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A remarkable new genus of Cylapinae from Sulawesi (Heteroptera: Miridae)

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Abstract

A new monotypic genus, *Sulawesifulvius*, with an unusual set of characters, is described to accomodate *S. schuhi* n. sp., a cylapine plant bug (Heteroptera: Miridae) from Sulawesi. Illustrations of the dorsal habitus, male and female genitalia, tarsi, fore- and hind legs are provided. The possible phyletic relationships of this taxon are briefly discussed.

Key words: *Sulawesifulvius*, new genus, new species, Sulawesi, taxonomy

Introduction

Thirteen specimens of an amazing bug, collected by fogging the forest canopy of Bogani Nani Wartabone National Park (formerly Dumoga Bone National Park), Sulawesi, Indonesia, were found by the senior author in the collections of The Natural History Museum (London). These specimens possess an unusual set of character states which at first glance made the family status of these bugs uncertain. More detailed examination proved that they have subdivided trochanters, trichobothria on meso- and metafemora, and a cuneus, and bicellulated membrane on each hemelytron. These states indicate that they belong to the family Miridae. The two segmented tarsi and claws with a subapical tooth argue for inclusion in the subfamily Cylapinae, while the short antennae and horizontally elongated head advocate placement within the tribe Fulviini. The specimens represent a remarkable new genus and species, which are described hereafter.

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***Sulawesifulvius* gen. nov.**

Type species: *Sulawesifulvius schuhi*, new species

Diagnosis

This genus is not similar to any known genus of Cylapinae. It has a superficial similarity to the genus *Peritropis* Uhler (Fulvinii), but differs from it by the structure of the antennae, hemelytra, and parameres.

