



A review of the stink bug genus *Plautia* Stål from Japan (Hemiptera, Heteroptera, Pentatomidae)

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Abstract

In this review, we revise the pentatomine stink bug genus *Plautia* Stål from Japan. Five species are recognized and diagnosed, including three new species: *P. sakishimensis* **sp. nov.**, *P. himechabane* **sp. nov.**, and *P. ishigaki* **sp. nov.** One of these, *P. himechabane* **sp. nov.**, was previously regarded as *P. splendens* Distant for the populations of the mainland of Japan, the Ryukyu Islands, and China. The species *Plautia cyanoviridis* Ruckes is proposed as a junior synonym of *P. splendens*, which is endemic to the Ogasawara Islands. A key is provided to facilitate the identification of the five species known in Japan.

Key words: Antestiini, Japan, new species, new synonym, Pentatominae, Pentatomoidea, taxonomy

Introduction

Plautia Stål is a stink bug genus in the pentatomine tribe Antestiini (Heteroptera: Pentatomidae) and includes 26 valid species and subspecies distributed throughout the Old World including various islands (Distant 1902; Hasan 1993; Linnavuori 1975; Rider 2006, 2015). Most members of this genus have a medium-sized body (around 10 mm in length) and share a typically green coloration with brownish to grayish fore wings. Some species have been recognized as economically important pests (Schaefer & Panizzi 2000; McPherson 2018), and *Plautia stali* Scott, 1965 is well-known in Japan as one of the most serious insect pests of various fruit crops, and large outbreaks of this species are common (Yasunaga *et al.* 1993; Umeya & Okada 2003; Kobayashi & Tachikawa 2004; the Japanese Society of Applied Entomology and Zoology 2006).

Most taxonomic studies of *Plautia* have been fragmental, with Linnavuori (1975, 1982) having treated most African species and Liu & Zheng (1994) and Ahmad & Rana (1996) documenting the faunae of China and the Indo-Pakistan area, respectively. In Japan, taxonomic study of *Plautia* began with Scott (1874) describing *P. stali* as a new species based on specimens collected in Japan. Subsequently, Distant (1900) and Ruckes (1963) described *P. splendens* Distant, 1900 from “Japan” and *P. cyanoviridis* Ruckes, 1963 from “Bonin Is.” (the Ogasawara Islands), respectively. Thus, currently only three species of *Plautia* have been recorded in Japan (cf. Takai & Ishikawa 2012; Ishikawa 2016).

It has been over 50 years since *P. cyanoviridis* was added to the recognized list of Japanese fauna (Ruckes 1963), yet no further taxonomic or faunistic study of *Plautia* has taken place in Japan. While this suggests that our current knowledge of this group in Japan sufficiently complete, our continued and enthusiastic efforts in Japan have successfully revealed that (1) the Sakishima Islands population of *P. stali* represents an undescribed species; (2) a species previously identified as *P. splendens* in the mainland of Japan and the Ryukyu Islands represents an undescribed species; (3) apart from these undescribed species, an additional undescribed species is present on Ishigaki-jima Island of the Ryukyu Islands; (4) *P. cyanoviridis* is in all likelihood synonymous with *P. splendens* described from “Japan” according to Distant (1900), and its distribution is likely restricted only to the Ogasawara Islands; and (5) in conclusion, five species of *Plautia* can be found across Japan.

The present study reviews the Japanese species of *Plautia* whose taxonomies and distribution were thought to be solved. Three novel species, *P. sakishimensis* **sp. nov.**, *P. himechabane* **sp. nov.** and *P. ishigaki* **sp. nov.**, are described. The species *Plautia cyanoviridis* is proposed as a junior synonym of *P. splendens*. All five species recognized in Japan are diagnosed including descriptions/redescriptions of the male and female genitalia. A key is provided to facilitate the identification of all known species in Japan.

Materials and methods

Approximately 2,000 dried specimens were examined. Both the male and female genitalia were soaked in hot 10% KOH solution for approximately 10 minutes and were then dissected in distilled water. The genitalia were preserved in small plastic tubes containing glycerol and were pinned with their respective specimens. Morphological observations were made under an Olympus SZ61 binocular microscope. Illustrations of the male and female genitalia were drawn using an Olympus BH-2 optical microscope with the aid of a drawing tube. Digital images of the specimens were taken with a Nikon D200 digital camera body, and a Nikon AF Micro Nikkor 60 mm f/2.8D lens (Figs. 1–27), and a Keyence digital microscope system (VHX-1000 digital microscope, VHX-S50 observation system, VHX-1100 multi scan, and VH-Z20R zoom lens) (Figs. 28–32, 68–72). The terminology used herein generally follows that of Tsai *et al.* (2011) and Rédei (2017). Depositories of the related material are abbreviated as follows:

BMNH	Natural History Museum, London, United Kingdom
ELEU	Entomological Laboratory, Faculty of Agriculture, Ehime University, Matsuyama, Ehime, Japan
ELKU	Entomological Laboratory, Faculty of Agriculture, Kyushu University, Fukuoka, Japan
NIAES	National Institute for Agro-Environmental Science, Tsukuba, Ibaraki, Japan
NSMT	Department of Zoology, National Museum of Nature and Science, Tsukuba, Ibaraki, Japan
OMNH	Osaka Museum of Natural History, Osaka, Japan
TUA	Laboratory of Entomology, Faculty of Agriculture, Tokyo University of Agriculture, Atsugi, Kanagawa, Japan
SNMNH	Smithsonian National Museum of Natural History, Washington, D.C., U.S.A.

In addition to the materials listed below, one type specimen was examined: syntype of *Pentatoma crossota* Dallas, 1851 (currently *Plautia crossota*): ♂, “n Bengal”, “Type”, “109. PENTATOMA CROSSOTA,” “♂”, “BMNH(E) 1255172”, deposited in BMNH.

Taxonomy

Plautia Stål, 1865

Plautia Stål, 1865: 191 (new genus). Type species by subsequent designation (Distant, 1902:180): *Cimex fimbriatus* Fabricius, 1787 (= *Pentatoma crossota* Dallas, 1851).

Diagnostic characters of the genus *Plautia* are as follows: body medium-sized, approximately 10 mm in length, convex, generally green, sometimes tinged with brownish yellow or blue; dorsum finely punctate; head roundly triangular. Antennal segment II long, nearly as long as segment III; lateral margins of pronotum straight, not laminated; humeral angles more or less round; scent gland peritreme long, slender, tapering; mesosternum with high, narrow median longitudinal carina; genital capsule trapezoid in ventral view, with more or less concave ventral rim; parameres often blade-like or T-shaped; phallus elongated oval in shape, with highly sclerotized phallosome; and apical receptacle of spermatheca with at least one horn-shaped process.

In the identification of Japanese species of *Plautia*, we confirm the usefulness of several external morphological characters as mentioned below, in particular in the “Key to species” section. In general, however, it is very difficult to distinguish between *Plautia* species using only external morphological characters due to their superficial resemblances to one another. For precise discrimination between species, the close observation of

genital structures, which are often uniquely shaped in each species, is usually indispensable. Several authors have attempted to describe these genital structures including the genital capsule, paramere, and phallus in male and spermatheca in female (Ahmad & Rana 1996; Hasan 1993; Hasan & Ahmad 1999; Linnavuori 1975, 1982; Liu & Zheng 1994, 1995). Their illustrations of the genitalia are effective and helpful in the accurate identification of each species in most cases. Nevertheless, due to a recent increase in the number of indeterminate species deriving mainly from East and Southeast Asia, it is necessary to provide more detailed descriptions and illustrations of the genitalia for use in future research. In the present study, we provide diagnostics, descriptions, and illustrations of both the male and female genitalia of previously described species, as well as whole body (including the genitalia) of the new species.

***Plautia stali* Scott, 1874**

(Figs. 1, 6, 7, 12, 14, 19–21, 28, 33, 38, 43, 48, 53, 58, 63, 68, 73, 78, 79)

Plautia stali Scott, 1874: 299 (new species). Syntypes: ♂♀, Japan; BMNH.

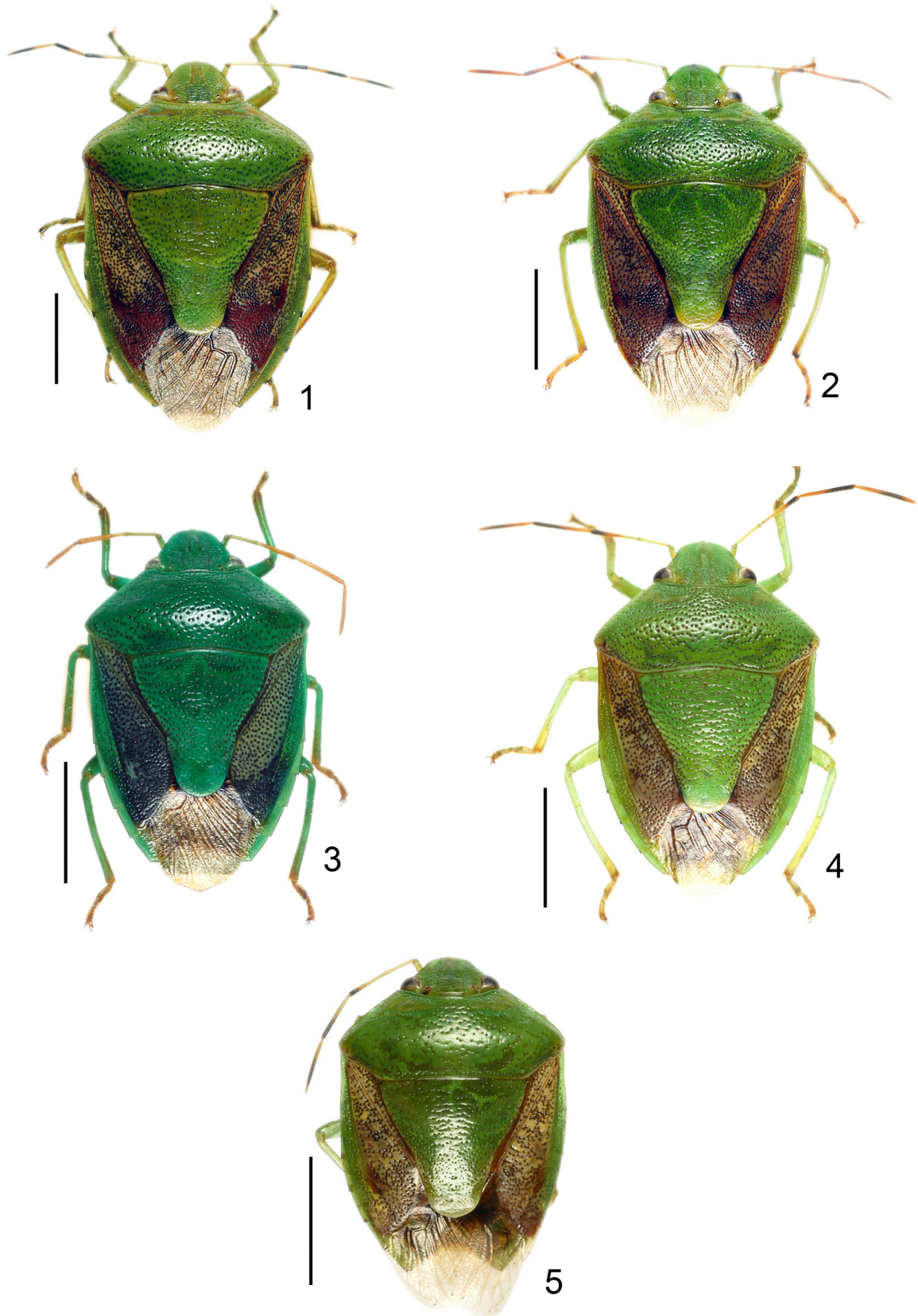
Nezara amurensis Reuter in Autran & Reuter, 1888: 200 (new species). Holotype: ♀, Amuria [Amur Basin, Russian Far East]; Zoological Museum, University of Helsinki, Finland. Synonymized by Kiritshenko (1961: 443).

Diagnosis. Among the species of *Plautia*, this pentatomid is recognized by the following combination of characters: body 9.0–12.7 mm long; antennal segment III blackish at least in apical 1/3 (Fig. 12); antennal segment IV blackish in apical half (Fig. 12); punctures on disc of pronotum and scutellum blackish and strong, almost same in size and color as punctures on coria of fore wings (Fig. 14); lateral margins of pronotum blackish (Fig. 19); blackish line of lateral margin of pronotum complete (Fig. 19) (rarely irregularly interrupted, Figs. 20, 21); lateral lobe of crown of paramere widely extended laterad, with roundly and deeply concave edge (Fig. 43); conjunctival processes of endosoma expanded laterad, curved ventrad, constricted laterally in basal part (Figs. 48, 53, 58, 63); processes of vesica V-shaped in ventral view, semitrapezoidal in outline in posterior view (Figs. 53, 63); apical receptacle of spermatheca with 1 to 2 horn-shaped processes (Figs. 78, 79); sclerotized zone of intermediate part of spermatheca less than 1/5 as long as intermediate part (Figs. 78, 79).

