 2a-d); partly (Fig. 2b) or almost entirely (Fig. 2d) fuscous thoracic pleura; hypophysis of right paramere relatively long, pointed (Figs. 3f, 5c); vesical wing-shaped sclerite lacking indentation apically, and needle-shaped sclerite longer and broader (Figs. 3g, 5d); and lateral lobe on posterior wall wider (Fig. 5e-f). Further description of external characters was provided by Distant (1909, 1911).

Measurements:

See Table 1.

Distribution:

Nepal (Kathmandu Valley).

Biology:

The adults were collected by sweep-netting various herbs, but the immature forms (the 5th instar nymph as in Fig. 2e) were found only on inflorescences and flower-buds of a hemp, *Cannabis sativa* L. (Cannabaceae). Collection records suggest that *Apolygus costatus* has a bivoltine life cycle and overwinters in egg stage.

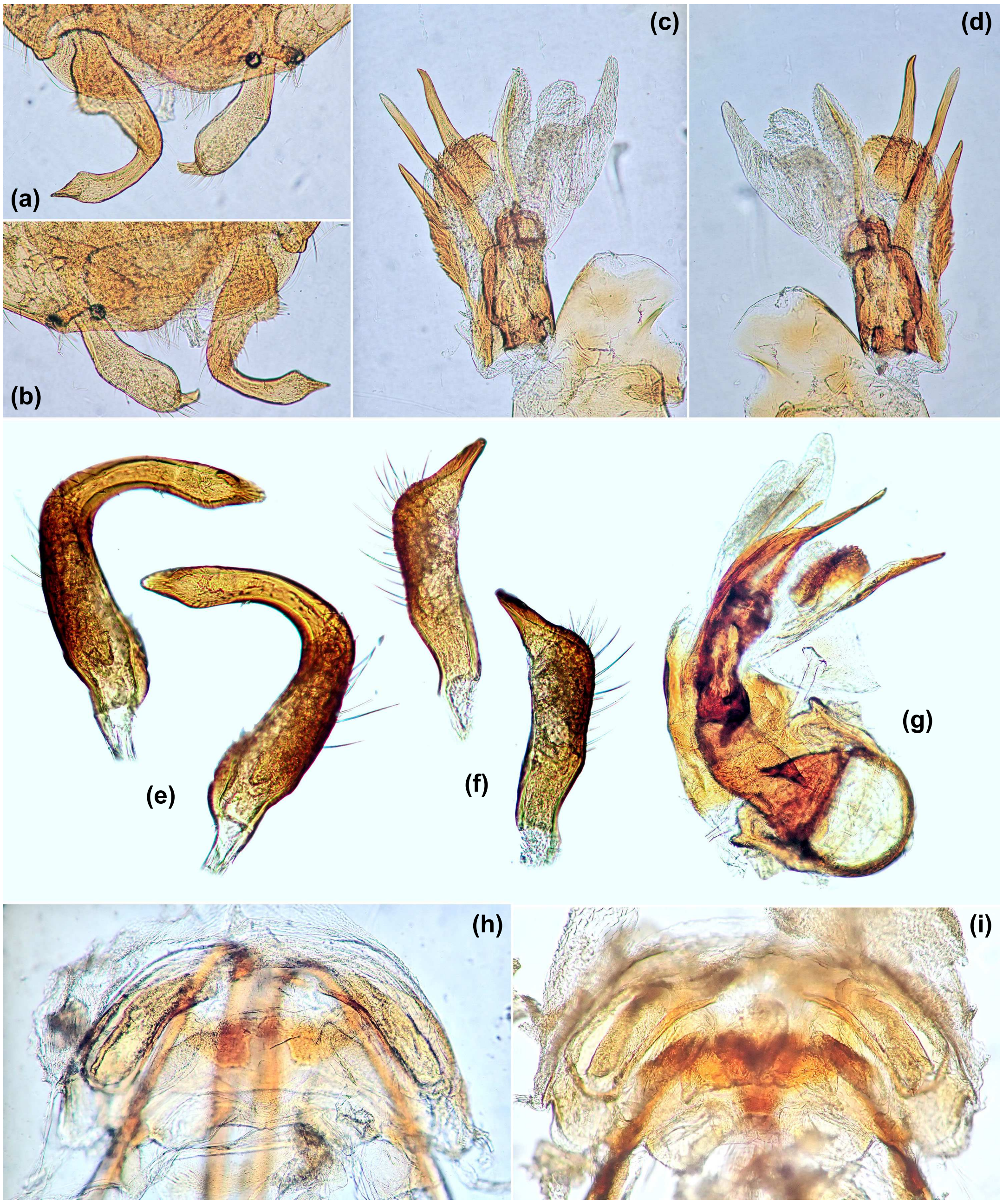

FIGURE 3. Male and female genitalia of: (a)-(d), (h) *Apolygus takensis* **sp. nov.**; (e)-(g), (i) *Apolygus costatus* (Distant, 1909) **comb. nov.** / (a)-(g) Male genitalia: (a) Genital segment (pygophore) with parameres, dorsal view; (b) Same, ventral view; (c)-(d), (g) Vesica; (e) Left paramere; (f) Right paramere; (h)-(i) Female genitalia: Genital chamber, dorsal view.