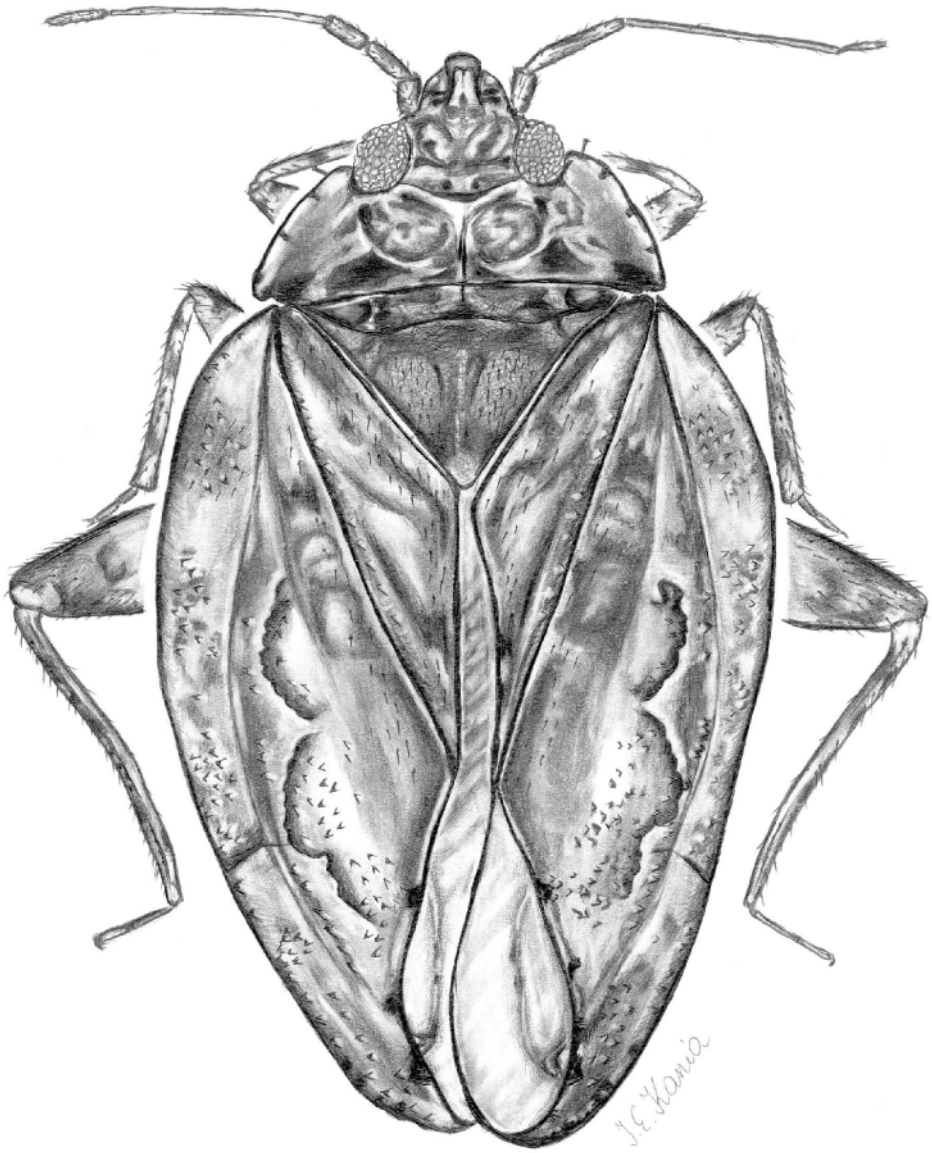


FIGURE 1. *Sulawesifulvius schuhi* gen. nov., sp. nov., holotype, dorsal habitus.

Etymology

Named according to Sulawesi (where is the type locality) and the type genus of the tribe