Redescription of genitalia. *Male.* Genital capsule (Figs. 33, 38) approximately 2.8 times as wide at maximum as its basal width, a little shorter than its maximum width, roundly produced at posterior angles; ventral rim (Figs. 28, 33) widely concave, slightly sinuate in middle part; concavity of ventral rim approximately 1/8 as deep as its maximum width (Fig. 33); transverse ridge well developed, invisible in ventral view, with slightly concave dorsal margin in posterior view (Fig. 38); dorsal sclerites semicircular, with acute ventral angle (Fig. 38); inner margin of dorsal sclerite convex at around ventral angle (Fig. 38); dorsal sinus subpentagonal in posterior view (Fig. 38); paramere sockets subtriangular in posterior view (Fig. 38). Crown of paramere (Fig. 43) subpentagonal, narrowed in apical part, round at apex, covered with short to long, erect setae on lateral lobe; inner margin almost straight; distal margin roundly concave; proximal margin slightly sinuate; lateral lobe widely extended laterad, with rounded distal angle and angulated proximal angle; edge of lateral lobe roundly and deeply concave. Conjunctival processes of endosoma (Figs. 48, 53, 58, 63) large, well expanded laterad, curved ventrad, constricted laterally in basal part; apices of conjunctival processes weakly sclerotized (Figs. 53, 63). Vesica gently curved in lateral view, with distal margin of processes of vesica at slightly lower level (Fig. 58). Processes of vesica relatively small, V-shaped in ventral view (Fig. 53), round in lateral view (Fig. 58), semitrapezoidal in outline in posterior view (Fig. 63).

Female. Valvifer VIII generally yellowish green, becoming yellowish apicad (Fig. 68), covered with short to long setae along posterior and mesal margins, and with a few setae on disc (Fig. 73); apical angle a little more acute than right angle (Fig. 73). Spermatheca long; apical receptacle (Figs. 78, 79) spherical, with 1 to 2 horn-shaped processes; horn-shaped processes produced laterad of apical receptacle, abruptly curved basad, reaching or surpassing distal flange; intermediate part (Figs. 78, 79) nearly parallel-sided, approximately 3 times as long as its width at middle, with sclerotized zone apically; apical sclerotized zone of intermediate part less than 1/5 as long as intermediate part (Figs. 78, 79); distal flange as wide as proximal flange (Figs. 78, 79).

Type material examined. *Syntype of *Plautia stali* Scott, 1874*, ♂ (Fig. 7): “*Plautia Ståli*, n. sp.”, “Type. Scott Coll. 88–11”, “Type”, “♂”, “BMNH(E) 1255169”, deposited in BMNH.

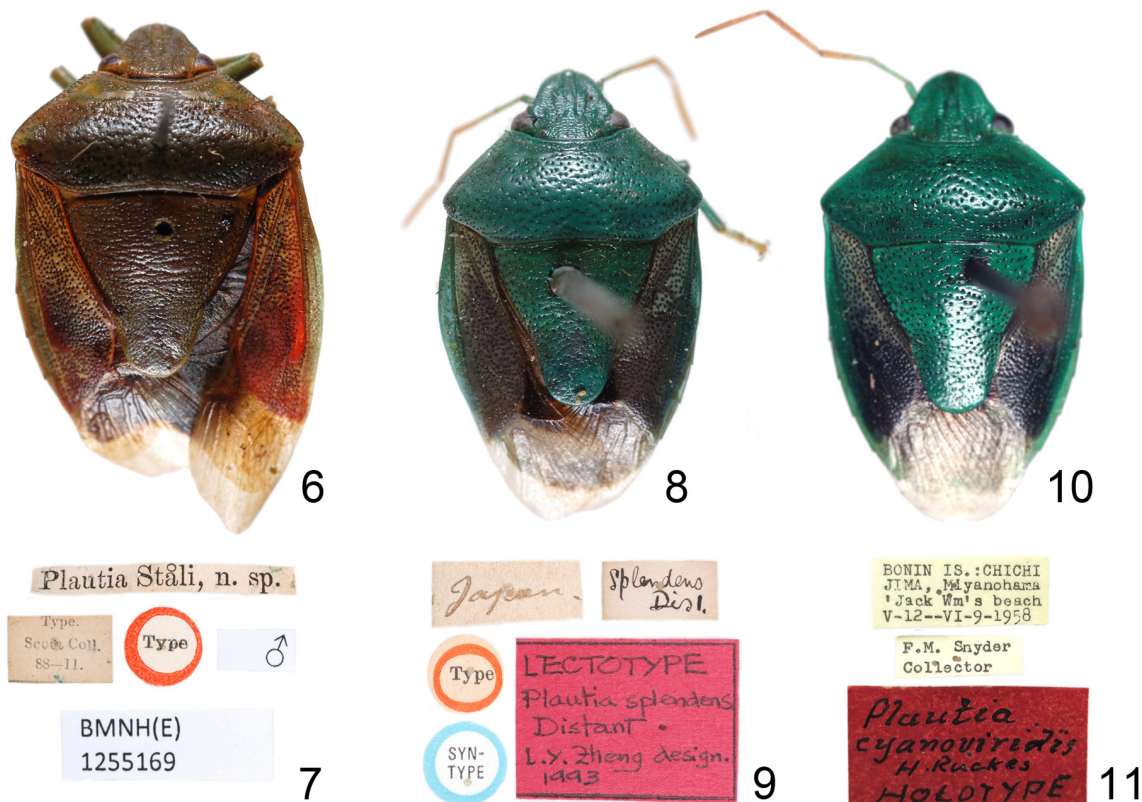


FIGURES 1–5. *Plautia* spp., male, habitus in dorsal view. 1, *P. stali*; 2, *P. sakishimensis* **sp. nov.**, holotype; 3, *P. splendens*; 4, *P. himechabane* **sp. nov.**, holotype; 5, *P. ishigaki* **sp. nov.**, holotype. Scale bars: 3 mm.

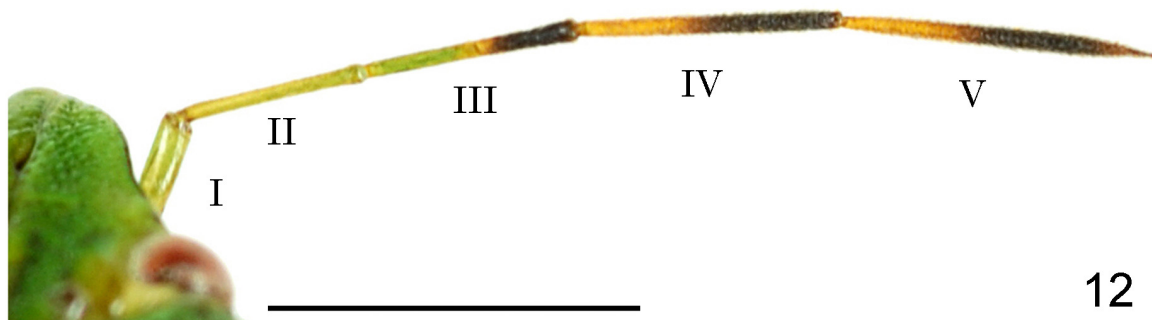
Other material examined. In addition to the type specimen, 1,478 specimens (ELEU, ELKU, NIAES, NSMT, OMNH, TUA) were examined from the following localities: JAPAN: Hokkaido (including Teuri Is.), Honshu (Aomori, Iwate, Miyagi, Akita, Yamagata, Fukushima, Ibaraki, Tochigi, Gunma, Saitama, Chiba, Tokyo, Kanagawa, Niigata, Yamanashi, Nagano, Gifu, Shizuoka, Aichi, Mie, Shiga, Kyoto, Osaka, Hyogo, Nara, Wakayama, Tottori, Shimane, and Yamaguchi Prefectures), Shikoku (Tokushima, Kagawa, Ehime, and Kochi Prefectures), Kyushu (Fukuoka, Saga, Nagasaki, Kumamoto, Oita, Miyazaki, and Kagoshima Prefectures), Izu Islands (Izu-oshima Is., Kozu-shima Is., Miyake-jima Is., Mikura-jima Is., and Hachijo-jima Is.), Oki Islands, Tsushima Is., and the Ryukyu Islands (Tanega-shima Is., Yaku-shima Is., Nakano-shima Is., Takara-jima Is., Amami-oshima Is., Kikai-jima Is., Tokuno-shima Is., Yoron-to Is., Okinawa-jima Is., Kouri-jima Is., Iheya-jima Is., and Kume-jima Is.).

Distribution. Japan (Hokkaido, Honshu, Shikoku, Kyushu, the Izu Islands, the Oki Islands, Tsushima Is., and the Ryukyu Islands (Okinawa-jima Is. and to the north)), Korea, China, Russian Far East, Hawaii. This species was previously thought to be distributed throughout Japan. However, the distribution of this species is here revised, ranging from Hokkaido to the Okinawa Islands. This revision was prompted by the recognition of the populations of the Sakishima Islands, the south-westernmost group of islands in the Ryukyu Islands, as a distinct species as mentioned below.

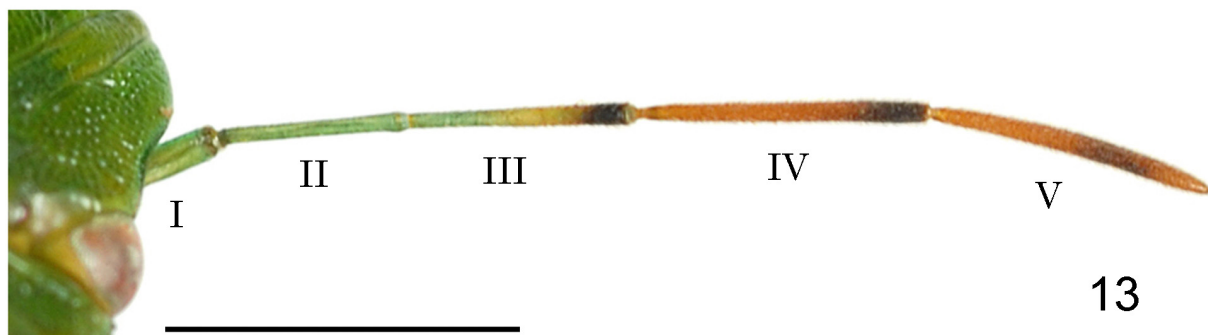
Remarks. Ever since Scott (1874) described *Plautia stali* from Japan as a new and distinct species, it has been treated as such for around 90 years. However, during this time *P. stali* was also considered by Miyamoto (1965, 1970) a variety of *Plautia crossota* (Dallas, 1851) or a subspecies of *P. crossota*, although no reasons for these suggestions were provided. Subsequent studies by Japanese authors have used both definitions of “*stali*”, defining it as infraspecific taxa (a variety or subspecies of *P. crossota*), including Miyamoto & Lee (1966), Miyamoto & Yasunaga (1989) and Yasunaga *et al.* (1993), and as a distinct species by Kawasawa & Kawamura (1975), Takai & Ishikawa (2012) and Ishikawa (2016). This issue was also discussed by Rider *et al.* (2002). Confusion about the use of “*stali*” has continued for over 50 years in Japan. Our careful examination of the external morphology of these species, including type specimens of *P. stali* and *P. crossota*, finally concluded that “*stali*” is not infraspecific but is a distinct species.



FIGURES 6–11. *Plautia* spp., type specimens and their labels. 6–7, *P. stali* Scott, 1874, syntype, male; 8–9, *P. splendens* Distant, 1900, lectotype, female; 10–11, *P. cyanoviridis* Ruckes, 1963, holotype.



