NEW OR LITTLE KNOWN ISOMETOPINE PLANT BUGS FROM JAPAN (HETEROPTERA: MIRIDAE)

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Three new species of the plant bug subfamily Isometopinae are described from Japan: *Paloniella parallela*, *Myiomma kukai*, and *M. takahashii*. A new genus, *Astroscopometopus*, is proposed to accommodate a little known Japanese species, *Isometopidea gryllocephala* Miyamoto, Yasunaga & M. Hayashi, and the male adult and very remarkable final instar nymph are also described. A checklist of the Japanese isometopine taxa is provided, in which *Isometopus mahal* (Distant) is reported from Japan for the first time.

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Key words. – Heteroptera; Miridae; Isometopinae; new genus; new species; Japan.

The Isometopinae is a small plant bug subfamily, with approximately 140 species worldwide (Kerzhner & Josifov 1999, Schuh 1995). The members of this subfamily have, without exception, paired ocelli between the compound eyes, which easily distinguishes them from other mirid subfamilies. Isometopines are primarily not host plant specific, and most appear to be predators, inhabiting trunks, bark or branches of broadleaved trees.

The Japanese isometopine fauna has been represented by six species in three genera (Hasegawa 1946, Miyamoto 1965, Miyamoto et al. 1996). Continuing efforts of the authors and colleagues have resulted in the recognition of three undescribed species. In addition, a recently described species, *Isometopidea gryllocephala* Miyamoto, Yasunaga & M. Hayashi, was found to be incorrectly placed in *Isometopidea*, based on comparison with the holotype of its type species, *I. lieweni* Poppius.

In this paper, a new species of *Paloniella* Poppius and two of *Myiomma* Puton are described from Japan. A new genus, *Astroscopometopus*, is proposed to correctly accommodate *Isometopidea gryllocephala*, and the recently discovered male adult and final instar nymph are also described for the first time. A checklist of the Japanese Isometopinae is provided, with distributional record for each species. *Isometopus mahal* (Distant) is reported from Japan for the first time.

All measurements are given in millimeters. The

material examined in this study, including types, is deposited in the Biological Laboratory, Hokkaido University of Education, Sapporo, Japan.

DESCRIPTIONS OF NEW TAXA

Astroscopometopus gen. n.

Type species. – *Isometopidea gryllocephala* Miyamoto, Yasunaga & M. Hayashi.

Diagnosis. – Distinguished from all known isometopines by the elongate oval body, the conspicuously and anteriorly flattened head, which is extremely projected dorsally and exceeding the height of the pronotum in lateral view, the broad collar and lateral carina of the pronotum, and the impunctate scutellum (figs. 1–3).

Description. – Body elongate oval, subparallel-sided; dorsal surface distinctly punctate, with uniformly distributed, silky, suberect setae. Head orientated vertically, strongly flattened anteriorly, nearly glabrous, impunctate and weakly rugose on frons, height much greater than width including eyes; eyes strongly projected dorsally, slightly exceeding height of pronotum in lateral view, with posterolateral margin bearing silky, long setae; vertex very narrow, about as wide as diameter of ocellus in dorsal view. Antenna rather gracile, not significantly broadened in male;

segment II weakly arched. Pronotum impunctate on calli, with strongly carinate and flattened lateral margin; collar present, broader than antennal segment I; mesoscutum with shallow punctures; scutellum heart-shaped, impunctate, excavated mesally, with depressed apex; thoracic pleura punctate. Hemelytra punctate, except on embolium and cuneus; embolium wide, somewhat upturned; membrane with two cells and densely distributed fine setae. Legs long, with five mesofemoral and six metafemoral trichobothria; tibia with pale brown spines.

Etymology. – From Greek, *astroscopus* (stargazer), combined with a mirid generic name *Isometopus* Fieber; gender masculine.

Discussion. – Judging from the similarity in external structure, this new genus seems to be most closely related to *Gigantometopus* Schwartz & Schuh, known from Sumatra, Indonesia. *Astroscopometopus* differs from *Gigantometopus* by the characters diagnosed above and the significantly smaller size (up to 4 mm). *Gigantometopus* has the largest body (nearly 7 mm in length) among the isometopines, very narrow lateral margin and collar of the pronotum, and distinctly punctate scutellum (Schwartz & Schuh 1990).