Fulviini, in which the new genus is placed. Gender masculine.

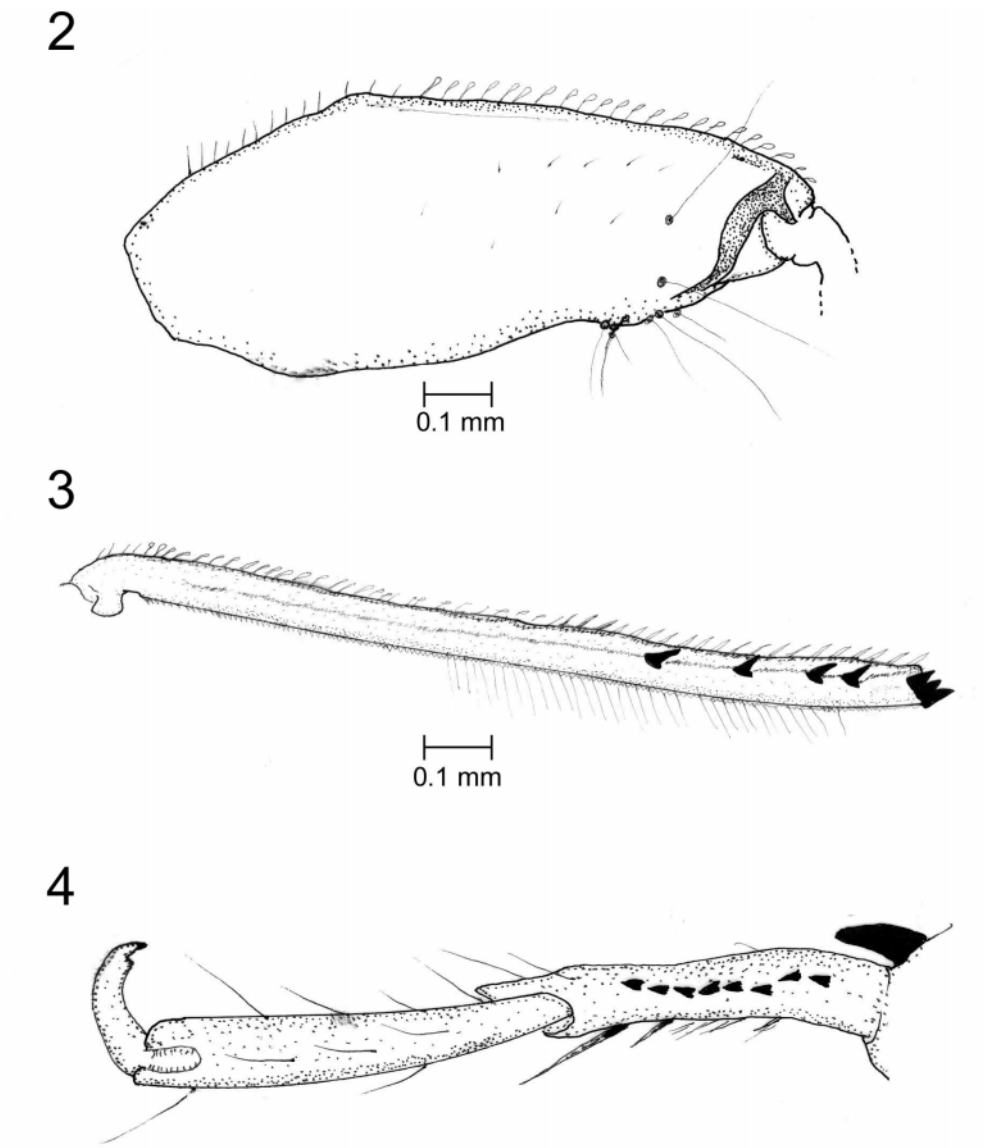


FIGURE 2–4. *Sulawesifulvius schuhi* gen. nov., sp. nov., paratype, leg; 2, metafemora; 3, metatibia; 4 metatarsi.