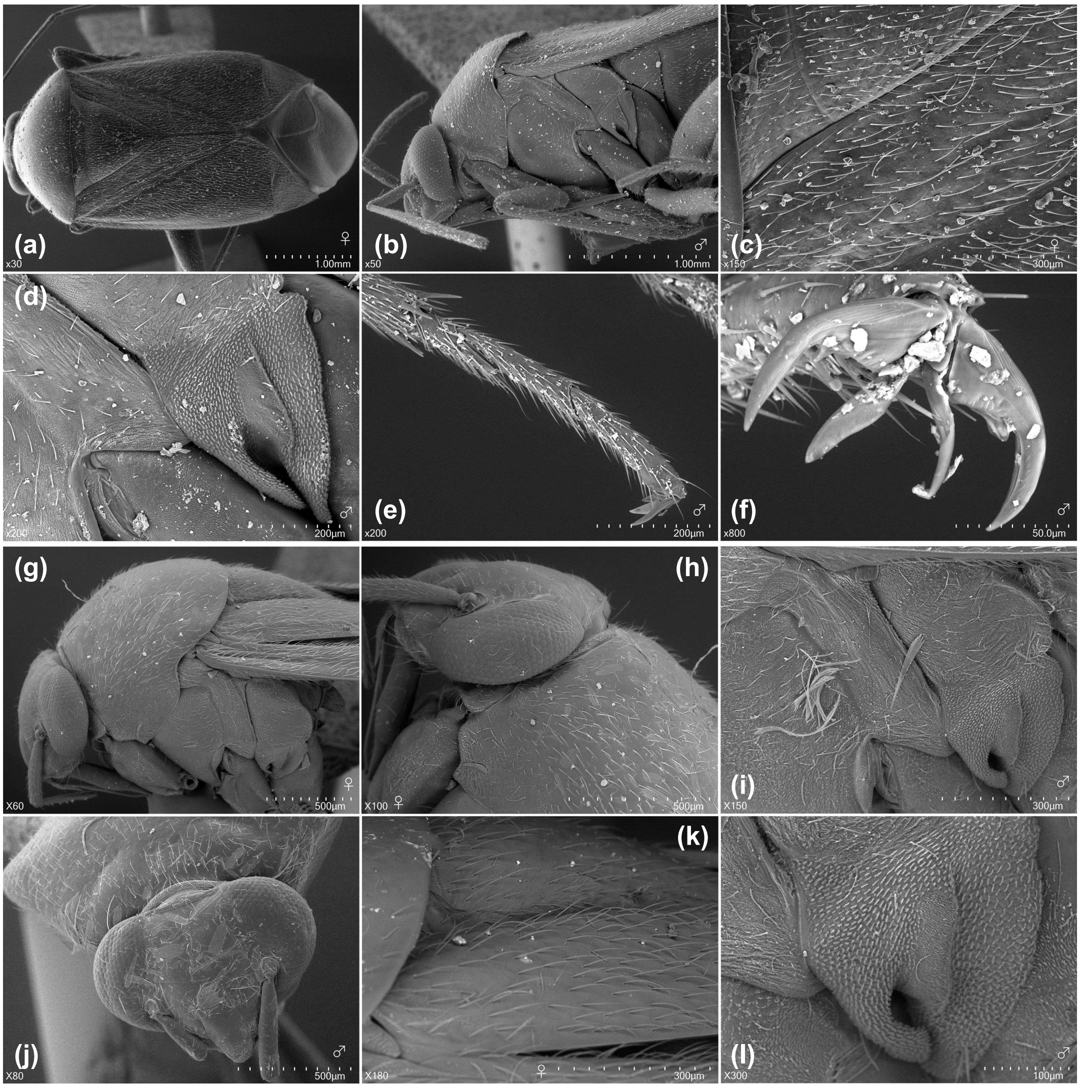

FIGURE 4. Scanning electron micrographs for: (a)-(f) *Apolygus costatus* (Distant, 1909) **comb. nov.**; (g)-(l) *Apolygus takensis* **sp. nov.** / (a) Dorsal habitus; (b), (g) Anterior body, left lateral view; (c), (k) Vestiture pattern on anterior hemelytron and scutellum; (d), (i) Thoracic pleura, left lateral view; (e) Metatarsus; (f) Pretarsal structure of metaleg; (h) Head and anterior pronotum, left lateral view; (j) Same, anterior view; (l) Metathoracic scent efferent system.

Discussion

As mentioned above, most of *Apolygus* congeners are highly diverse in temperate and warm temperate zones in eastern Asia. More than 60 valid species are known to occur in China, Japan, Korea, Taiwan and the Russian Far East (Zheng *et al.*, 2004; Oh *et al.*, 2018; Yasunaga, 2023). In Southeast Asia including the Indochina, any reliable record of genuine *Apolygus* member has been missing. The Oriental species at first sight similar to *Apolygus* predominantly match *Apolygopsis* as argued by Yasunaga (2023).

The finding of the present new species, *Apolygus takensis* **sp. nov.**, from Thailand possibly represents