Herczek (1993) cladistically recognized three tribes in the Isometopinae, and established a new tribe Gigantometopini, for which the large body size and a deep incision between pronotal calli were regarded as autapomorphies. *Astroscopometopus* is significantly smaller than *Gigantometopus*, but undoubtedly belongs to this tribe, having the incision and several other similar structures.

The single representative of *Astroscopometopus* was originally described in the genus *Isometopidea* Poppius. Subsequent examination of the holotype of its type species *Isometopidea lieuwini* Poppius, deposited in the Zoological Museum, University of Helsinki, Finland, has revealed that the placement of *gryllocephalus* in *Isometopidea* is incorrect. *Isometopidea* differs from *Astroscopometopus* by: head somewhat rounded and not strongly flattened in front, height not greater than width including eyes; eyes less prominent dorsally and not attaining height of pronotum in lateral view; vertex roundly declivous; lateral margin and collar of pronotum narrow; calli punctate laterally; posterior margin of pronotum notched; and thoracic pleura widely punctate. In the original description (Poppius 1913), some of these characters are not clearly described.

The final instar nymph of *A. gryllocephalus* was recently discovered by M. Hayashi. These nymphs are amongst the most conspicuous Miridae we have ever seen (see description below). Unfortunately, we cannot confirm that the outstanding form of the nymph is a generic character of *Astroscopometopus*, because immatures of the related genera are yet to be found.

Astroscopometopus gryllocephalus (Miyamoto, Yasunaga & M. Hayashi) **comb. n.** (figs. 1-6, 9-11)

Isometopidea gryllocephala Miyamoto et al. 1996: 108 (n. sp.); Kerzhner & Josifov 1999: 2 (cat.).

Diagnosis. – Easily recognized by the characters mentioned in the generic diagnosis. The final instar nymph is also readily recognized by the peculiarly spinulate eyes, pronotum and scent glands. A description of the female adult was provided by Miyamoto et al. (1996).

Description. – Male: almost similar in general appearance to female. Body pale greyish brown, widely punctate; dorsal surface shining, with uniformly distributed, silky, long setae. Head pale brown, narrowly tinged with red below eyes; frons somewhat roughened; vertex red around ocelli. Antenna sombre brown; segment I somewhat darker; lengths of segments I-IV: 0.15, 1.18, 0.67, 0.29. Rostrum brown. Pronotum darkened on calli, with semitransparent lateral carina; posterior half of collar darkened; mesoscutum dark brown, shining; scutellum creamy white, darkened laterally. Hemelytra pale brown, except for darker clavus; corium with a circular, creamy spot mesially; embolium impunctate; inner basal angle of cuneus creamy white; membrane pale greyish brown, semitransparent. Coxae creamy white; legs pale brown; apices of pro- and mesofemora somewhat darkened; metafemur creamy white basally, with two dark brown, apical, oblique bands; pro- and mesotibiae with 3-4 obscure annulations; inward of basal 2/3 and apex of metatibia dark brown; apical tarsomeres darkened; lengths of metafemur, tibia and tarsus: 1.14, 1.81, 0.36. Abdomen brown, partly tinged with green. Male genitalia (figs. 9-11): Left paramere (fig. 10) with several long setae, rather tumid sensory lobe, and rather slender and curved hypophysis; right paramere short (fig. 9). Vesica (fig. 11) simple, weakly sclerotized at apical region; ejaculatory duct somewhat expanded apically.