Description

Body small, elongated, oval, flattened dorsoventrally, covered with very short, scale-like setae. Head relatively short, vertex and frons with two raised tubercles; clypeus very distinct. Antennal tubercles small, almost contiguous with margin of eye. First and second

antennal segments relatively thick, second slightly narrowed in the middle, covered with short setae. Third segment longest, very thin, with sparse, fine, obscure setae; fourth segment short, thicker than third, covered with long setae. Rostrum straight, thin, and short, reaching beyond forefemora; first rostral segment shorter than head, remaining segments subequal.

Pronotum short, broad, lateral margins elevated, anterior angles of pronotum protruding, enveloping head and reaching beyond middle of eyes (Fig. 1). Single, erect, scale-like seta on top of angles of pronotum. Antero-lateral part of pronotum distinctly separated. Calli raised with depression between them. Posterior margin of pronotum almost straight. Mesoscutum well exposed, raised, with small, oblique carina on sides. Scutellum with small, raised subapical tubercle mesially.

Hemelytra well developed, distinctly tapering towards membrane. Exocorium very broad, slightly elevated. Clavus slightly raised, costal fracture short. Cuneus very long, enveloping membrane (Fig. 1); membrane narrow, elongated, two-celled, the minor cell very small; its venation thin.

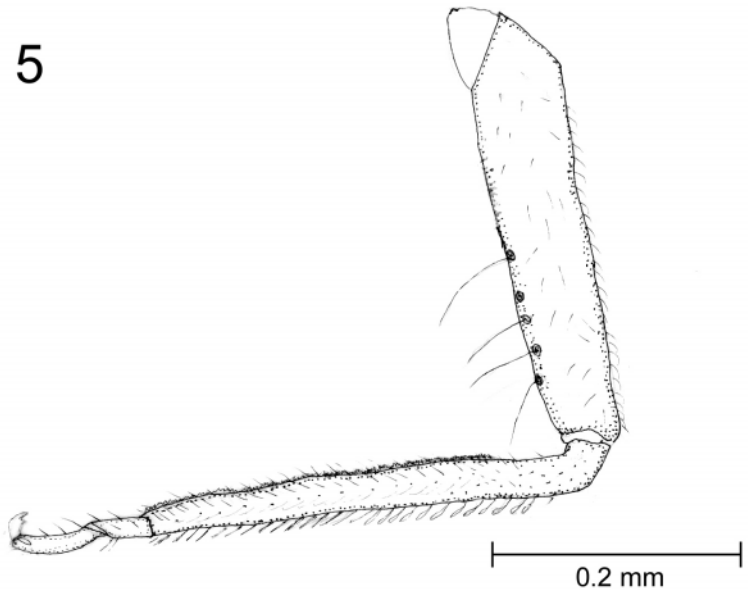
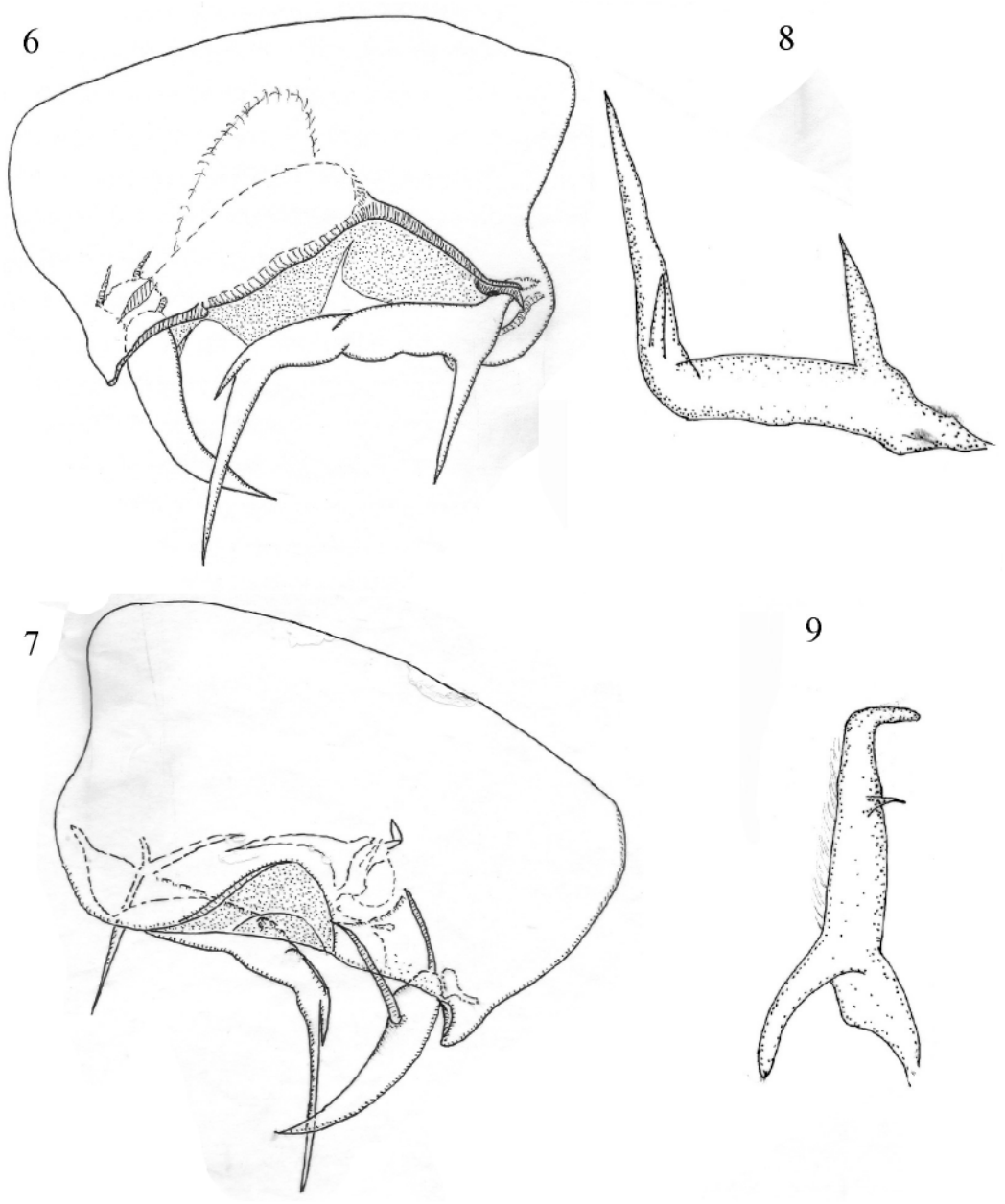