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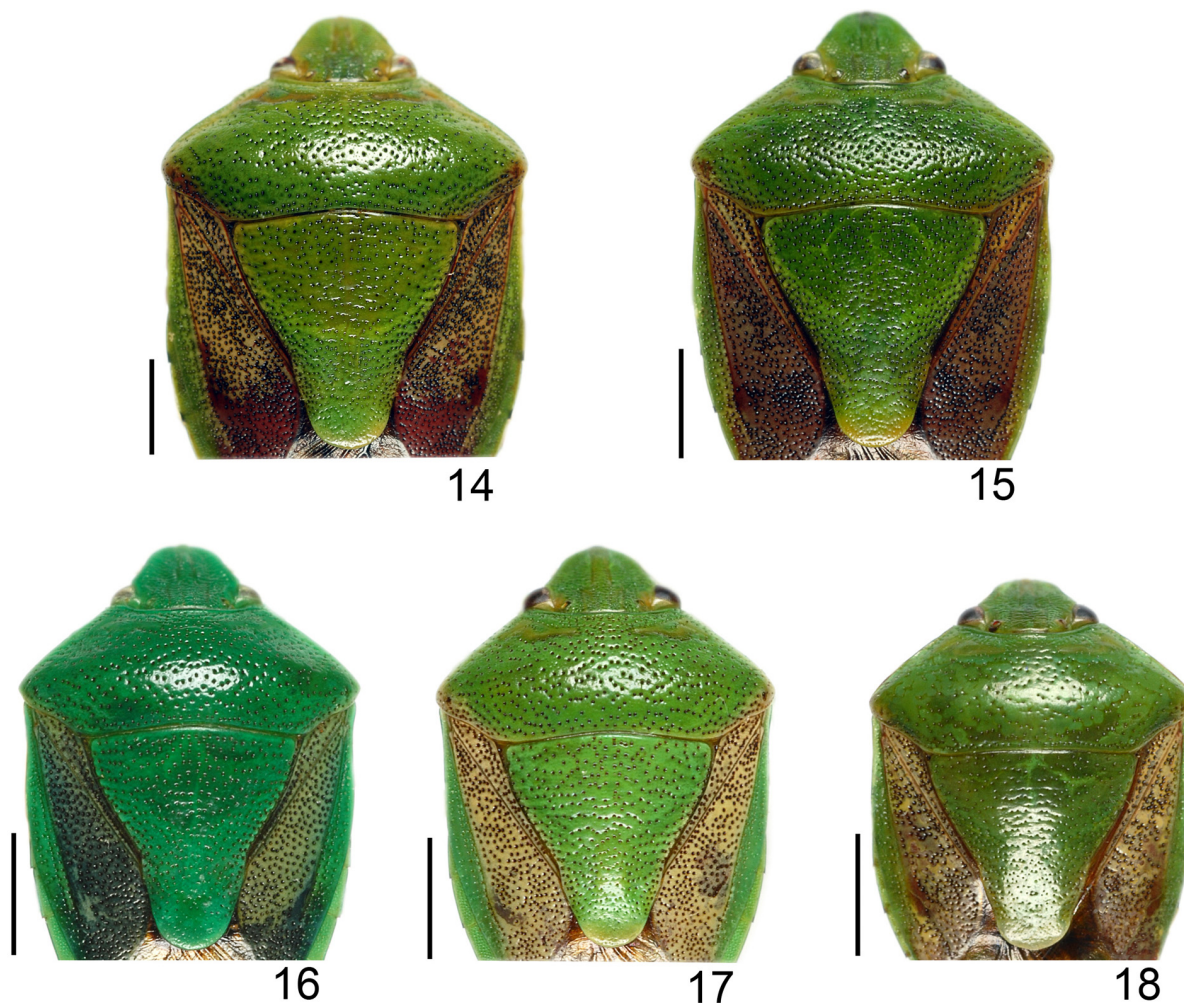
FIGURES 12–13. Right antennae of *Plautia* spp. 12, *P. stali*; 13, *P. sakishimensis* sp. nov. Scale bars: 2 mm. Lettering: I = segment I; II = segment II; III = segment III; IV = segment IV; V = segment V.

***Plautia sakishimensis* Ishikawa & Moriya, sp. nov.**

(Figs. 2, 13, 15, 22–24, 29, 34, 39, 44, 49, 54, 59, 64, 69, 74, 80, 81)

Diagnosis. Among the species of *Plautia*, this pentatomid is recognized by the following combination of characters: body 8.4–12.0 mm long; antennal segment III blackish in apical 1/5 (Fig. 13); antennal segment IV blackish in apical 1/3 or more less (Fig. 13); punctures on disc of pronotum and scutellum blackish and strong, almost same in size and color as punctures on coria of fore wings (Fig. 15); lateral margins of pronotum blackish (Fig. 22); blackish line of lateral margin of pronotum usually irregularly interrupted (Figs. 23, 24) (sometimes complete, Fig. 22); crown of paramere constricted in apical part (Fig. 44); lateral lobe of crown triangularly extended, with almost straight proximal margin (Fig. 44); conjunctival processes of endosoma expanded laterad, curved ventrad, with a dorsal expansion and a pair of lateral expansions at base (Figs. 49, 54, 59, 64); processes of vesica V-shaped in ventral view, semitrapezoidal in outline in posterior view (Figs. 54, 64); sclerotized zone of intermediate part of spermatheca approximately 1/5 as long as intermediate part (Figs. 80, 81).

Description. *Male.* Coloration. Body generally yellowish green (Fig. 2). Punctures on pronotum, scutellum and coria generally blackish (Fig. 15). Head with short longitudinal blackish line above antenniferous tubercle (Figs. 22–24). Antennal segments I and II yellowish green (Fig. 13); segment III yellowish green in basal half, yellowish brown from middle to apical 1/5, and blackish in apical 1/5 (Fig. 13); segment IV yellowish brown in basal 7/10 and blackish in apical 3/10 (Fig. 13); segment V yellowish brown in basal half and in apical 1/5, and blackish from middle to apical 1/5 (Fig. 13). Labium brownish yellow, with blackish apical part. Pronotum blackish along lateral margins; blackish line of lateral margin often irregularly interrupted (Fig. 23), sometimes almost disappearing except both ends (Fig. 24), or rarely complete (Fig. 22). Apical part of scutellum yellowish (Figs. 2, 15). Corium of fore wing except antero-marginal area brown to dark brown, sometimes with a few pale irregular markings (Figs. 2, 15); membrane of forewing transparent, tinged with pale brown (Fig. 2). Legs yellowish green; tarsi brownish yellow, darkened at apex of each tarsomere; claws brownish yellow in basal half and black in apical half; pulvilli dark brown. Posterolateral corners of abdominal segments III to VII narrowly and distinctly black.



FIGURES 14–18. *Plautia* spp., head, pronotum, scutellum and coria of fore wings in dorsal view. 14, *P. stali*; 15, *P. sakishimensis* sp. nov.; 16, *P. splendens*; 17, *P. himechabane* sp. nov.; 18, *P. ishigaki* sp. nov. Scale bars: 2 mm.

Structure. Head finely punctate, weakly and densely rugose, approximately $3/4$ as long as width across eyes; interocular space approximately 2.8 times as wide as eye in dorsal view. Bucculae roundly convex ventrad in anterior $1/3$, pointed at anterior $1/4$, gradually tapering posteriad in posterior $2/3$. Antenna a little more than $3/5$ as long as body length (to apex of abdomen), sparsely covered with short, erect and suberect setae in segments I, II and basal half of segment III, and densely in segments IV, V and apical half of segment III; approximate proportion of segments I to V 1.0 : 1.8 : 2.1 : 2.8 : 2.8 (Fig. 13). Labium reaching abdominal segment III; approximate proportion of segments I to IV 1.0 : 1.8 : 1.4 : 1.2.

Pronotum (Fig. 15) along midline approximately 1.2 times as long as head, approximately $1/3$ as long as humeral width; disc of pronotum densely punctate; these punctures distinct and strong (Fig. 15); width across humeri approximately 2.4 times as much as width across eyes; humeral angle round, slightly projected laterad; lateral margin straight, smooth, ecarinate, with sparse fine setae. Scutellum (Fig. 15) as long as its basal width, punctate as in pronotum. Fore wings exceeding apex of abdominal segment VII by approximately $3/20$ of its length (Fig. 2); punctures of coria denser than and almost same in size as punctures of pronotum and scutellum (Fig. 15).

Abdomen (from base of segment III to apex of segment VII) approximately $7/10$ as long as its maximum width. Genital capsule (Figs. 34, 39) approximately 2.2 times as wide at maximum as its basal width, approximately $4/5$ as long as its maximum width, roundly produced at posterior angles; ventral rim (Figs. 29, 34) widely concave, slightly sinuate in middle part; concavity of ventral rim approximately $1/6$ as deep as its maximum width (Fig. 34); transverse ridge well developed, invisible in ventral view, with slightly concave dorsal margin in posterior view (Fig. 39); dorsal sclerites semicircular, with acute ventral angle (Fig. 39); inner margin of dorsal

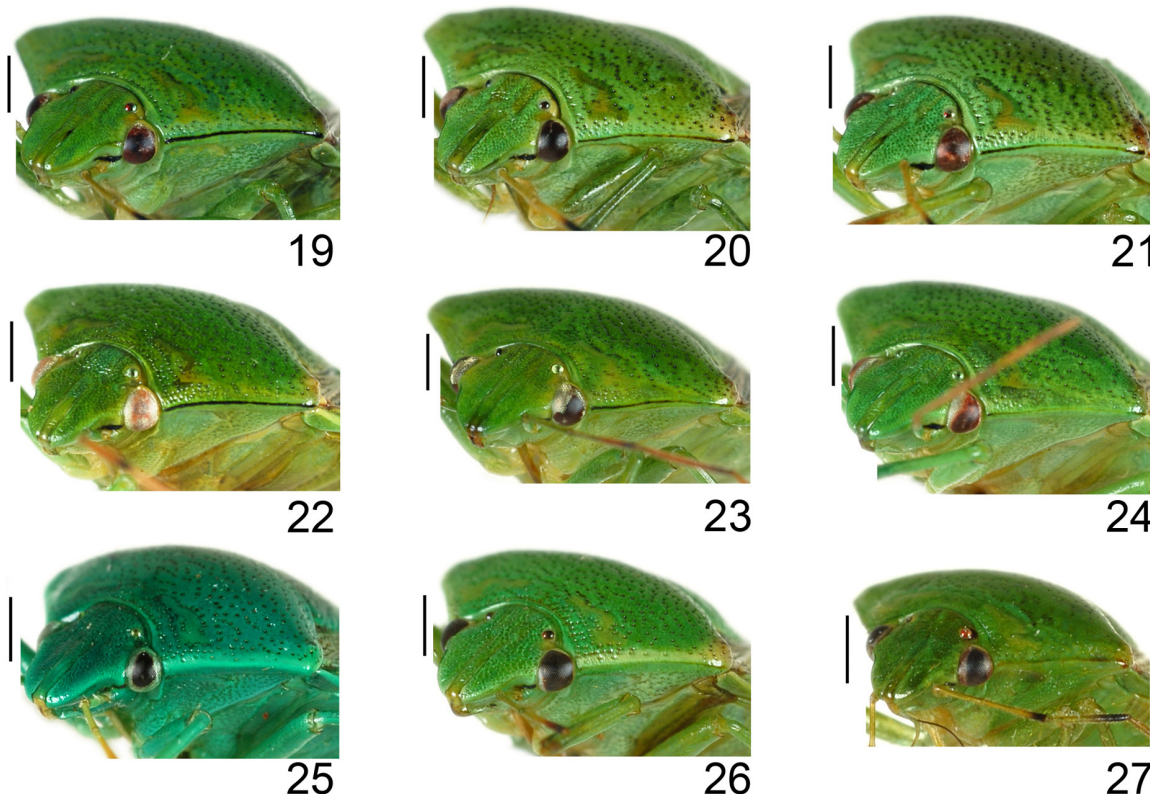
sclerite slightly concave throughout its length (Fig. 39); dorsal sinus subpentagonal in posterior view (Fig. 39); paramere sockets subtriangular in posterior view (Fig. 39). Crown of paramere (Fig. 44) subtriangular, curved upward and constricted in apical part, round at apex, covered with short to long, erect setae on lateral lobe; inner margin slightly arched; distal margin almost straight, strongly curved near apex of crown; proximal margin almost straight; lateral lobe triangularly extended, round at angle. Conjunctival processes of endosoma (Figs. 49, 54, 59, 64) large, well expanded laterally, curved ventrad, provided with large dorsal expansion and a pair of small lateral expansions at base; apices of conjunctival processes weakly sclerotized (Figs. 54, 64). Vesica gently curved in lateral view, with distal margin of processes of vesica at same level (Fig. 59). Processes of vesica relatively small, V-shaped in ventral view (Fig. 54), round in lateral view (Fig. 59), semitrapezoidal in outline in posterior view (Fig. 64).

Female. Similar to the male. Body relatively larger than male. Valvifer VIII generally yellowish green, becoming yellowish apicad (Fig. 69), covered with short to long setae along posterior and mesal margins, and with a few setae on disc (Fig. 74); apical angle a little more acute than right angle (Fig. 74). Spermatheca long; apical receptacle (Figs. 80, 81) spherical, with 1 horn-shaped process; horn-shaped process produced laterad of apical receptacle, abruptly curved basad, surpassing distal flange; intermediate part (Figs. 80, 81) nearly parallel-sided, approximately 3.5 times as long as its width at middle, with sclerotized zone apically; apical sclerotized zone of intermediate part approximately 1/5 as long as intermediate part (Figs. 80, 81); distal flange as wide as proximal flange (Figs. 80, 81).

Measurements [in mm, ♂ (n=79) / ♀ (n=90)]. Body length 8.4–11.2 (holotype 10.3) / 8.6–12.0; width across eyes 2.3–2.9 / 2.4–3.0; width across humeral width 5.3–6.8 / 5.4–7.4; maximum width of abdomen 5.4–6.8 / 5.2–7.3.

Type series. Holotype: ♂ (Fig. 2), “[JAPAN] Banna-kôen, Ishigaki-jima Is., the Ryukyus, 19. III. 2012, LT, T. Ishikawa” (LETUA IC 2018-00133) (TUA).

A total of 168 paratypes (78♂ 90♀, LETUA IC 2018-00134–00301, TUA) are here designated from the following localities: Miyako-jima Is., Irabu-jima Is., Ishigaki-jima Is., Kohama-jima Is., Iriomote-jima Is., and Yonaguni-jima Is. of the Ryukyu Islands, Japan.