Final instar nymph (figs. 4-6): form unique. Body oval, dark brown, with several distinct spines along lateral margin, irregularly speckled with pale areas; dorsal surface furnished with dark, stiff, upright setae. Head pale brown, with a pair of dark horns extending from inner margins of eyes; face with dark spots, a pair of mesal dark stripes, and a pair of lateral orange stripes. Antenna dark brown; segment II arched, with pale, long setae that are twice as long as diameter of segment; segment III pale brown, with dark base and apex; lengths of segments I-IV: 0.19, 0.95, 0.79, 0.35. Rostrum brown, broad, long, reaching abdominal sternum VI or VII; apex of segment IV darkened. Pronotum dark brown, whitish anteriorly, with a pair of dark spots on collar area; each lateral margin with two conspicuous projections (anterior one shorter;

Figs. 1-8. Male (7) and female (1-3, 8) adults, and final instar nymph (4-6) of *Astroscopometopus gryllocephalus* (1-6) and *Myiomma takahashii* (7-8).

posterior one very long, darkened anteriorly); mesonotum wing pads with a pair of lateral projections. Legs pale brown; femora and tibiae with many dark spots; tibiae each with 3-4 dark annulations; apical tarsomeres dark brown; lengths of metafemur, tibia and tarsus: 1.24, 1.62, 0.35. Abdomen widely darkened ventrally; dorsal scent gland dark brown,

conically projected.

Dimensions. – ♂: Body length 3.6; head width 0.59; vertex width 0.19; head height 0.97; mesal pronotal length 0.69; basal pronotal width 1.32; width across hemelytra 1.50. Final instar nymph: Body length 3.0; head width 0.57; head height (including projections of eyes) 1.14; rostral length 1.75;

Figs. 9-13. Male genitalia of *Astroscopometopus gryllocephalus* (9-11), *Myiommata takahashii* (12) and *M. samuelsoni* Miyamoto (13). – 9, Right paramere; 10, 12 & 13, left paramere; 11, phallus. Scale bars 0.1 mm.

mesal pronotal length 0.48; pronotal width across each apex of longer, posterior projection 1.90; width across wing pads 1.86.

Distribution. – Japan (Ryukyus: Ishigaki Is.).

Biology. – Both immature and mature forms of this rare mirid were found to inhabit the bark of the subtropical ash, *Fraxinus griffithii* C. B. Clarke (Oleaceae).

Material examined. – JAPAN: Ishigaki Is.: 1 ♀, Shiramizu, 19.iii.1993, M. Hayashi et al. (holotype); 1 ♀, Mt. Yarabudake, 10.iii.1999, K. Takahashi; 1 ♂ & 8 final instar nymphs, Mt. Fukami-Omoto, 18.iii.2000, M. Hayashi.

Paloniella parallela sp. n.

(fig. 14)

Type-material. – Holotype ♀, Funa'ura, Iriomote Is., Ryukyus, Japan, 10.v.1993, T. Yasunaga. – Paratype: 1 ♀, Mt. Banna, Ishigaki Is., Ryukyus, 15.v.1993, T. Yasunaga.

Diagnosis. – Recognized by the uniformly brown general coloration and nearly parallel-sided head. Related to the Chinese *P. annulata* (Ren, 1987), from which this new species can be distinguished by the larger body, nearly parallel-sided head with the weakly excavated ventral margin, longer antennal segment III, and dark tibiae.

Description. – Female: body generally brown, ovate; dorsal surface shining, uniformly punctate, with densely distributed, silky, short setae. Head nearly parallel-sided in frontal view, with narrowly yellow posterior margin, shallowly punctate; ocelli small, contiguous to eyes. Antenna pale brown; segment I chocolate brown; segment II with two obscure annulations at base and apex; apical part of segment III and whole IV somewhat darker; lengths of segments I-IV: 0.10-0.12, 0.42-0.43, 0.26-0.28, 0.14-0.15. Rostrum shiny brown, reaching apex of metacoxa; bases of segments II, III and IV yellow. Pronotum slightly darkened posteromesally, very narrowly carinate laterally; scutellum about as long as wide; pleura yellowish brown; propleuron punctate. Embolium and cuneus semitransparent; membrane pale greyish brown. Coxae and legs pale brown; mesocoxa and basal parts of all tarsi widely dark brown; lengths of metafemur, tibia and tarsus: 0.66-0.74, 0.80-0.81, 0.21-0.22. Abdomen pale brown; sternum IX darkened.

Male: unknown.