FIGURE 5. *Sulawesifulvius schuhi* gen. nov., sp. nov., paratype, mesoleg.

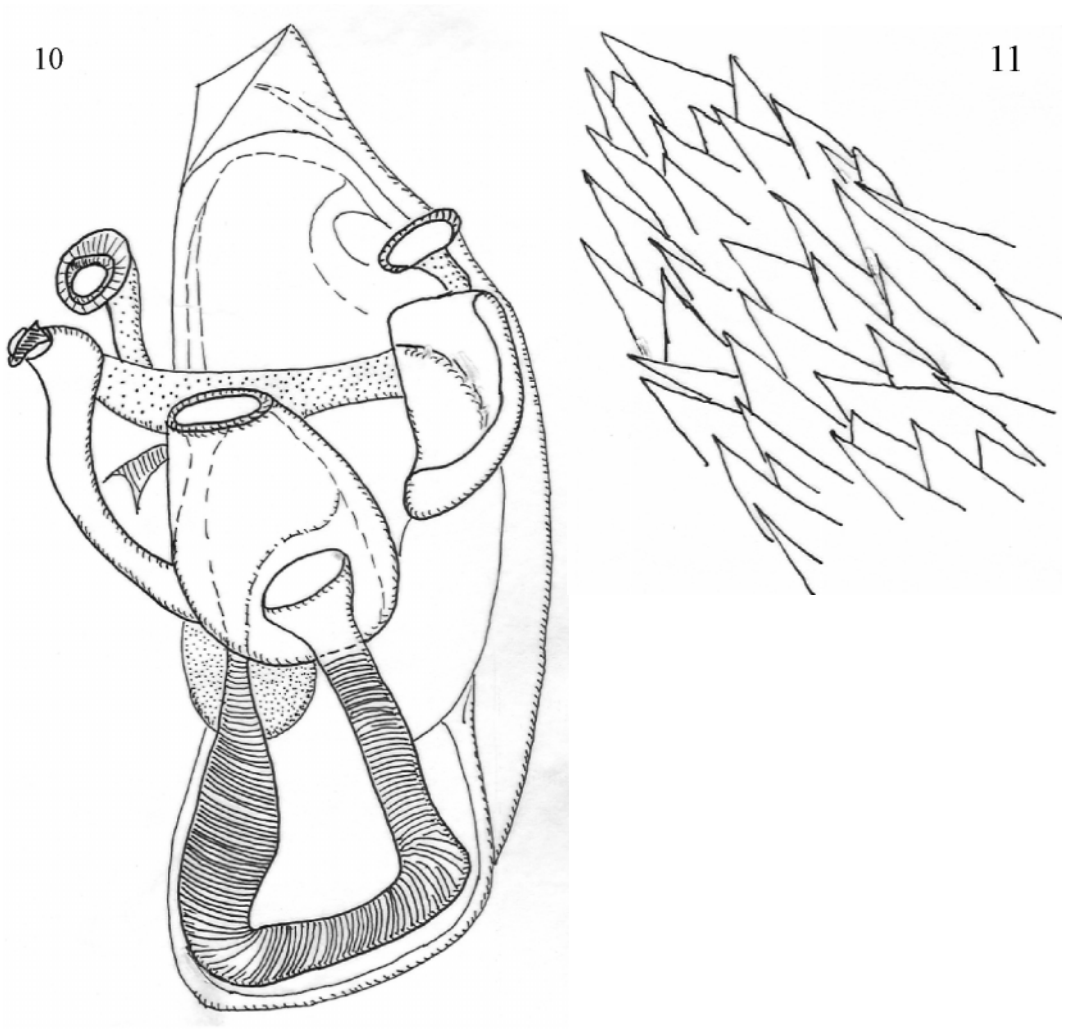
Ostiolar peritreme very small. Fore- and middle legs cursorial, hind legs probably saltatorial. Mesofemora with at least five trichobothria in distal half (Fig. 5). Metafemora distinctly enlarged, with distinct subapical depressions on sides, covered with dense, scale-like setae and bearing eight long trichobothria apically. Metatibiae with scale-like setae, partially covered with very long, fine, protruding setae. Longitudinal rows of short spines along each tibiae and few long, thick spines on apical portion of metatibiae (Fig. 3). Tarsi

two-segmented, fore- and mesotarsi short, metatarsi slightly longer, first segment with row of thick, short spines (Fig. 4), second slightly swollen distally; parempodia setiform; claws with distinct, subapical tooth (Fig. 4).

Parameres asymmetrical, large, with long, sharp processes (Figs 6–9), aedeagus membranous, relatively small (Fig. 10).



FIGURES 6–9. *Sulawesifulvius schuhi* gen. nov., sp. nov., male paratype, genital structures; 6–7, pygophore (cleared), dorsal (6) and ventral (7) views, position of phallus shown as seen through transparent cuticle; 8, right paramere; 9, left paramere.



Figs 10–11. *Sulawesifulvius schuhi* gen. nov., sp. nov., male paratype, genital structures; 10, Phallus (non-erected) as seen in ventral, most exposed view (slightly diagonally from topographically right side, hence processi capitati and basal apparatus seemingly aszmmetrical); 11, apex of vesica.

***Sulawesifulvius schuhi* sp. n.**

Diagnosis

See the genus.

Etymology

This species is named to honour the prominent heteropterologist Dr. Randall T. Schuh (American Museum of Natural History, New York, United States of America).

Description

Male. Body red with pale and brown areas, body length 3.40–3.53 mm, width 1.85–1.92. Head pale with red patches, two small spots on vertex and one large patch anterior to these. Frons pale with small red patches on sides, mandibular plate and clypeus pale with small red patches. Head length, in dorsal view, 0.52 mm, width 0.64–0.67 mm, diameter of eye 0.18 mm. First antennal segment pale yellow, slightly tinged with red. Second antennal segment yellow, pale brown basally, slightly tinged with red, with yellow ring and small, brown patch mesially, slightly darker apically, covered with short, pale setae. Third segment brown, darkened towards apex, covered with very thin, short, white, setae. Fourth segment dark brown, covered with white, shining, protruding setae, longer than its diameter. Length of antennal segments in mm: 0.13–0.14: 0.29–0.33: 0.68–0.73: 0.20. Rostrum brown, shining, length of rostral segments in mm: 0.27: 0.23: 0.22: 0.22.