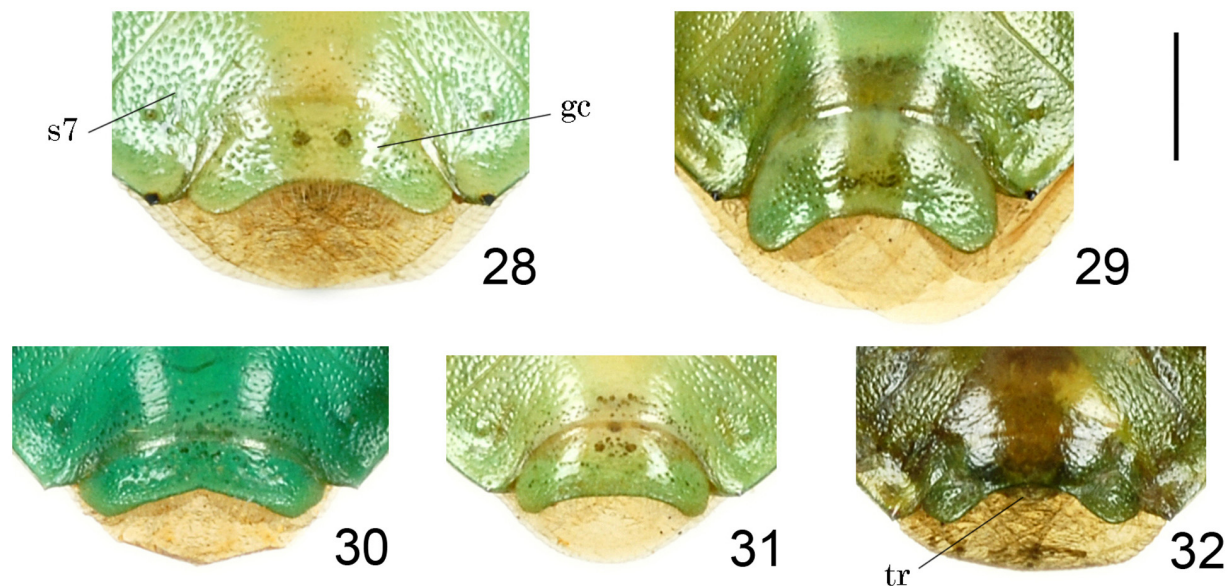
FIGURES 19–27. *Plautia* spp., head and pronotum in anterolateral view. 19–21, *P. stali*; 22–24, *P. sakishimensis* sp. nov.; 25, *P. splendens*; 26, *P. himechabane* sp. nov.; 27, *P. ishigaki* sp. nov. Scale bars: 1 mm.

Distribution. The Sakishima Islands, the south-westernmost group of islands within the Ryukyu Islands, Japan.

Etymology. The specific epithet refers to its occurrence in the Sakishima Islands of the Ryukyu Islands, Japan; an adjective.

Remarks. This new species has historically been recognized as the Sakishima Islands population of *Plautia stali*. We describe this population as a distinct species as mentioned above due to significant differences in external morphology between the Sakishima Islands population and the remaining populations of *Plautia stali*.

In general appearance, *Plautia sakishimensis* **sp. nov.** closely resembles *P. stali* Scott, 1874. However, *P. sakishimensis* **sp. nov.** is distinguished from *P. stali* by antennal segment III blackish in apical 1/5 (Fig. 13) [vs. blackish at least in apical 1/3 (Fig. 12)], antennal segment IV blackish in apical 1/3 or more less (Fig. 13) [vs. blackish in apical half (Fig. 12)], a blackish line of the lateral margin of the pronotum usually irregularly interrupted (Figs. 23, 24) [vs. usually complete (Fig. 19)], the lateral lobe of the crown of paramere triangularly extended (Fig. 44) [vs. widely extended laterad, with the edge roundly and deeply concave (Fig. 43)], and the conjunctival processes of endosoma with a dorsal expansion and a pair of lateral expansions at the base (Figs. 49, 54, 59, 64) [vs. lacking such expansions (Figs. 48, 53, 58, 63)]. Moreover, *P. sakishimensis* **sp. nov.** is also similar in general appearance to *P. crossota* (Dallas, 1851), but is distinguished from the latter by the lateral margins of pronotum not carinate (Fig. 15) [vs. slightly carinate], punctures of coria of fore wings denser than and almost same in size as punctures of pronotum and scutellum (Fig. 15) [vs. much denser and larger], the posterior angles of genital capsule round in the dorsal and ventral views (Figs. 29, 34) [vs. angulate], the ventral angle of the dorsal sclerites of genital capsule acutely projected (Fig. 39) [vs. merely angulated], crown of paramere curved upward and constricted in apical part (Fig. 44) [vs. not curved and constricted], and conjunctival processes of endosoma with a large dorsal expansion and a pair of small lateral expansions at the base (Figs. 49, 54, 59, 64) [vs. lacking such expansions].



FIGURES 28–32. *Plautia* spp., apical part of male abdomen in ventral view. 28, *P. stali*; 29, *P. sakishimensis* **sp. nov.**; 30, *P. splendens*; 31, *P. himechabane* **sp. nov.**; 32, *P. ishigaki* **sp. nov.** Scale bar: 1 mm. Lettering: gc = genital capsule; s7 = sternum VII; tr = transverse ridge.

***Plautia splendens* Distant, 1900**

(Figs. 3, 8–11, 16, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 82)

Plautia splendens Distant, 1900: 171 (new species). Lectotype (Zheng in Liu & Zheng 1994: 243, 247): ♀, Japan; BMNH.

Plautia cyanoviridis Ruckes, 1963: 353 (new species). Holotype: ♂, Chichi Jima, Bonin Is. [Ogasawara Islands, Japan];

SNMNH. **New subjective synonym.**

Diagnosis. Among the species of *Plautia*, this pentatomid is recognized by the following combination of characters: body 8.0–10.0 mm long and generally dark blue green (Fig. 3); antennae lacking blackish area (Fig. 3); punctures on disc of pronotum and scutellum blackish and strong, almost same in size as punctures on coria of fore wings (Fig. 16); lateral margins of pronotum pale without dark line (Fig. 25); ventral rim of genital capsule V-shaped (Figs. 30, 35); crown of paramere drop-shaped (Fig. 45); lateral lobe of crown strongly extended laterad, with widely round distal angle and acutely angulated proximal angle (Fig. 45); conjunctival processes of endosoma long, tapering (Figs. 50, 55, 60, 65); processes of vesica roughly Y-shaped in ventral view, oblong in outline in posterior view (Figs. 55, 65); valvifer VIII with oval oblique brownish spot apically (Fig. 70); horn-shaped process of apical receptacle of spermatheca short, produced dorsad of apical receptacle, strongly curved (Fig. 82); sclerotized zone of intermediate part of spermatheca approximately half as long as intermediate part (Fig. 82).

Redescription of genitalia. *Male.* Genital capsule (Figs. 35, 40) approximately 2.8 times as wide at maximum as its basal width, approximately 7/10 as long as its maximum width, triangularly produced at posterior angles; ventral rim (Figs. 30, 35) V-shaped; concavity of ventral rim approximately 1/5 as deep as its maximum width (Fig. 35); transverse ridge well developed, invisible in ventral view, with roundly concave dorsal margin in posterior view (Fig. 40); dorsal sclerites elliptic, roundly extended outward, with small projection at ventral angle (Fig. 40); dorsal sinus almost circular in posterior view (Fig. 40); paramere sockets semicircular in posterior view (Fig. 40). Crown of paramere (Fig. 45) drop-shaped, covered with short setae for most part, round at apex; lateral lobe large, strongly extended laterad, with widely round distal angle and acutely angulated proximal angle; distal margin slightly concave; proximal margin weakly sinuate. Conjunctival processes of endosoma (Figs. 50, 55, 60, 65) simple, long, weakly arched, directed distad, tapering, blunt at apex. Vesica short, straight in lateral view, directed dorsoposteriad (Fig. 60). Processes of vesica relatively large, roughly Y-shaped in ventral view (Fig. 55), elliptic in lateral view (Fig. 60), oblong in outline in posterior view (Fig. 65).

Female. Valvifer VIII roughly pentagonal, generally dark blue green, often with oval oblique brownish spot apically (Fig. 70), covered with short to long setae on disc and along posterior and mesal margins (Fig. 75); apical angle a little more obtuse than right angle (Fig. 75). Spermatheca long; apical receptacle (Fig. 82) spherical, with 1 horn-shaped process; horn-shaped process short, produced dorsad of apical receptacle, strongly curved; intermediate part (Fig. 82) a little widened at apical part, gradually narrowed basad, approximately 3.5 times as long as its width at middle, with sclerotized zone apically; apical sclerotized zone of intermediate part approximately half as long as intermediate part (Fig. 82); distal flange 1.5 times as wide as proximal flange (Fig. 82).

Type material examined. Lectotype of *Plautia splendens* Distant, 1900, ♀ (Fig. 8): “Japan.”, “splendens Dist.”, “Type”, “SIN-TYPE”, “LECTOTYPE *Plautia splendens* Distant L.y. Zheng design. 1993”, deposited in BMNH. Holotype of *Plautia cyanoviridis* Ruckes, 1963, ♂ (Fig. 10): “BONIN IS.: CHICHI JIMA, Miyano-hara ‘Jack Wm’s beach V-12- -VI-9-1958’”, “F.M. Snyder Collector”, “*Plautia cyanoviridis* H. Ruckes HOLOTYPE”, deposited in SNMNH.

Other material examined. In addition to the type specimens, 50 specimens (ELKU, NIAES, NSMT, OMNH, TUA) were examined from the following localities: JAPAN: the Ogasawara Islands (Muko-jima Is., Ani-jima Is., Chichi-jima Is., Minami-jima Is., and Haha-jima Is.). This species is endemic to the Ogasawara Islands.

Distribution. The Ogasawara Islands (Muko-jima Is., Ani-jima Is., Chichi-jima Is., Minami-jima Is., and Haha-jima Is.).

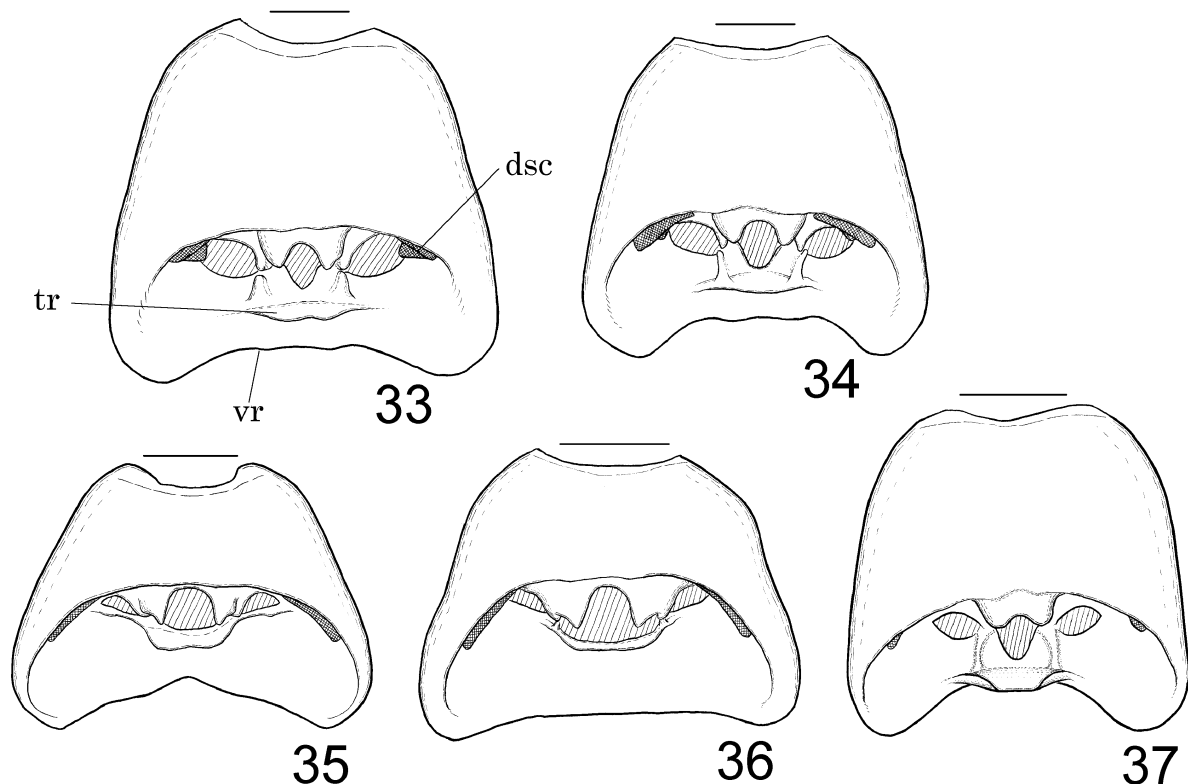
Remarks. Detailed examination of type specimens of *Plautia splendens* (lectotype) and *P. cyanoviridis* (holotype) revealed that these two species are conspecific without any doubt. The scientific name *P. splendens* has been used for another species (which is described as a new species, *P. himechabane*, detailed below) inhabiting the mainland of Japan, the Ryukyu Islands, and China (see below for details). Closer attention is thus necessary when interpreting prior studies using the scientific name *P. splendens*.