Dimensions. – ♀: body length 2.2-2.3; head width 0.75-0.76; vertex width 0.25-0.29; head height 0.44-0.48; rostral length 0.90-0.97; mesal pronotal length 0.38-0.41; basal pronotal width 1.20-1.22; width across hemelytra 1.50-1.52.

Etymology. – From Latin *parallelus* (= parallel), referring to the nearly parallel-sided head of this new

Figs. 14–16. Isometopinae from Japan. – 14. *Paloniella parallela*, holotype female; 15, *Myiomma kukai*, holotype female; 16, *Isometopus mahal*, female from Ishigaki Is.

species; an adjective.

Biology. – This isometopine was collected by sweeping branches of evergreen broadleaved trees. No further information is currently available.

Distribution. – Japan (Ryukyus: Ishigaki and Iriomote Isls.).

Myiomma kukai sp. n.
(fig. 15)

Type-material. – Holotype ♀, Hanasaka, Mt. Koya, Wakayama Pref., Honshu, Japan, ex *Juglans ailantifolia*, 6.viii.1998, S. Gotoh.

Diagnosis. – Distinguished from the presumed related species, *M. samuelsoni* Miyamoto, 1965, known from Iriomote Island of the Ryukyus by the following characters: the whitish brown dorsum, widely dark brown head, thoracic pleura, coxae, femora and abdomen, shiny pronotum, obliquely darkened posterior part of the hemelytra.

Description. – Female: body elongate oval; dorsal surface whitish brown, shining, with uniformly distributed, short, rather reclining setae. Head dark brown, pruinose below eyes in front, with narrowly yellow posterior margin, mostly occupied by compound eyes and rounded in dorsal view. Antenna pale brown; segment I and apical 1/3 of II darkened;

lengths of segments I & II: 0.10, 0.53 (apical two segments mutilated). Rostrum generally dark brown, reaching apex of metacoxa. Pronotum shiny whitish brown, with darkened anterior 1/3 and posterolateral angles, almost impunctate and not wrinkled; mesoscutum dark brown, with a pair of pale, somewhat reddish, oblique carinae; scutellum flat, finely rugose, with dark brown base and apex; pleura chocolate brown, shining; lateral part of propleuron yellowish brown. Hemelytra with uniformly distributed, brownish, reclining setae; corium triangularly darkened posteriorly; cuneus dark brown, with anterior half creamy white; membrane sombre pale brown, semitransparent. Coxae and legs dark brown; metafemur tumid, with yellow apex; apical part of each tibia and whole tarsi pale brown; lengths of metafemur, tibia and tarsus: 0.62, 0.86, 0.21. Abdomen widely dark brown; posterior margin of sternum VIII creamy yellow.

Male: unknown.

Dimensions. – ♀: Body length 2.25; head width 0.44; vertex width 0.09; head height 0.44; rostral length 0.95; mesal pronotal length 0.29; basal pronotal width 0.86; width across hemelytra 1.06.

Etymology. – Named after the famous Japanese Buddhist priest Kukai (774–835), who settled a historical temple at the type locality of this new mirid; a noun in apposition.

Biology. – A single specimen was collected from a Japanese walnut, *Juglans ailantifolia* Carr. (Juglandaceae).

Distribution. – Japan (Honshu). This has the northernmost distribution among known Asian congeners.

Myiommata takahashii sp. n.

(figs. 7, 8, 12)

Type-material. – Holotype ♂, Takeda, Ishigaki Is., Ryukyu, Japan, light trap, 9.iv.1998, K. Takahashi. – Paratypes: Ishigaki Is.: 1 ♀, Kabira, 10.i.1999, K. Takahashi; 1 ♀, Nosoko, 19.iv.1999, K. Takahashi; 3 ♀, Fukami-Omoto, 18.iii.2000, M. Hayashi.

Diagnosis. – Easily recognized by the entirely black pronotum which distinguishes it from the presumed related species, *M. minutum* Miyamoto, 1965 and *M. samuelsoni* Miyamoto, 1965, known from Iriomote Island. The left paramere of *M. takahashii* (fig. 12) is also different from those of the two species (fig. 13, Miyamoto 1965). The general coloration of the new species is sexually dimorphic; the male (fig. 7) is significantly darker than the female (fig. 8).