Pronotum pale yellow, mottled with red, with two large, pale brown patches contiguous to posterior margin of pronotum. Lateral margins translucent, pale yellow, with four small, dark red patches along its external sides. Length of pronotum 0.30 mm, lateral margins 0.55 mm, posterior margin 1.30 mm. Mesoscutum red with paler patches, tinged with brown on sides. Scutellum pale grey-brown, red on sides, with red longitudinal stripe paler mesially; apex of scutellum grey-brown.

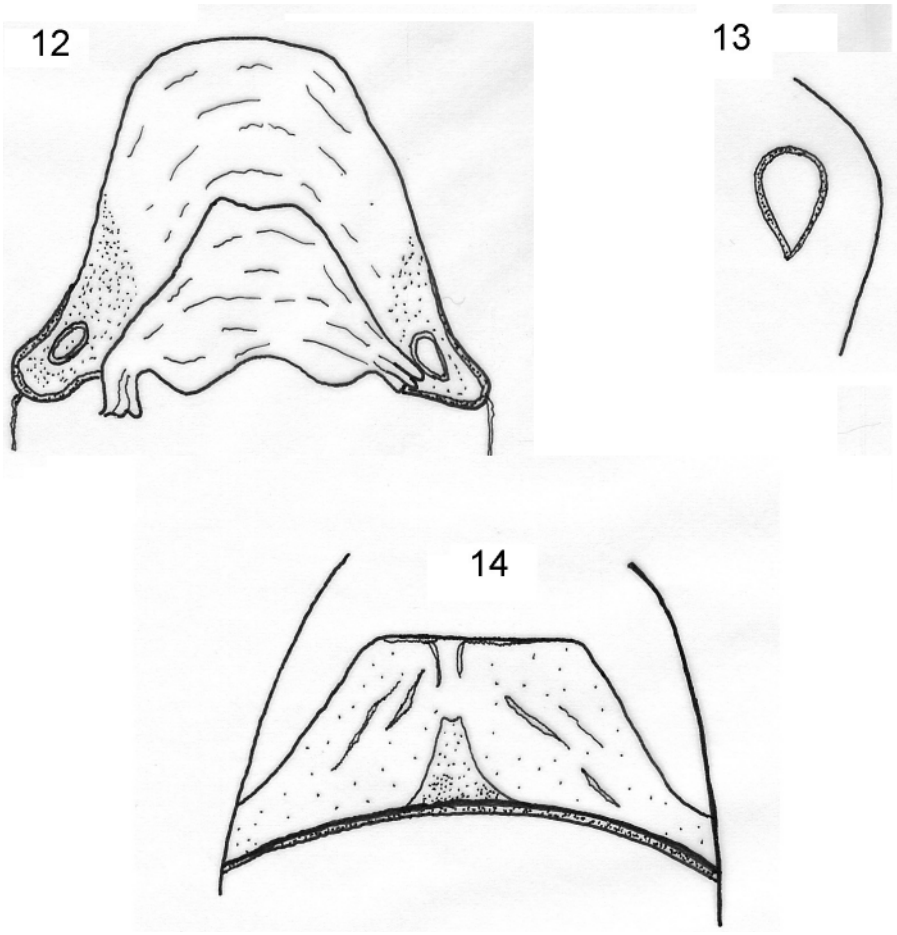
Hemelytra covered with dense, short, silvery, shining, scale-like pilosity; exocorium pinkish with darker reddish patches, also covered with dark brown or black, short, scale-like setae. Corium with characteristic brown pattern (Fig. 1), red in part contiguous with the claval suture. Clavus red, slightly paler along suture, with a rib-like claval vein. Cuneus pink with small, darker patches on margin, covered with silvery and dark brown scale-like setae. Row of silvery, erect setae perpendicular to inner margin of cuneus. Membrane grey, venation pale brown, partly tinged with red.

Underside of body pale yellow, abdomen yellowish with transverse red bands on segments. Ostiolar peritreme pale yellow. Coxae, trochanters, and femora (except for apical portion) yellowish-brown; apices of femora red with pale ring or patch; trochanters with red or brown rings, tarsi pale brown.

