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Two new Aradidae from Taiwan (Hemiptera: Heteroptera: Aradidae)

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A b s t r a c t

Two new species of the flat bug subfamily Aradinae from Taiwan are described and figured: *Aradus formosanus* n.sp., which is related to the Far-Eastern species group *Aradus orientalis* – *A. compar* and *Miraradus angulatus* n.sp., which is the first representative of this Oriental genus known from Taiwan.

Key words: Heteroptera, Aradidae, *Aradus*, *Miraradus*, new species, Taiwan.

Z u s a m m e n f a s s u n g

Von der Insel Taiwan werden zwei neue Taxa der Familie Aradidae beschrieben: *Aradus formosanus* n.sp. und *Miraradus angulatus* n.sp., wobei letzterer der erste Nachweis eines Vertreters dieser Orientalischen Gattung in Taiwan ist.

I n t r o d u c t i o n

Examination of flat bug specimens collected in Taiwan has shown, that there are two unrecorded new taxa, which are described and figured below: *Aradus formosanus* n.sp. and *Miraradus angulatus* n.sp., the first species belonging to this genus reported to date from this island.

Measurements were taken with a micrometer eyepiece, 20 units equal 1mm unless otherwise stated.

Depositories of types: CAUB Entomological Museum, China Agricultural University, Beijing, P.R. China
CEHI Collection E.Heiss, Innsbruck, Austria
NCHU National Chung Hsing University, Taichung, Taiwan

T a x o n o m y

***Aradus formosanus* n. sp.** (Fig. 1 - 4, photo 1, 2)

M a t e r i a l e x a m i n e d: Holotype male, labelled: Taiwan, Ilan Co., Dongao 50 m, 24°31'30 N, 121°49' E, 12 XI 2008, L.Dembicky leg. (CEHI); paratype female collected with holotype (CEHI):

D i a g n o s i s: This species belongs to but is distinguished from all species of the East Palaearctic *Aradus orientalis* – *A.compar* group (HEISS 2001, 2003, 2008) by the structure and colouration of the antennae, the shape of parameres and parandria of male genitalic structures, and by the subbrachypterous alary condition of the female.

D e s c r i p t i o n : Holotype male. Macropterous, mat; body covered with flat, round scale-like tubercles, legs and antennae with fine granulation.

General colouration light brown with lighter to whitish scales on corium and abdomen; antennae brown, segment III yellowish white except base and apex; legs brownish, femora stramineous on apical 1/3, two rings on tibiae and the second tarsal segment except its apex.

H e a d : Longer than wide across eyes (diatone) (36 / 32); clypeus with longer tubercles apically, as long as antennal segment I. Antenniferous lobes with acute apex slightly diverging, reaching 1/2 of antennal segment I, lateral margins subparallel with a blunt preocular tubercle; Antennae long and slender, 2.68 x as long as diatone (86 / 32), segment I shortest and thickest, II thinner and cylindrical, III longest and about 1.6 x as long as II, of whitish colour except a dark ring on base and apex, IV longer than II with pilose apex; relative length of antennal segments I:II:III:IV = 9:20:32:25. Eyes globose, protruding laterally; postocular lobes subparallel and acute posteriorly. Vertex with a median granulate ridge flanked by 2 (1+1) ovate smooth depressions laterally. Rostrum arising from an open atrium, reaching anterior margin of mesosternum.

P r o n o t u m : About 3.3 x as wide as long (76/23); paranota widely expanded laterally, their margin slightly reflexed and irregularly dentate; posterior margin concave at middle; disk flat without distinct carinae, anterior lobe with 2 (1+1) horseshoe-like smooth depressions.

S c u t e l l u m : Longer than basal width (36/27), lateral margins granulate and subparallel at middle, then converging posteriorly to narrowly rounded reflexed apex; disk depressed on anterior and posterior half separated by a higher transverse elevation.

A b d o m e n : Posterolateral angles of dorsal external laterotergites (deltg) II-VII progressively protruding, their lateral margins with an indistinct tooth; between deltg's VIII a V-shaped cleft. Corium basally expanded and reflexed then straight and converging posteriorly, reaching tergite VI, cubital vein elevated and smooth; membrane with 4 distinct veins of which the two anterior ones are anastomosing, covering dorsal opening of tergite VIII. Spiracles II-VII ventral remote from lateral margin, VIII lateral and visible from above.

L e g s : Long and slender, femora and tibiae cylindrical, trochanters of fore- and middle legs fused to femora, those of hind legs separated by a suture.

G e n i t a l i c s t r u c t u r e s : Tergite VIII cuplike for reception of pygophore, inner margin without setae; parameres blade like as fig. 1,2; parandria long and slender with long setae as fig.3; tergite IX bilobate as fig.4.

F e m a l e : Head, antennae, and prothorax as in male, abdomen much wider and posterolateral angles of deltg II-VII rectangular, deltg VIII triangular with rounded apex and a deep cleft between them. Exposed tergites of abdomen flat, covered with scale-like tubercles as other parts of body, hemelytra subrachypterous, corium short and reaching only 1/2 of tergite III with a small vestige of membrane on inner margin, veins indistinct.