***Plautia himechabane* Ishikawa & Moriya, sp. nov.**

(Figs. 4, 17, 26, 31, 36, 41, 46, 51, 56, 61, 66, 71, 76, 83)

Plautia splendens (non Distant 1900): Esaki (1932: 1581) (record from Honshu (the mainland of Japan), redescription) and subsequent Japanese authors; Liu & Zheng (1995: 231) (new record from China, description and figures of male genitalia).

Diagnosis. Among the species of *Plautia*, this pentatomid is recognized by the following combination of characters: body 6.7–9.8 mm long; antennal segment III blackish in apical 1/3 (Fig. 4); antennal segment IV blackish in apical half (Fig. 4); punctures on disc of pronotum and scutellum blackish and strong, almost same in size and color as punctures on coria of fore wings (Fig. 17); lateral margins of pronotum pale without dark line (Fig. 26); ventral rim of genital capsule widely, shallowly and roundly concave (Figs. 31, 36); crown of paramere drop-shaped (Fig. 46); lateral lobe of crown roundly and strongly extended laterad (Fig. 46); conjunctival processes of endosoma long, tapering (Figs. 51, 56, 61, 66); processes of vesica roughly Y-shaped in ventral view, semirectangular in outline in posterior view (Figs. 56, 66); valvifer VIII often with oval oblique brownish spot apically (Fig. 71); horn-shaped process of apical receptacle of spermatheca long, produced laterad of apical receptacle, reaching proximal flange (Fig. 83); sclerotized zone of intermediate part of spermatheca approximately half as long as intermediate part (Fig. 83).



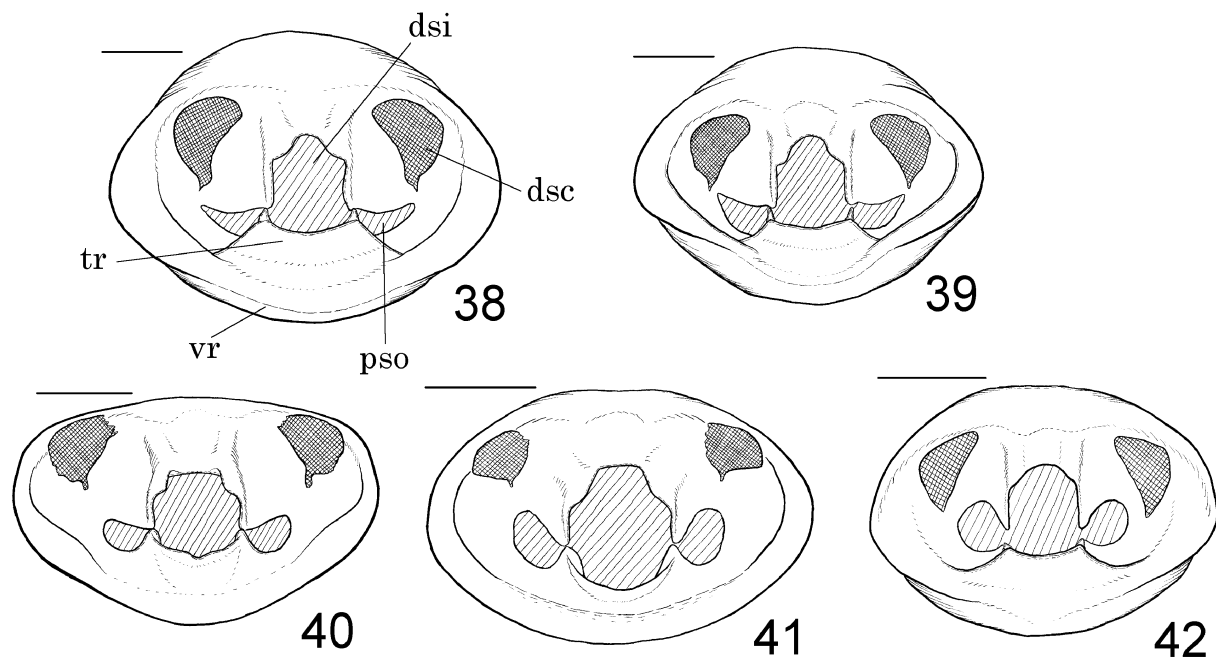
FIGURES 33–37. *Plautia* spp., genital capsule in dorsal view. 33, *P. stali*; 34, *P. sakishimensis* **sp. nov.**; 35, *P. splendens*; 36, *P. himechabane* **sp. nov.**; 37, *P. ishigaki* **sp. nov.** Scale bars: 0.5 mm. Lettering: dsc = dorsal sclerite; tr = transverse ridge; vr = ventral rim.

Description. *Male.* Coloration. Body generally yellowish green (Fig. 4). Punctures on pronotum, scutellum and coria generally blackish (Fig. 17). Head with short longitudinal blackish line above antenniferous tubercle (Fig. 26). Antennal segments I and II yellowish green; segment III yellowish green in basal 1/3, brownish yellow from basal 1/3 to apical 1/3, and blackish in apical 1/3; segment IV brownish yellow in basal half and blackish in apical half; segment V brownish yellow in basal 2/5 and in apical 1/5, and blackish from basal 2/5 to apical 1/5. Labium brownish yellow, with blackish apical part. Pronotum pale along lateral margins (Fig. 26). Apical part of scutellum whitish (Figs. 4, 17). Corium of fore wing except antero-marginal area greyish pale yellow, with a few obscure irregular markings (Figs. 4, 17); membrane of fore wing transparent, tinged with pale brown (Fig. 4). Legs yellowish green; tarsi yellowish green, with yellowish tinge in apical part of tarsomere III; claws brownish yellow in basal half and black in apical half; pulvilli dark brown. Posterolateral corners of abdominal segments III to VII narrowly and distinctly black.

Structure. Head finely punctate, weakly and densely rugose, a little more than 3/4 as long as width across eyes; interocular space approximately 3.2 times as wide as eye in dorsal view. Bucculae roundly convex ventrad in

anterior 1/3, pointed at anterior 1/4, gradually tapering posteriad in posterior 2/3. Antenna a little more than 3/5 as long as body length (to apex of abdomen), sparsely covered with short, erect and suberect setae in segments I, II and basal half of III, and densely in segments IV, V and apical half of III; approximate proportion of segments I to V 1.0 : 1.7 : 2.2 : 2.8 : 2.8. Labium reaching abdominal segment III or IV; approximate proportion of segments I to IV 1.0 : 1.8 : 1.5 : 1.3.

Pronotum (Fig. 17) along midline approximately 1.1 times as long as head, approximately 2/5 as long as humeral width; disc of pronotum densely punctate; these punctures distinct and strong (Fig. 17); width across humeri 2.1 times as much as width across eyes; humeral angle round, slightly projected laterad; lateral margin straight, smooth, ecarinate, with sparse fine setae. Scutellum (Fig. 17) as long as its basal width, punctate as in pronotum. Fore wings exceeding apex of abdominal segment VII by approximately 1/10 of its length (Fig. 4); punctures of coria denser than and almost same in size as punctures of pronotum and scutellum (Fig. 17).

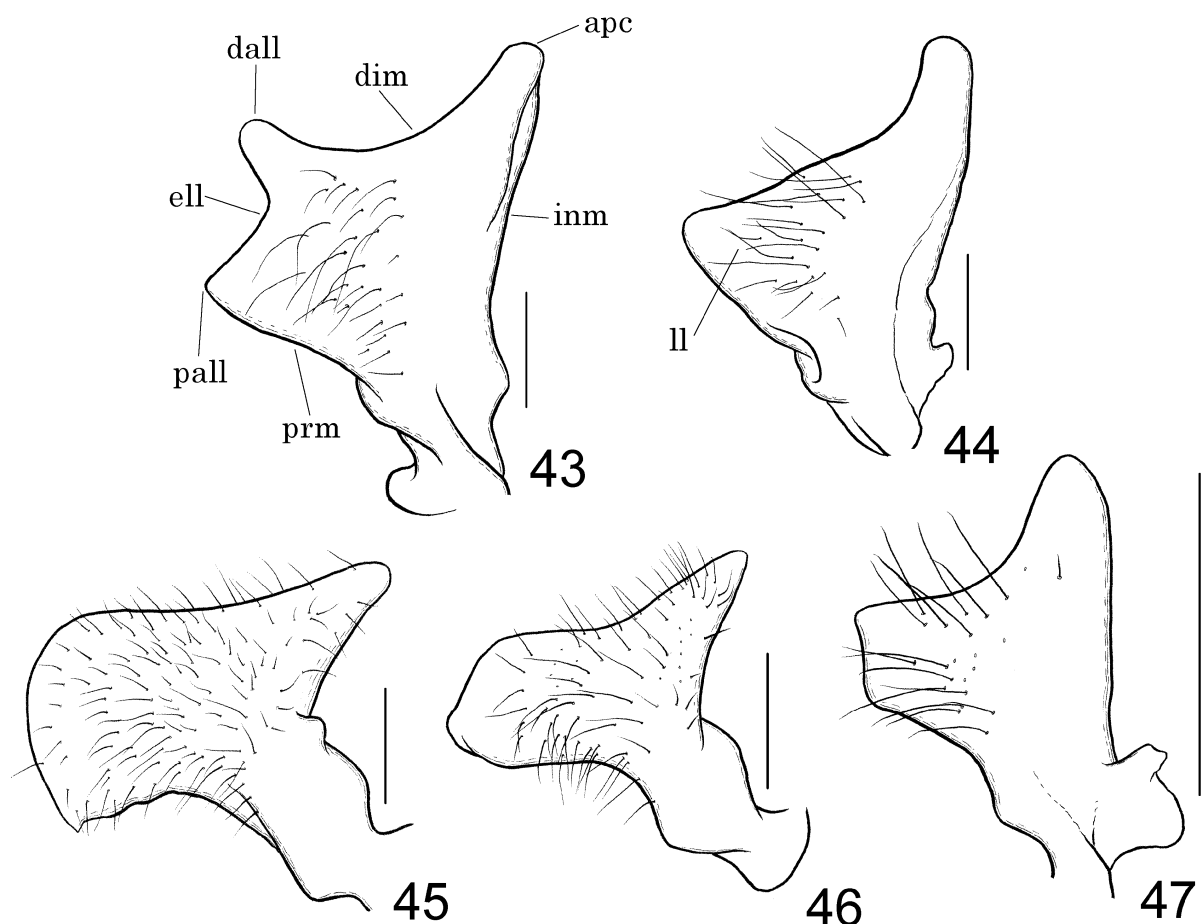


FIGURES 38–42. *Plautia* spp., genital capsule in posterior view. 38, *P. stali*; 39, *P. sakishimensis* sp. nov.; 40, *P. splendens*; 41, *P. himechabane* sp. nov.; 42, *P. ishigaki* sp. nov. Scale bars: 0.5 mm. Lettering: dsc = dorsal sclerite; dsi = dorsal sinus; pso = paramere socket; tr = transverse ridge; vr = ventral rim.

Abdomen (from base of segment III to apex of segment VII) approximately 7/10 as long as its maximum width. Genital capsule (Figs. 36, 41) approximately 2.5 times as wide at maximum as its basal width, approximately 3/5 as long as its maximum width, roundly produced at posterior angles; ventral rim (Figs. 31, 36) widely, shallowly and roundly concave, almost straight in middle part; concavity of ventral rim approximately 1/15 as deep as its maximum width (Fig. 36); transverse ridge well developed, invisible in ventral view, with roundly and deeply concave dorsal margin in posterior view (Fig. 41); dorsal sclerites elliptic, angularly extended outward, with small projection at ventral angle (Fig. 41); dorsal sinus suboctagonal in posterior view (Fig. 41); paramere sockets elliptic in posterior view (Fig. 41). Crown of paramere (Fig. 46) drop-shaped, covered with short to long setae for most part, obtuse at apex; lateral lobe roundly and strongly extended laterad with widely round distal and proximal angles; distal margin gently concave; proximal margin roundly concave. Conjunctival processes of endosoma (Figs. 51, 56, 61, 66) simple, long, almost straight, directed distad, tapering, blunt at apex. Vesica short, straight in lateral view, directed dorsoposteriad (Fig. 61). Processes of vesica relatively large, roughly Y-shaped in ventral view (Fig. 56), elliptic in lateral view (Fig. 61), semirectangular in outline in posterior view (Fig. 66).

Female. Similar to the male. Body relatively larger than male. Valvifer VIII roughly triangular, generally yellowish green, often with oval oblique brownish spot apically (Fig. 71), covered with short to long setae on disc and along posterior and mesal margins (Fig. 76); apical angle a little more obtuse than right angle (Fig. 76). Spermatheca long; apical receptacle (Fig. 83) spherical, with 1 horn-shaped process; horn-shaped process long,

produced laterad of apical receptacle, abruptly curved basad, reaching proximal flange; intermediate part (Fig. 83) gradually narrowed basad, approximately 3 times as long as its width at middle, with sclerotized zone apically; apical sclerotized zone of intermediate part approximately half as long as intermediate part (Fig. 83); distal flange 1.5 times as wide as proximal flange (Fig. 83).