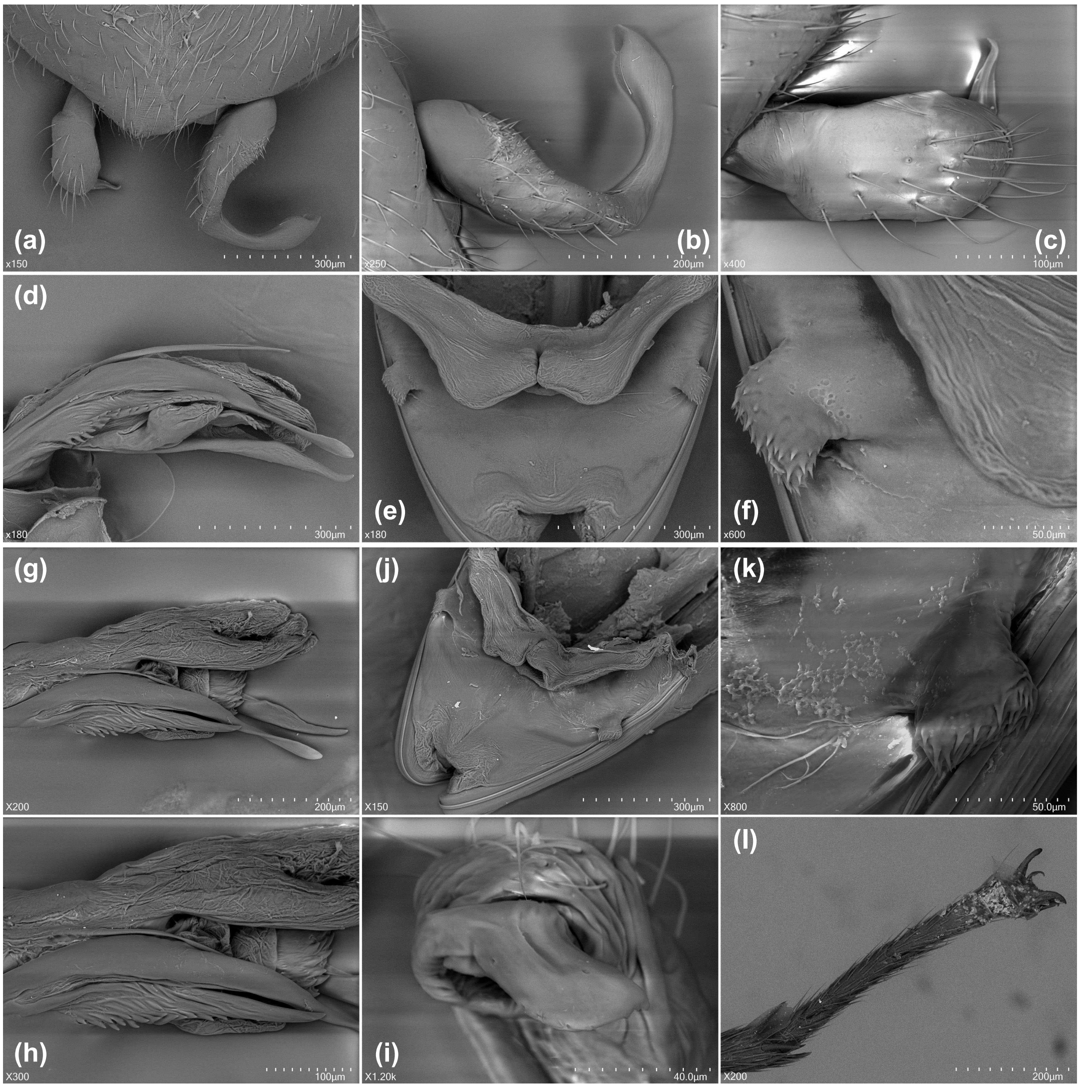

FIGURE 5. Scanning electron micrographs for: (a)-(f) *Apolygus costatus* (Distant, 1909) **comb. nov.**; (g)-(l) *Apolygus takensis* **sp. nov.** / (a) Genital segment, ventral view; (b) Left paramere; (c) Right paramere; (d), (g)-(h) Vesica; (e), (j) Posterior wall; (f), (k) Same, lateral lobe and interramal lobe; (i) Apex of right paramere; (l) Metatarsus.

the first distributional record for the genus in the Indochina or Southeast Asia. Since the type locality is located at northern hill area of the country, the climate and vegetation appear to be suitable for this mirid. Its closest relative from Nepal, *A. costatus*, is also restricted to Kathmandu Valley (1400-1600 m alt.), or warm temperate zone and yet to be discovered in subtropical lowland area (< 1000 m). Therefore, *Apolygus* members are presumed to have been radiated principally in the temperate zones in eastern Asia and only a few members (for instance, a common ancestor of *A. costatus* and *A. takensis* **sp. nov.**) could expand their distribution areas to the Oriental Region.