Description. – Body oval; dorsal surface not strongly shining, with uniformly distributed, pale, reclining setae. Head dark brown, shagreened and partly tinged with red below eyes in front, with yellow posterior margin. Antenna dark brown; apex of segment I pale and segment II broadened in ♂; basal half of segment II pale brown; segments III and IV very short; lengths of segments I-IV (♂/ ♀): 0.10/ 0.09-0.11, 0.71/ 0.47-0.51, 0.12/ 0.19, 0.13/ 0.16-0.19. Pronotum entirely fuscous, somewhat roughened and finely rugose; mesoscutum fuscous, with a pair of reddish, oblique carinae; scutellum dark brown, with apical part narrowly (♂)/ widely (♀) whitish brown except for dark extreme apex; pleura almost entirely dark brown. Hemelytra widely sombre brown and partly tinged with red (♂)/ widely brownish white (♀); ♀ corium narrowly darkened along inner margin, with a dark, square spot at apical inner corner; cuneus dark brown with pale anterior half; membrane pale greyish brown, semitransparent. Coxae and legs dark brown but procoxa and all femora pale brown in ♂; ♀ metafemur with yellow apex; tibiae widely pale brown in ♂/ sometimes pale apically in ♀; tarsi pale brown; lengths of metafemur, tibia and tarsus (♂/ ♀): 0.67/ 0.66-0.76, 0.93/ 0.89-1.01, 0.24/ 0.22-0.25. Abdomen wholly dark brown. Male genitalia: left paramere (fig. 12) with sensory lobe tumid; hypophysis slender, long.

Dimensions. – ♂/ ♀: Body length 2.15/ 2.25-2.39; head width 0.48/ 0.44-0.48; vertex width 0.11/ 0.09-0.10; head height 0.44/ 0.43-0.48; rostral length 0.86/ 0.95; mesal pronotal length 0.30/ 0.28-

0.31; basal pronotal width 0.82/ 0.85-0.92; width across hemelytra 1.02/ 1.01-1.14.

Etymology. – Named after Dr. K. Takahashi who enthusiastically collected isometopine material and provided them for this study; a noun in genitive case.

Biology. – Both mature and immature forms were found on bark of *Fraxinus griffithii* C. B. Clarke, and co-occurred with *Astroscometopus gryllocephalus*.

CHECKLIST OF JAPANESE ISOMETOPINAE

Subfamily Isometopinae Fieber, 1860

Tribe Gigantometopini Herczek, 1993

Genus *Astroscometopus* Yasunaga et Hayashi, **gen. n.**
A. gryllocephalus (Miyamoto, Yasunaga et M. Hayashi, 1996), **comb. n.** – Japan (Ishigaki Is.)

Tribe Isometopini Fieber, 1860

Genus *Isometopus* Fieber, 1860

I. hananoi Hasegawa, 1946 – Japan (Honshu, Kyushu)

I. hasegawai Miyamoto, 1965 – Japan (Ishigaki & Iriomote Isls.)

I. japonicus Hasegawa, 1946 – Japan (Hokkaido, Honshu, Shikoku, Kyushu, Tsushima Is.)

I. mahal (Distant, 1911) (fig. 16) – Japan (Ishigaki Is. = new record), India.

Genus *Paloniella* Poppius, 1913

P. parallela Yasunaga et M. Hayashi, **sp. n.** – Japan (Iriomote Is.)

Tribe Myiommadini Bergroth, 1924

Genus *Myiommata* Puton, 1872

M. kukai Yasunaga et M. Hayashi, **sp. n.** – Japan (Honshu)

M. minutum Miyamoto, 1965 – Japan (Iriomote Is.)

M. samuelsoni Miyamoto, 1965 – Japan (Ishigaki & Iriomote Isls.)

M. takahashii Yasunaga et M. Hayashi, **sp. n.** – Japan (Ishigaki Is.)

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