M e a s u r e m e n t s : Holotype male: length 9.6mm; width of pronotum 3.8mm; width of corium 3.25mm; width of abdomen across tergite IV 4.6mm.

F e m a l e : length 10.8mm; length / width of head 78/24; width of pronotum 5.9mm; width of corium 3.4mm; width of abdomen across tergite IV 4.6mm; relative length of antennal segments I:II:III:IV = 10:21:34:26.

E t y m o l o g y : Portuguese sailors discovered the island in 1517, calling them Ilha Formosa, meaning beautiful island. The species name refers to that.

***Miraradus angulatus* n.sp.** (Fig. 5 - 8, photo 3 ,4)

M a t e r i a l e x a m i n e d : Holotype male labelled: Taiwan, Hualien Co., Piluchi For.Res.Sta. 2100m, 24 IV 1997, C.W.&L.B. O' Brien leg. (CEHI); Paratypes: 2M collected with holotype; 1M 1F Taiwan, Taichung, Anmashan 15-31 VII 1972, Chen Young leg.; 1M 1F Taiwan, Kiaoshiung Hsien, Peinantashan trail 1950m, 8 VII 1993 A.Smetana leg.; 3M Taiwan, Kiaoshiung Hsien, Tengchih 1610m, 24 IV 1990 A.Smetana leg.; 1F Taiwan, Nantou Co., Huei-Sun For.Res. Area NE Meijuan, 10-11 VII 1992, T. J. Henry & A.G.Wheeler leg.; 1M, 1F labelled: Formosa, Tattaka 8 VIII 26 and 2M, 2F 24 V 27, T. Kano leg. in National Science Museum Tokyo. Paratypes will be deposited in coll. CAUB, CEHI, and NCHU.

D i a g n o s i s : The new taxon is distinguished from the 6 species of *Miraradus* described to date by the less transverse, laterally rectangulate pronotum, the structure and colouration of antennae, and the male genitalic structures.

D e s c r i p t i o n : Holotype male. Macropterous, mat, body legs and antennae covered by fine granulation. General colour dark brown, basolateral teeth of pronotum yellowish, also the basal expansion of the corium and adjacent cubital vein, the carinate margin of scutellum preapically, the posterior margin of deltg VI and VII, and the inner margin of deltg VIII. A fading yellowish ring is recognizable on tibiae of holotype.

As in the females there is a tendency in some males (not in the holotype) that the apical half of antennal segment III is fully or partly yellowish, which is however developed only on the dorsal side.

H e a d : Only slightly longer than wide (25/24.5), clypeus short reaching $\frac{1}{2}$ of antennal segment I; antenniferous lobes with acute apices, lateral margins subparallel bearing a small preocular tubercle; antennae 2.26 x as long as the diatone (55.5/24.5), segment I shortest and thickest constricted basically, II cylindrical, III about as long as II tapering toward base and somewhat flattened apically, IV shorter than III with conical pilose apex; relative length of antennal segment I:II:III:IV = 11:15:15.5:14. Vertex medially raised and granulate flanked by 2 (1+1) ovate smooth depressions laterally. Eyes globose, protruding; postocular lobes rounded with a distinct tubercle posteriorly. Rostrum arising from an open atrium reaching posterior margin of prosternum.

P r o n o t u m : 2.26 x as wide as long (59/23); paranota rectangularly expanded laterally, their lateral margins with fine irregular dentation; posterior margin concave at middle along scutellum; disk rather flat, the 4 longitudinal carinae marked by a row of larger granules, smooth ovate depressions laterad of two median carinae on fore lobe.

S c u t e l l u m : Distinctly longer than wide (33/23), lateral margins carinate and evenly rounded and constricted toward reflexed narrow apex, disk basally elevated with a median carina along basal half.

A b d o m e n : Posterolateral angles of deltg II-IV hook-like and projecting, those of deltg V-VII triangular, deltg VIII rhomboidal with acute apex. Corium moderately expanded and slightly reflexed basolaterally, veins carinate. Membrane dark brown with 4 veins of which the two inner ones are anastomosing. Spiracles II-VI ventral, VII and VIII lateral and visible from above.

L e g s : Long and slender, unarmed, femora and tibiae cylindrical, trochanters of all legs fused to femora.

G e n i t a l i c s t r u c t u r e s : Segment VIII cup like, inner margins carinate without setae; parameres hook-like as fig.5,6; parandria very small as fig. 7; tergite IX consisting of a single bilobate plate as fig.8.



Photo 1-4. 1 - *Aradus formosanus* n.sp, male; 2 – ditto female; 3 - *Miraradus angulatus* n.sp., male; 4 – ditto female.