		Body	Head	VTX	PRN	HEM	Antennomere L				LBM	Metaleg L	
		L	W	W	W	W	I	II	III	IV	L	FM	TB
A. takensis sp. n.	HT ♂	4.65	1.06	0.38	1.84	2.00	0.48	–	–	–	1.69	1.71	2.30
	PT ♀	4.65	1.08	0.38	1.86	2.11	0.50	1.50	–	–	–	1.73	2.32
	PT ♀	4.41	1.09	0.42	1.88	2.21	0.58	1.54	–	–	–	1.63	2.50
A. costatus	♂	4.89	1.11	0.38	1.94	2.28	0.56	1.56	1.02	0.58	1.56	1.88	2.69
	♂	4.74	1.09	0.38	1.88	2.19	0.56	1.50	0.92	0.61	1.59	1.73	2.59
	♂	4.41	1.06	0.36	1.73	1.96	0.46	1.48	1.02	0.71	1.54	1.73	2.40
	♀	4.86	1.13	0.40	1.90	2.27	0.56	1.56	0.96	0.61	1.56	1.79	2.55
	♀	4.92	1.15	0.42	2.04	2.34	0.56	1.54	0.96	0.73	1.69	1.92	2.73
	♀	4.71	1.11	0.43	1.92	2.27	0.58	1.52	0.96	0.61	1.61	1.96	2.73

TABLE 1. Measurements for two *Apolygus* species (Abbreviations: FM = femur; HEM = hemelytra (maximum width); HT = holotype; L = length; LBM = labium; PRN = pronotum; PT = paratype; TB = tibia; VTX = vertex (interocular space); W = width).

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