Lateral margins of the pygophore (Figs 6–7) concave medially on the right side, distally on the left one. Posterodorsal margin broadly and deeply, but gradually emarginate, posteroventral margin suddenly and deeply emarginate in the middle. Both the emarginations filled by dorsal and ventral membraneous lobes, respectively, their exact shape and identity (membranous extensive proctiger or intersegmental membrane 9–10) not ascertained with certainty. Left posterolateral edge of pygophore subtriangularly produced, the right one forming a lobe beneath articulation of the right paramere. Posterodorsal margin with a strong marginal apodeme, complex systems of apodemes at basis of each paramere. Parameres' shape as illustrated (Figs 8–9), the right one larger, longer and more complex than the left one, its articulation more dorsal. In natural position both parameres protruding from the pygophore, the left one directed posterad, the right one transverse, crossing over

the left one in dorsal view. Suspensorial apodemes (not illustrated) unusually long, and unusually strongly sclerotized. Phallus (Figs 10, 11) very small, in resting position (all the attempts of erection failed) inversely U-shaped, phallobase without particulars. The distal part of the phallus enveloped by transparent theca provided with a distal opening. Endosoma formed by a simple conjunctiva, and a vesica occupying nearly all the dorsal lobe of U. Vesica formed by a single lobe with microsculpture shown in Fig. 11. *Ductus seminis* long, in resting position also inversely U-shaped, terminating by strongly sclerotized bulb, bearing apically a wide secondary gonopore with no particular structures framing its broad opening.

Female similar to male, length of body 3.55–3.66 mm, width 1.92–2.0 mm, length of head 0.46–0.50 mm, width 0.67–0.73 mm, diameter of eye 0.16–0.20 mm. Length of antennal segments in mm: 0.14–0.15: 0.34–0.36: 0.73: 0.19–0.20.



FIGURES 12–14. *Sulawesifulvius schuhi* gen. nov., sp. nov., paratype, female; 12, anterior part of vagina, in dorsal view; 13, right parieto-vaginal ring, in dorsal view; 14, Posterior wall, in dorsal view.

Parieto-vaginal rings (Figs 12–13) reduced, very small, partially hidden by dorsal wall in dorsal view, their outer margins pointed, the other margins gently curved. Dorso-labiate and ventro-labiate plates undeveloped. Medial plate connecting the sclerotized rings absent. Dorsal wall (Fig. 12) and anterior sac large, lateral oviducts short and wide. Posterior wall (Fig. 14) translucent. A structures (inner-ramal sclerites) fused, dorsal margin reinforced, concave, ventral margin straight, lateral margin curved. B structure sensu Chérot (2002) reduced to medial part (the so-called foot or medial process).

Type material

Holotype (male): Tray 54; Fog 5, 400 m, 11. ii. 85; BMNH, Plot C; Indonesia: Sulawesi, Utara, Dumoga-Bone N. P., February, 1985; R. Ent. oc. Lond., Project Wallace, B.M. 1985-10. **Paratypes:** (male) Tray 51; Fog 11, 230 m, 10. iii. 85, BMNH plot A; Indonesia: Sulawesi, Utara, Dumoga-Bone N. P., March, 1985; (three males and two females) Tray 52 and 54; Fog 5, 400 m, 11. ii. 85; BMNH, Plot C; Indonesia: Sulawesi, Utara, Dumoga-Bone N. P., February, 1985; R. Ent. oc. Lond., Project Wallace, B.M. 1985-10; (two males) Tray 32 and 18; Fog 13, 230 m, 11. vii. 85, BMNH Plot A; Indonesia: Sulawesi, Utara, Dumoga-Bone N. P., July, 1985; R. Ent. oc. Lond., Project Wallace, B.M. 1985-10; (male) Tray 45; Fog 5, 400 m, 11. ii. 85; BMNH, Plot C; Indonesia: Sulawesi, Utara, Dumoga-Bone N. P., February, 1985; R. Ent. oc. Lond., Project Wallace, B.M. 1985-10; (female) Tray 106; Fog 15, 400 m, 19. vii. 85; BMNH, Plot C; Indonesia: Sulawesi, Utara, Dumoga-Bone N. P., July, 1985; (male) Tray 48; Fog 5, 400 m, 11. ii. 85; BMNH, Plot C; Indonesia: Sulawesi, Utara, Dumoga-Bone N. P., February, 1985; R. Ent. oc. Lond., Project Wallace, B.M. 1985-10; (female) Tray 27; Fog 5, 400 m, 11. ii. 85; BMNH, Plot C; Indonesia: Sulawesi, Utara, Dumoga-Bone N. P., July, 1985. Holotype and ten paratypes housed in Natural History Museum, London, GB, two paratypes in Department of Zoology, University of Silesia, Katowice, Poland.

Biology

Practically unknown. The specimens were collected by fogging of the forest canopy of Bogani Nani Wartabone National Park (Sulawesi, Indonesia).