FIGURES 43–47. *Plautia* spp., crown of left paramere. 43, *P. stali*; 44, *P. sakishimensis* sp. nov.; 45, *P. splendens*; 46, *P. himechabane* sp. nov.; 47, *P. ishigaki* sp. nov. Scale bars: 0.5 mm. Lettering: apc = apex of crown; dall = distal angle of lateral lobe; dim = distal margin; ell = edge of lateral lobe; inm = inner margin; ll = lateral lobe; pall = proximal angle of lateral lobe; prm = proximal margin.

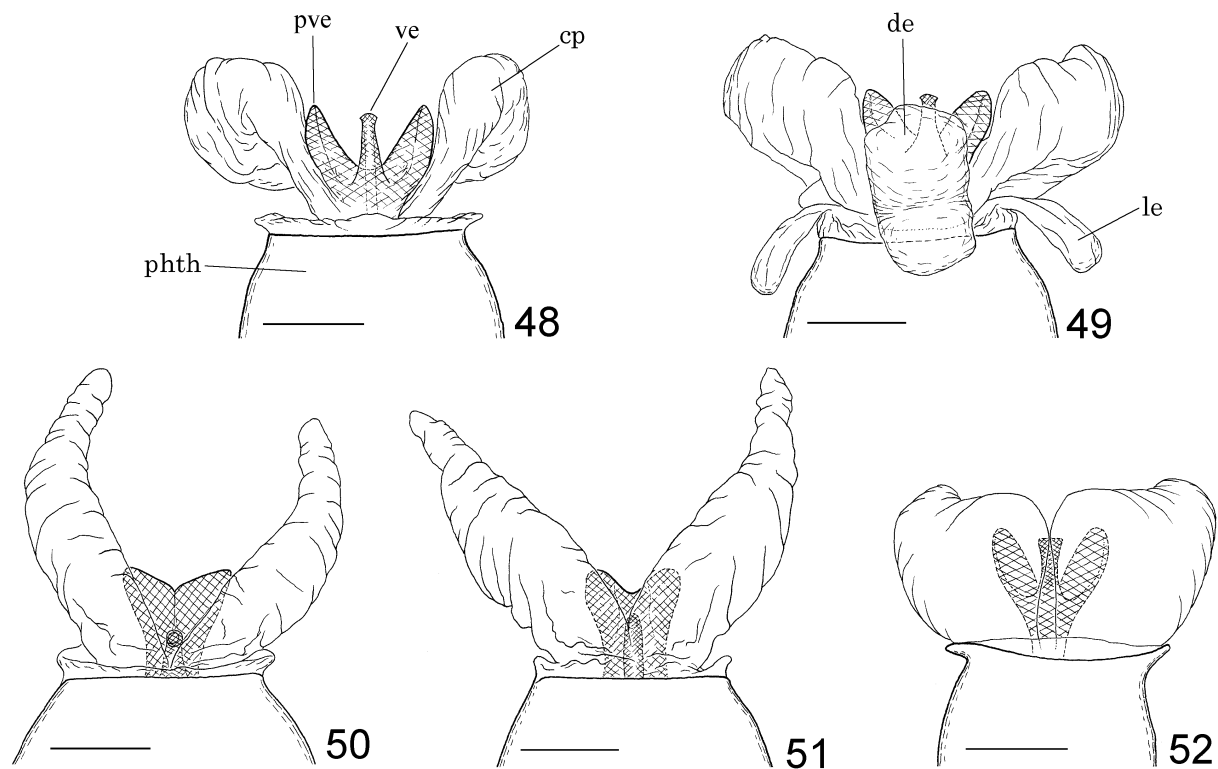
Measurements [in mm, ♂ (n=56) / ♀ (n=53)]. Body length 6.7–8.6 (holotype 8.1) / 7.1–9.8; width across eyes 2.1–2.6 / 2.2–2.9; width across humeral width 4.3–5.8 / 4.7–6.4; maximum width of abdomen 4.2–5.6 / 4.7–6.2.

Type series. Holotype: ♂ (Fig. 4), “JAPAN the Ryukyus, Ishigaki-jima Is., Hirae, 24.38904N 124.19505E, 23. IX. 2014, light trap, Kiichi Shimizu” (LETUA IC 2018-00024) (TUA).

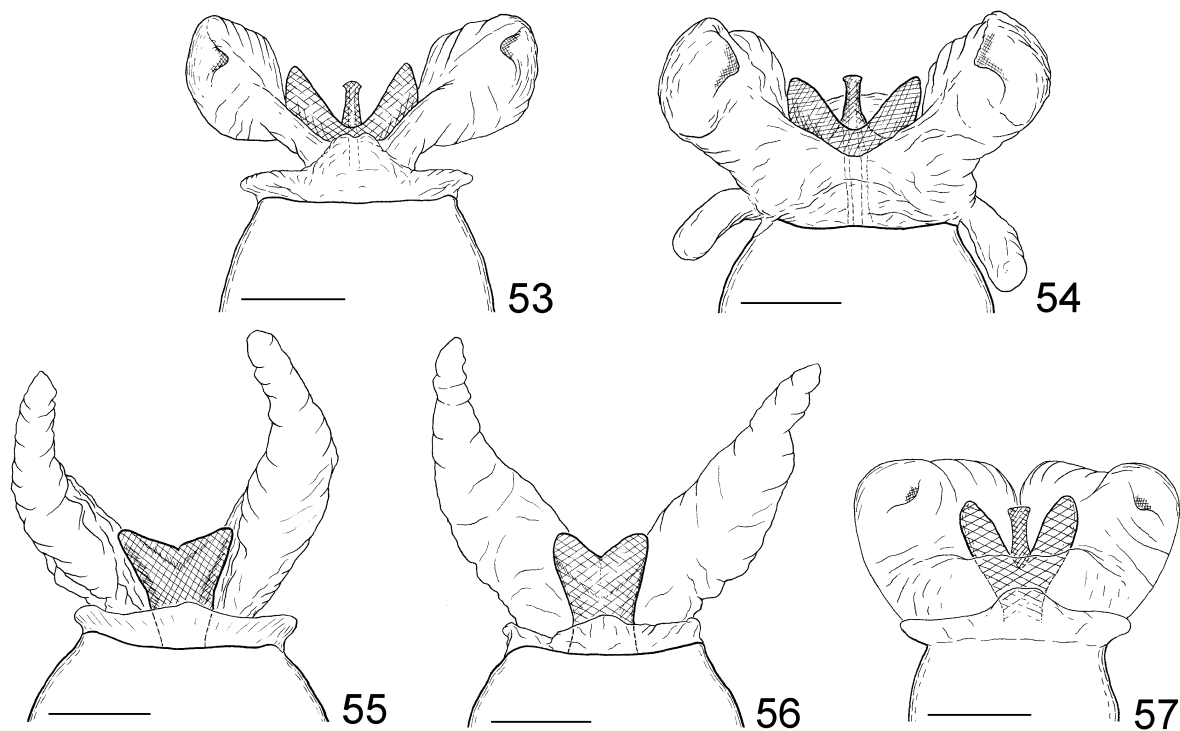
A total of 108 paratypes (55♂ 53♀, LETUA IC 2018-00025–00132, TUA) are here designated from the following localities: Okinawa-jima Is., Ishigaki-jima Is., Iriomote-jima Is., and Yonaguni-jima Is. of the Ryukyu Islands, Japan.

Other material examined. In addition to the type specimens, 163 specimens (ELEU, ELKU, NIAES, NSMT, OMNH, TUA) were examined from the following localities: JAPAN: Honshu (Kanagawa, Aichi, Wakayama, Ishikawa, Okayama, Hiroshima, and Yamaguchi Prefectures), Shikoku (Tokushima, Kagawa, Ehime, and Kochi Prefectures), Kyushu (Miyazaki and Kagoshima Prefectures), and the Ryukyu Islands (Yaku-shima Is., Nakano-shima Is. of the Tokara Islands, Amami-oshima Is., Tokuno-shima Is., Yoron-to Is., Okinawa-jima Is., Minami-daito-jima Is., Miyako-jima Is., Ishigaki-jima Is., Taketomi-jima Is., Iriomote-jima Is., and Yonaguni-jima Is.).

Distribution. Japan (Honshu, Shikoku, Kyushu, and the Ryukyu Islands), China (Southeastern Territory). Based on locality data, it is likely that in Honshu, Shikoku and Kyushu, Japan, this species only inhabits regions within a few kilometers of the coast.



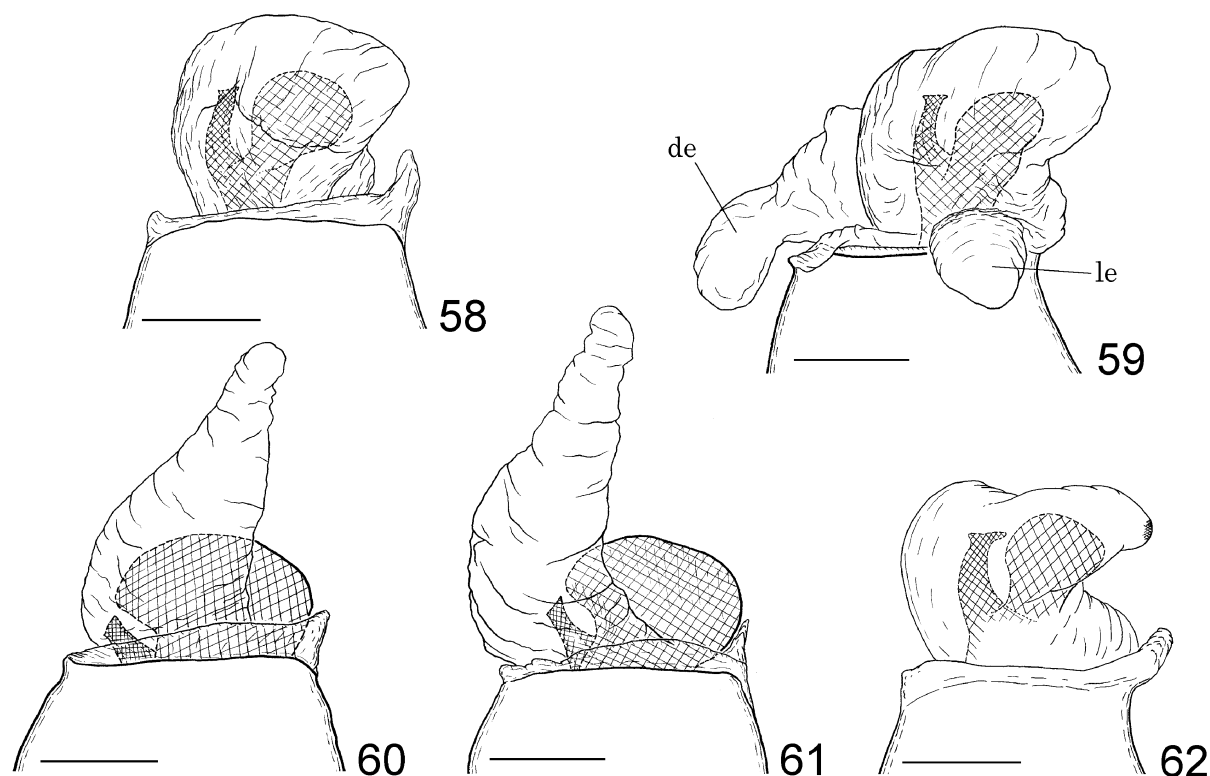
FIGURES 48–52. *Plautia* spp., apical part of phallus in dorsal view. 48, *P. stali*; 49, *P. sakishimensis* **sp. nov.**; 50, *P. splendens*; 51, *P. himechabane* **sp. nov.**; 52, *P. ishigaki* **sp. nov.** Scale bars: 0.1 mm. Lettering: cp = conjunctival process; de = dorsal expansion; le = lateral expansion; pve = process of vesica; phth = phallotheca; ve = vesica.



FIGURES 53–57. *Plautia* spp., apical part of phallus in ventral view. 53, *P. stali*; 54, *P. sakishimensis* **sp. nov.**; 55, *P. splendens*; 56, *P. himechabane* **sp. nov.**; 57, *P. ishigaki* **sp. nov.** Scale bars: 0.1 mm.

Etymology. The specific epithet is named after the Japanese common name for this new species ‘Himechabane-ao-kamemushi’; a noun in apposition.

Remarks. This new species has been misidentified for more than 85 years. The first error of this nature was made by Esaki (1932) who used *Plautia splendens* to describe the population of the mainland Japan (Honshu). Subsequent Japanese heteropterists such as Syôiti Miyamoto and Hitoshi Hasegawa followed Esaki’s identification, using the name *P. splendens* for populations from other areas of Japan (Shikoku, Kyushu, and the Ryukyu Islands) and for Chinese populations (Liu & Zheng 1995). There were likely two factors responsible for the misidentification. Firstly, the type locality of *P. splendens* was described by Distant (1900) as simply “Japan” based on specimens likely collected from the Ogasawara Islands of Japan. Secondly, the general appearances of *P. splendens* and *P. himechabane* are similar to each other except for the overall body color. Esaki (1932) would likely have been unable to determine that the “Japan” referred to by Distant (1900) was in fact the Ogasawara Islands, which are 1,000 km away from the mainland, supposing that the differences in body color were simply due to intraspecific variation. The comprehensive fieldwork and detailed morphological examinations provided here clarify that *P. splendens* is a species found only in the Ogasawara Islands (furthermore, it is a senior synonym of *P. cyanoviridis*, as mentioned above) and that any species referred to as *P. splendens* found in the mainland of Japan, the Ryukyu Islands, or China do not correspond to any species described until now.