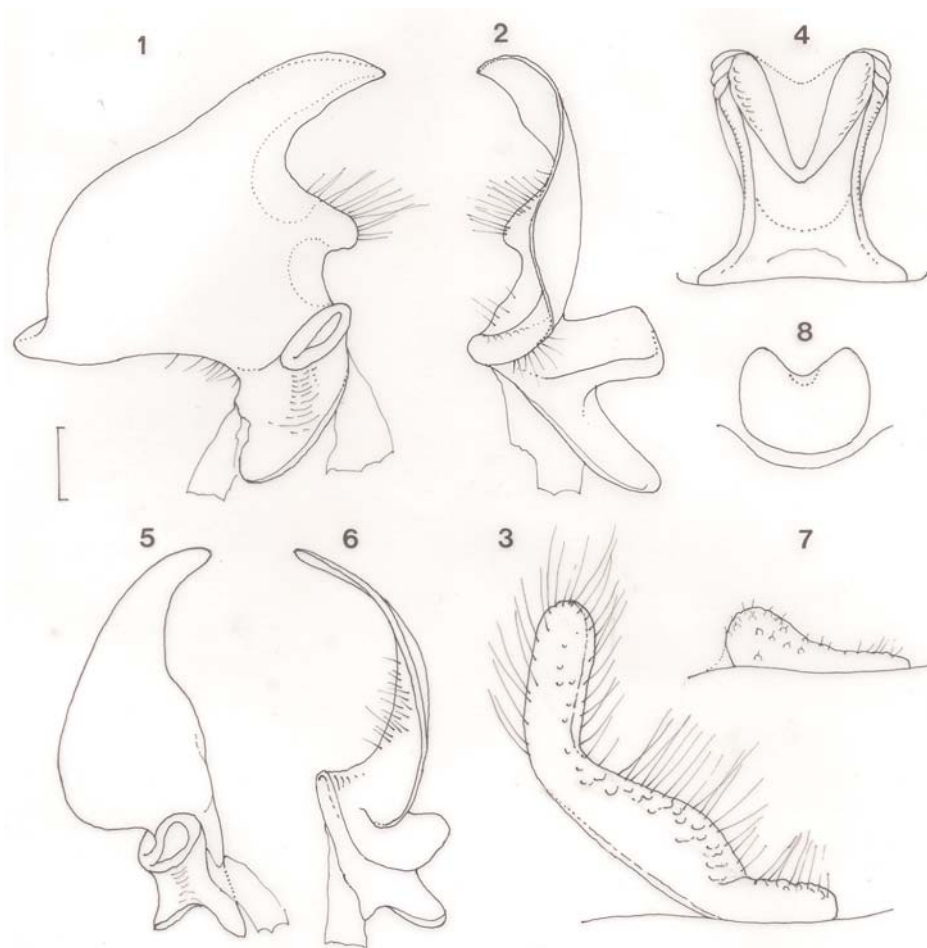


Fig. 1-8. 1-4 *Aradus formosanus* n.sp. 1 – right paramere, dorsal view; 2 – ditto lateral view; 3 – left parandrium; 4 – tergite IX. 5-8 *Miraradus angulatus* n.sp. 5 - right paramere, dorsal view, 6 – ditto lateral view; 7 - left parandrium; 8 – tergite IX. Scale 0.1 mm.

F e m a l e : Basically as the male but generally of larger size; antennal segment III with a yellowish spot or fully yellowish on apical half of flattened dorsal face; paratergites VIII widely cleft medially, lateral margins of deltg VII and VIII with a distinct tooth posterior to the visible spiracles.

M e a s u r e m e n t s : Holotype : length 7.2mm, width of abdomen across tergite IV 3.35mm. Paratypes. Males : length 6.7 – 7.3mm; width of abdomen 3.15 – 3.35mm, ratio length of antennae / diatone 2.16 – 2.24; ratio width / length of pronotum 2.36 – 2.66.

Females: length 8.8 – 9.4mm; width of abdomen 4.3 – 4.65mm, ratio length of antennae / diatone 2.1 – 2.34; ratio width / length of pronotum 2.4 – 2.58.

E t y m o l o g y : Named after the conspicuous rectangular paranotal expansions.

D i s c u s s i o n : The genus *Miraradus* VÁSÁRHELYI 1980 contains to date 6 Oriental species distributed from northern India, Nepal, Bhutan to Vietnam and may be expected to occur also in southwestern China. The insular taxon *M.angulatus* n.sp. is the easternmost record of this genus and may be endemic to this island. Its general habitus is closest to *M. oervendetes* VÁSÁRHELYI 1980 described from Bhutan; however, the latter has a much wider pronotum (ratio length / width 3.2 against 2.56 in *angulatus*) and shorter antennae (ratio length / diatone 2.17 / 2.26).

Due to inconsistencies in the descriptions of some species and the lack of adequate illustrations of the genitalic structures for comparative purposes (VÁSÁRHELYI 1981, 1990), a revision and reconsideration of all taxa seems necessary to ascertain their taxonomic status. A review of *Miraradus* is in preparation.

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