Discussion

The new taxon possesses a set of unusual characters. Its third antennal segment is longer than the others, the fourth being short and thickened apically. In Cylapinae (and in the Miridae generally) the longest antennal segment is usually the second (as found in almost all Fulviini) and the third and fourth segments are very long and subequal (e.g., *Cylapus* Say, *Microcylapus* Carvalho, *Rhinocylapus* Poppius, and *Cylapomorpha* Poppius). The long third antennal segment is characteristic of other heteropteran families e.g., Leptopodidae, Hypsipterygidae, some Piesmatidae, Reduviidae and Tingidae. The rostrum of *S. schuhi* is

thin and very short, hardly reaching beyond the fore coxae. Within the subfamily Cylapinae the rostrum is usually long, or very long, except in the tribe Bothriomirini where the rostrum is short and stout.

The pronotum of *S. schuhi* is very short and its anterior angles partly envelop the head. This pronotal structure does not occur in the other Cylapinae. Only in some *Peritropis* Uhler do the anterior angles of the pronotum slightly protrude (e.g., *Peritropis saldaeformis* Uhler or *P. advena* Kerzhner) but they never envelop the head. A pronotal structure similar to that of *Sulawesifulvius* occurs in *Diphleps* Bergroth of the subfamily Isometopinae.

The hemelytra of *Sulawesifulvius* envelop the membrane. This is a unique character state in Cylapinae and probably in Miridae as well. The cuneus of the new taxon is long, curved (as in *Diphleps*), and reaches the apex of the membrane. When the wings are fully folded, the membrane is completely enveloped. The long curved cuneus occurs also in the cylapine genus *Hemiophthalmocoris* Poppius, but even in *H. abbreviatus* Gorczyca, it does not envelop the membrane completely (Gorczyca 2000, Fig. 28).

The apical portions of the metafemora of *S. schuhi* are distinctly narrow and knob-like. Such femora do not occur in any known Cylapinae genus and may be a part of a stridulatory organ.

The parameres of *S. schuhi* are very robust and strongly asymmetrical. Parameres in Miridae are asymmetrical and this state is synapomorphic for the family (Schuh & Štys 1991: 304). In some species of Cylapinae, the asymmetry is very slightly marked, as in some *Fulvius* Stål (e.g., *Fulvius anthocoroides*-group) or in *Peritropis nilotica* Gorczyca. On the other hand, asymmetry may be very distinct as in *Fulvius bifenestratus*-group (Gorczyca 2002), *Peritropis granulosa* Gorczyca, in some *Rhinomiris* Kirkaldy (Gorczyca & Chérot 1998, Figs 29–36), or in *Yamatofulvius* (Yasunaga 2000, Figs 66, 67, 70, 71, 74, 75). If asymmetry is usual in Miridae, the right paramere of *C. schuhi* is larger than the left. This condition is unusual in the Cylapinae and in the family Miridae as well. Usually, the left paramere is larger than the right in the family. Until now we do not know of any species within the family Miridae where the right paramere is distinctly larger than the left, excepted several Orthotylinae (particularly Ceratocapsini).

The architecture of the phallus does not seem to fit well either Cylapini or Fulviini as exemplified by species studied in detail by Kerzhner & Konstantinov (1999). We are not sure whether the phallus is erectible (it probably is), but the endosoma is apparently subdivided into conjunctiva and vesica. The *ductus seminis* is strongly modified.

The reduced parieto-vaginal rings of *S. schuhi* are relatively similar to those of *Bothriomiris gothoi* Yasunaga (cf. Yasunaga 2000, p. 205, Fig. 86) and to those of several *Hemiophthalmocoris* spp. (cf. Gorczyca & Chérot 2002, p. 59, Figs 6 and 8). The wide lateral oviducts are apparently not rare in the Cylapinae: e.g., *Hemiophthalmocoris sulawesicus* Gorczyca & Chérot (cf. Gorczyca & Chérot 2002, p. 59, Fig. 4), *Peritropis advena* Kerzhner (cf. Yasunaga 2000, p. 193, Fig. 45), *Punctifulvius kerzhneri* Schmitz (cf. Yasunaga,

2000, p. 196, Fig. 53), and *Yamatofulvius sinuicornis* Yasunaga (cf. Yasunaga 2000, p. 202, Fig. 77) have large oviducts.

The new genus is so unusual, that it is very difficult to suggest affinities with other cylapine genera. It shows a mosaic of character states. A very remote, superficial similarity can be considered with *Peritropis* Uhler, but *Sulawesifulvius* differs from it in the structure of the antennae, hemelytra, and parameres. The phyletic relationships of this taxon will remain unclear until a worldwide generic level phylogeny of the subfamily, including fossil data, is provided.

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