FIGURES 58–62. *Plautia* spp., apical part of phallus in left-lateral view. 58, *P. stali*; 59, *P. sakishimensis* sp. nov.; 60, *P. splendens*; 61, *P. himechabane* sp. nov.; 62, *P. ishigaki* sp. nov. Scale bars: 0.1 mm. Lettering: de = dorsal expansion; le = lateral expansion.

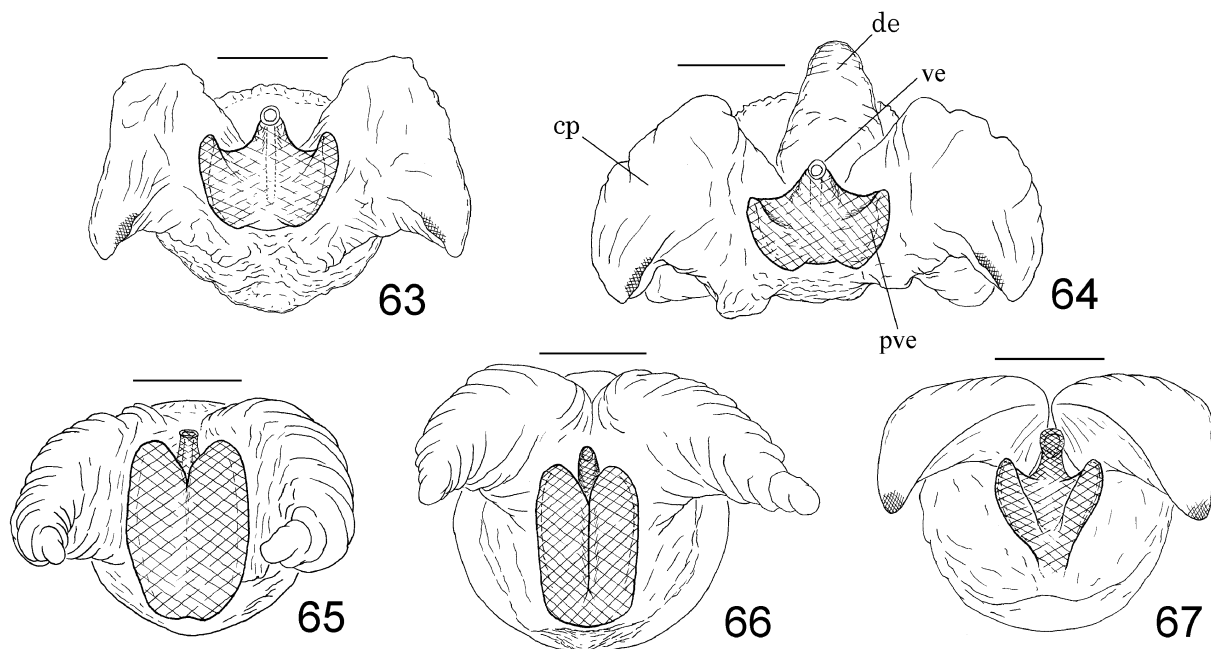
This new species is closely related with *P. splendens* Distant, 1900. However, *P. himechabane* sp. nov. is distinguished from *P. splendens* by the yellowish green body (Fig. 4) [vs. dark blue green body (Fig. 3)], antennae with blackish areas (Fig. 4) [vs. lacking blackish area (Fig. 3)], the apical part of scutellum whitish (Figs. 4, 17) [vs. concolorous with the remaining parts of scutellum (Figs. 3, 8, 10, 16)], the ventral rim of genital capsule widely and shallowly concave (Figs. 31, 36) [vs. V-shaped (Figs. 30, 35)], the dorsal sclerites of genital capsule angularly extended outward (Fig. 41) [vs. roundly extended outward (Fig. 40)], paramere sockets elliptic in the posterior view (Fig. 41) [vs. semicircular (Fig. 40)], the lateral lobe of the crown of paramere with widely round proximal angle (Fig. 46) [vs. with acutely angulated proximal angle (Fig. 45)], processes of vesica semirectangular in outline in the posterior view (Fig. 66) [vs. oblong (Fig. 65)], valvifer VIII roughly triangular (Fig. 76) [vs. pentagonal (Fig.

75)], and a horn-shaped process of the apical receptacle of spermatheca long and produced laterad of the apical receptacle (Fig. 83) [vs. short and produced dorsad of apical receptacle (Fig. 82)].

***Plautia ishigaki* Ishikawa & Moriya, sp. nov.**

(Figs. 5, 18, 27, 32, 37, 42, 47, 52, 57, 62, 67, 72, 77, 84)

Diagnosis. Among the species of *Plautia*, this pentatomid is recognized by the following combination of characters: body 6.7–8.8 mm long, glossed (Fig. 5); antennal segment III blackish in apical 1/3 (Fig. 5); antennal segment IV blackish in apical half (Fig. 5); punctures on disc of pronotum and scutellum brownish and weak, sparser and much smaller than punctures on coria of fore wings (Fig. 18); lateral margins of pronotum brownish and weakly edged (Figs. 18, 27); brownish line of lateral margin of pronotum irregularly interrupted (Fig. 27); transverse ridge of genital capsule visible from ventral rim in ventral view (Figs. 32); lateral lobe of crown of paramere strongly extended laterad, nearly truncate at apex, with roundly concave distal and proximal margins (Fig. 47); conjunctival processes of endosoma thick and short, curved ventrad (Figs. 52, 57, 62, 67); processes of vesica Y-shaped in ventral view, roughly heart-shaped in outline in posterior view (Figs. 57, 67); sclerotized zone of intermediate part of spermatheca approximately 1/8 as long as intermediate part (Fig. 84).

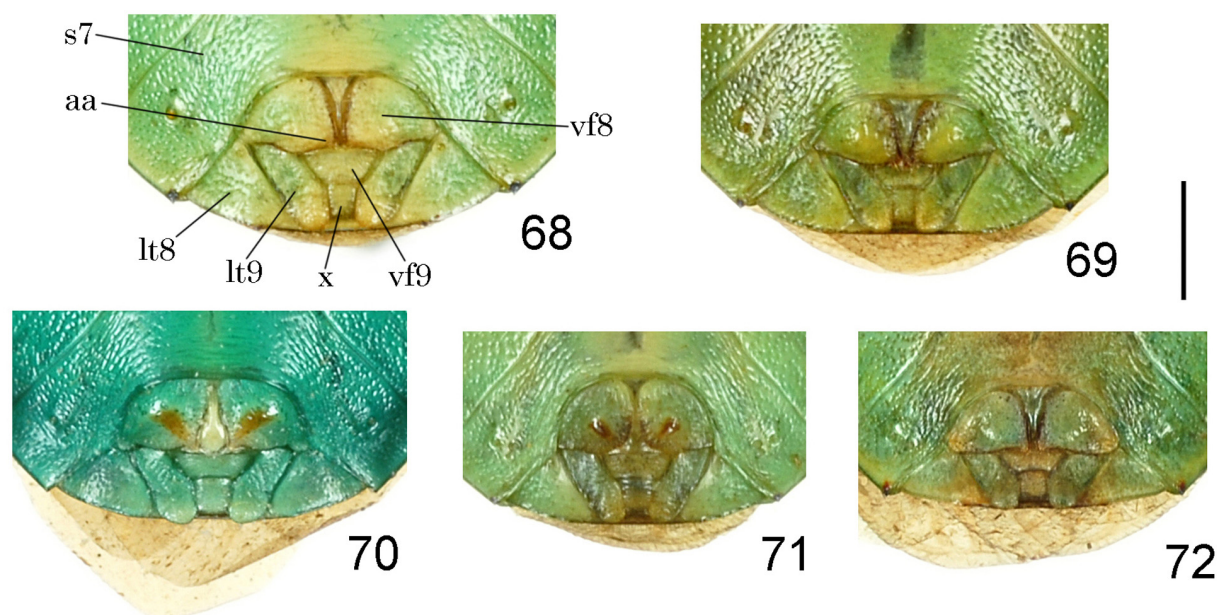


FIGURES 63–67. *Plautia* spp., apical part of phallus in posterior view. 63, *P. stali*; 64, *P. sakishimensis* sp. nov.; 65, *P. splendens*; 66, *P. himechabane* sp. nov.; 67, *P. ishigaki* sp. nov. Scale bars: 0.1 mm. Lettering: cp = conjunctival process; de = dorsal expansion; pve = process of vesica; ve = vesica.

Description. *Male.* Coloration. Body generally yellowish green, glossed (Fig. 5). Punctures on pronotum and scutellum generally brownish and punctures on coria generally blackish (Fig. 18). Head with short longitudinal blackish line above antenniferous tubercle (Fig. 27). Antennal segments I and II yellowish green; segment III yellowish green to brownish yellow in basal 2/3 and blackish in apical 1/3; segment IV yellowish green to brownish yellow in basal half and blackish in apical half; segment V brownish yellow in basal 1/3 and in apical 1/5, and blackish from basal 1/3 to apical 1/5. Labium brownish yellow, with blackish apical part. Pronotum brownish along lateral margins (Fig. 27); brownish line of lateral margin sometimes irregularly interrupted or partly obscure. Apical part of scutellum whitish (Figs. 5, 18). Corium of fore wing except antero-marginal area greyish pale yellow, with a few obscure irregular markings (Figs. 5, 18); membrane of fore wing transparent, tinged with pale brown (Fig. 5). Legs yellowish green; tarsi yellowish green to brownish yellow; claws brownish yellow in basal half and black in apical half; pulvilli dark brown, tinged with green. Posterolateral corners of abdominal segments III to VII narrowly and distinctly dark brown.

Structure. Head finely punctate, weakly and densely rugose, a little more than 3/4 as long as width across eyes; interocular space approximately 3 times as wide as eye in dorsal view. Bucculae roundly convex ventrad in anterior 1/3, pointed at anterior 1/5, gradually tapering posteriad in posterior 2/3. Antenna 3/4 as long as body length (to apex of abdomen), sparsely covered with short, erect and suberect setae in segments I, II and basal half of III, and densely in segments IV, V and apical half of III; approximate proportion of segments I to V 1.0 : 1.7 : 2.0 : 2.9 : 3.1. Labium reaching abdominal segment III; approximate proportion of segments I to IV 1.0 : 1.6 : 1.4 : 1.1.

Pronotum (Fig. 18) along midline approximately 1.2 times as long as head, approximately 2/5 as long as humeral width; disc of pronotum punctate; these punctures small and weak (Fig. 18); width across humeri 2.2 times as much as width across eyes; humeral angle round, slightly projected laterad; lateral margin straight, weakly edged, with sparse fine setae. Scutellum (Fig. 18) as long as its basal width, punctate as in pronotum. Fore wings exceeding apex of abdominal segment VII by approximately 1/10 of its length (Fig. 5); punctures of coria denser and much larger than punctures of pronotum and scutellum (Fig. 18).

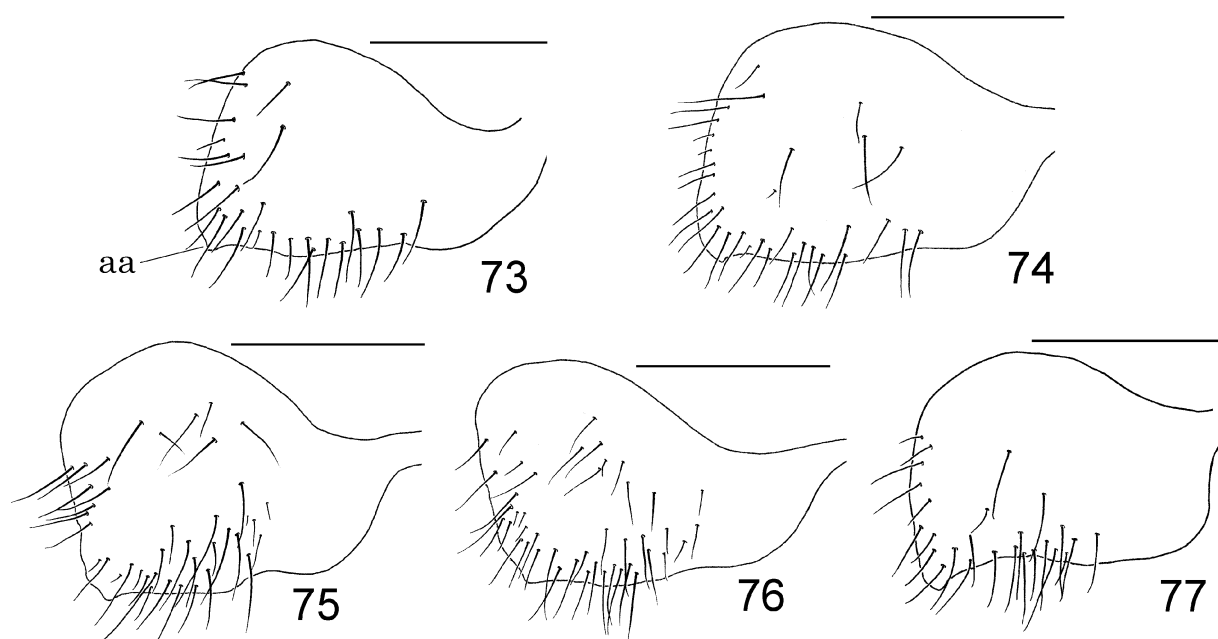


FIGURES 68–72. *Plautia* spp., apical part of female abdomen in ventral view. 68, *P. stali*; 69, *P. sakishimensis* **sp. nov.**; 70, *P. splendens*; 71, *P. himechabane* **sp. nov.**; 72, *P. ishigaki* **sp. nov.** Scale bar: 1 mm. Lettering: aa = apical angle of valvifer VIII; lt8 = laterotergite VIII; lt9 = laterotergite IX; s7 = sternum VII; vt8 = valvifer VIII; vt9 = valvifer IX; x = segment X.

Abdomen (from base of segment III to apex of segment VII) approximately 7/10 as long as its maximum width. Genital capsule (Figs. 37, 42) approximately 2.3 times as wide at maximum as its basal width, as long as its maximum width, roundly produced at posterior angles; ventral rim (Figs. 32, 37) widely and roundly concave; concavity of ventral rim approximately 1/5 as deep as its maximum width (Fig. 37); transverse ridge well developed, visible from ventral rim in ventral view (Fig. 32), with gently concave dorsal margin in posterior view (Fig. 42); dorsal sclerites semitriangular, with acute ventral angle (Fig. 42); dorsal sinus subpentagonal in posterior view (Fig. 42); paramere sockets circular in posterior view (Fig. 42). Crown of paramere (Fig. 47) subpentagonal, covered with long setae on lateral lobe, round at apex; inner margin straight; distal and proximal margins roundly concave; lateral lobe strongly extended laterad, truncate at apex. Conjunctival processes of endosoma (Figs. 52, 57, 62, 67) thick and short, curved ventrad, tapering, obtuse at apex. Vesica gently curved in lateral view (Fig. 62). Processes of vesica relatively small, Y-shaped in ventral view (Fig. 57), circular in lateral view (Fig. 62), roughly heart-shaped in outline in posterior view (Fig. 67).

Female. Similar to the male. Body relatively larger than male. Valvifer VIII generally yellowish green (Fig. 72), covered with short to long setae in apical half (Fig. 77); apical angle a little more acute than right angle (Fig. 77). Spermatheca long; apical receptacle (Fig. 84) spherical, with 1 horn-shaped process; horn-shaped process produced laterad of apical receptacle, abruptly curved basad, exceeding distal flange; intermediate part (Fig. 84) parallel-sided, approximately 4.5 times as long as its width at middle, with sclerotized zone apically; apical

sclerotized zone of intermediate part approximately 1/8 as long as intermediate part (Fig. 84); distal flange a little narrower than proximal flange (Fig. 84).



FIGURES 73–77. *Plautia* spp., left valvifer VIII. 73, *P. stali*; 74, *P. sakishimensis* sp. nov.; 75, *P. splendens*; 76, *P. himechabane* sp. nov.; 77, *P. ishigaki* sp. nov. Scale bars: 0.5 mm. Lettering: aa = apical angle.

Measurements [in mm, ♂ (n=7) / ♀ (n=16)]. Body length 6.7–7.8 (holotype 7.4) / 7.5–8.8; width across eyes 2.1–2.4 / 2.3–2.5; width across humeral width 4.7–5.3 / 5.1–5.8; maximum width of abdomen 4.6–5.1 / 5.1–5.3.

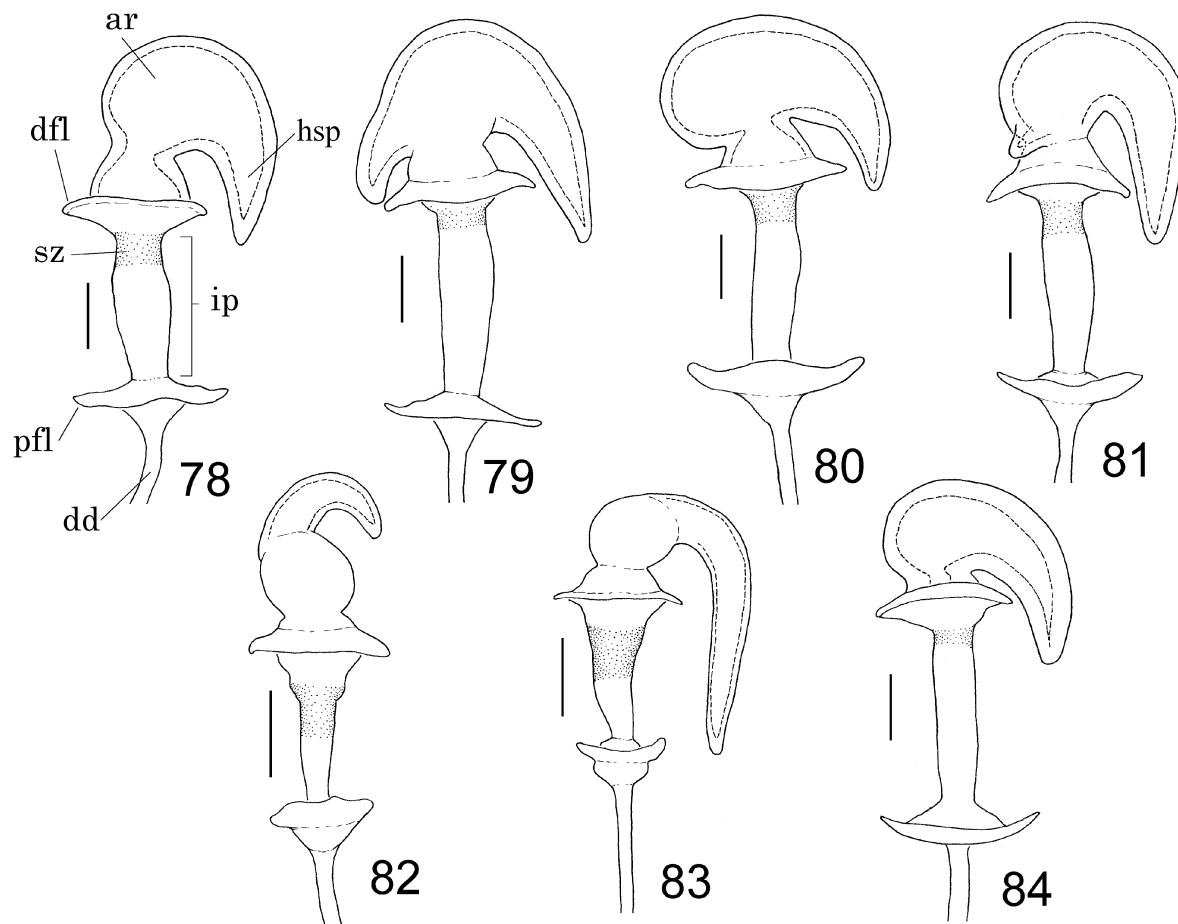
Type series. *Holotype*: ♂ (Fig. 5), “[JAPAN] Hirae-Chisokobaru, Ishigaki-jima Is., the Ryukyus, N24.3825 E124.1917, 15. IX. 2010, light trap, Hirosato Kodama” (LETUA IC 2018-00001) (TUA).

Paratypes (6♂ 16♀). JAPAN, the Ryukyu Islands, Ishigaki-jima Is.—same locality as holotype: 1♂ 1♀, 24. IX. 2008, Tsunaki Ando (LETUA IC 2018-00002–00003) (TUA), 1♂, 13. VII. 2010, Hirosato Kodama (LETUA IC 2018-00004) (TUA), 1♀, 6. IX. 2010, Hirosato Kodama (LETUA IC 2018-00005) (TUA), 1♀, 4. X. 2010, Hirosato Kodama (LETUA IC 2018-00006) (TUA), 1♀, 10. X. 2010, Hirosato Kodama (LETUA IC 2018-00007) (TUA), 1♀, 30. VI. 2013, Rie Ukuda (LETUA IC 2018-00008) (TUA), 1♀, 25. VII. 2013, Rie Ukuda (LETUA IC 2018-00009) (TUA), 1♂, 15 VIII. 2013, Rie Ukuda (LETUA IC 2018-00010) (TUA), 1♂, 20. VIII. 2013, Rie Ukuda (LETUA IC 2018-00011) (TUA), 1♂, 24. VIII. 2013, Rie Ukuda (LETUA IC 2018-00012) (TUA), 3♀, 25. VIII. 2013, Rie Ukuda (LETUA IC 2018-00013–00015) (TUA), 1♀, 8. IX. 2013, Rie Ukuda (LETUA IC 2018-00016) (TUA), 1♀, 9. IX. 2013, Rie Ukuda (LETUA IC 2018-00017) (TUA); —Hirae, 24.38284N 124.19233E: 1♀, 22. VII. 2012, collector unknown (LETUA IC 2018-00018) (TUA), 1♀, 1. VIII. 2017, Ayako Yamaguchi (LETUA IC 2018-00019) (TUA), 1♀, 3. VIII. 2017, Ayako Yamaguchi (LETUA IC 2018-00020) (TUA), 1♂, 3. IX. 2017, Ayako Yamaguchi (LETUA IC 2018-00021) (TUA); —Hirae, 24.38904N 124.19505E: 1♀, 23. VI. 2017, Kiichi Shimizu (LETUA IC 2018-00022) (TUA), 1♀, 30. VIII. 2017, Kiichi Shimizu (LETUA IC 2018-00023) (TUA). All the paratypes were collected by light traps.

Distribution. Ishigaki-jima Island of the Ryukyu Islands, Japan.

Etymology. The specific epithet is named for the type locality, Ishigaki-jima Island, one of islands in the Ryukyu Islands, Japan; a noun in apposition.

Remarks. In general appearance, this new species is very similar to *P. crossota* (Dallas, 1851). However, *P. ishigaki* sp. nov. is distinguished from *P. crossota* by its relatively smaller body length (6.7–8.8 mm vs. 8.0–11.0 mm), the lateral margins of pronotum brownish (Fig. 27) (vs. blackish), the middle part of the ventral rim of genital capsule roundly concave (Fig. 32) (vs. slightly convex), and the lateral lobe of the crown of paramere truncate at apex (Fig. 47) (vs. triangularly projected).



FIGURES 78–84. *Plautia* spp., apical part of spermatheca. 78–79, *P. stali*; 80–81, *P. sakishimensis* **sp. nov.**; 82, *P. splendens*; 83, *P. himechabane* **sp. nov.**; 84, *P. ishigaki* **sp. nov.** Scale bars: 0.1 mm. Lettering: ar = apical receptacle; dd = distal duct; dfl = distal flange; hsp = horn-shaped process; ip = intermediate part; pfl = proximal flange; sz = sclerotized zone.

Key to species of *Plautia* from Japan

- 1 Lateral margins of pronotum pale without dark line (Figs. 25, 26); crown of paramere drop-shaped (Figs. 45, 46); valvifer VIII often with oval oblique brownish spot apically (Figs. 70, 71) 2
- Lateral margins of pronotum blackish or brownish even a part (Figs. 19–24, 27); crown of paramere subpentagonal (Figs. 43, 47) or subtriangular (Fig. 44); valvifer VIII without brownish spot apically (Figs. 68, 69, 72) 3
- 2 Body dark blue green (Fig. 3); antennae lacking blackish area (Fig. 3); ventral rim of genital capsule V-shaped (Figs. 30, 35) *Plautia splendens* Distant
- Body yellowish green (Fig. 4); antennae with blackish areas (Fig. 4); ventral rim of genital capsule widely, shallowly and roundly concave (Figs. 31, 36) *Plautia himechabane* **sp. nov.**
- 3 Lateral margins of pronotum brownish (Fig. 27); punctures on disc of pronotum and scutellum brownish and weak, sparser and much smaller than punctures on coria of fore wings (Fig. 18); transverse ridge of genital capsule visible from ventral rim in ventral view (Figs. 32) *Plautia ishigaki* **sp. nov.**
- Lateral margins of pronotum blackish (Figs. 19–24); punctures on disc of pronotum and scutellum blackish and strong, almost same in size and color as punctures on coria of fore wings (Figs. 14, 15); transverse ridge of genital capsule invisible from ventral rim in ventral view (Figs. 28, 29) 4
- 4 Antennal segment III blackish at least in apical 1/3 (Fig. 12); antennal segment IV blackish in apical half (Fig. 12); crown of paramere subpentagonal (Fig. 43); conjunctival processes of endosoma lacking any expansions at base (Figs. 48, 53, 58, 63) *Plautia stali* Scott
- Antennal segment III blackish in apical 1/5 (Fig. 13); antennal segment IV blackish in apical 1/3 or more less (Fig. 13); crown of paramere subtriangular (Fig. 44); conjunctival processes of endosoma with a dorsal expansion and a pair of lateral expansions at base (Figs. 49, 54, 59, 64) *Plautia sakishimensis* **sp. nov.**

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