

Two newly recorded leafhopper genera of the subfamily Deltocephalinae (Hemiptera: Cicadellidae) from Pakistan

Naveed HASSAN, Yalin ZHANG^①

Key Laboratory of Plant Protection Resources and Pest Management of the Ministry of Education, Entomological Museum, Northwest A&F University, Yangling, Shaanxi 712100, China

Abstract: The leafhopper genus *Changwhania* Kwon and subgenus *Limotettix* (*Scleroracrus*) Van Duzee are reported for the first time from Pakistan. A widely-distributed species *Changwhania ceylonensis* Baker, 1925 n. rec. and the Nearctic species *Scleroracrus cacheolus* n. rec. are described and illustrated in this paper.

Key words: Auchenorrhyncha; Deltocephalinae; key; distribution

巴基斯坦角顶叶蝉亚科两新纪录属（半翅目：叶蝉科）

Naveed HASSAN, 张雅林^①

西北农林科技大学植保资源与病虫害治理教育部重点实验室，西北农林科技大学昆虫博物馆，陕西 杨凌 712100

摘要：报道巴基斯坦角顶叶蝉亚科 1 新纪录属 *Changwhania* Kwon 和 1 新纪录亚属 *Limotettix* (*Scleroracrus*) Van Duzee，并记述 2 新纪录种 *Changwhania ceylonensis* Baker, 1925 n. rec. 和 *Limotettix* (*Scleroracrus*) *cacheolus* n. rec.。

关键词：头喙亚目；角顶叶蝉亚科；分类；分布

Introduction

The leafhopper genus *Changwhania* Kwon and subgenus *Limotettix* (*Scleroracrus* Van Duzee) belongs to subfamily Deltocephalinae, mainly feeding and breeding on grasses and different plant families respectively. Up till now, 31 genera and 57 species of subfamily Deltocephalinae are recorded from Pakistan (Khatri & Webb 2010). The genus *Changwhania* Kwon includes four known species, and was reported in the genus *Deltocephalus* for the first time from Sri Lanka by Melichar (1903) followed by Singh-Pruthi (1930) who reported it from different parts of India. Kwon (1980) established this genus for two species *C. terauchii* (Matsumura, 1915), the type species, and *C. changwhani* Kwon, 1980 from South Korea. Webb & Heller (1990) reported the genus from South East Asia and transferred species from *Deltocephalus* to this genus and noting two other synonymies. The *Changwhania ceylonensis* Baker, 1925 is a widely-distributed species, previously reported from Sri Lanka and India by various authors under different taxa. Zhang *et al.* (2009) reviewed the genus and described a new species from China. Here we report this genus for the first time from Pakistan. We also

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① Corresponding author, E-mail: yalinzh@nwsuaf.edu.cn

redescribed with illustration of *Changwhania ceylonensis* Baker, 1925.

Meanwhile, the subgenus *Limotettix* (*Scleroracus* Van Duzee) is characterized by the distinctive pattern of transverse wavy lines on the crown. Previously this genus was included in the tribe Athysanini Van Duzee 1892 by most authors (Anufriev & Emeljanov 1988; Hamilton 1994; Holzinger *et al.* 1997) but Zahniser and Dietrich (2013) placed it in the tribe Limotettigiini Baker, 1915. The genus *Limotettix* was considered to be cosmopolitan with most members assumed to be distributed in North America (Hamilton 1994). Some European scientists placed the subgenera *Ophiolix* Ribaut 1942 and *Scleroracus* Van Duzee as separate genera or subgenera of the genus *Ophiola* Edwards 1922 (Emeljanov 1966; Ossainillson 1983; Nast 1987; Biedermann & Niedringhaus 2004). However, other workers considered it in a broader sense and placed them in the genus *Limotettix* (Ribaut 1952; Anufriev & Emeljanov 1988; Hamilton 1994; Zahniser 2007). Currently the genus *Limotettix* includes 13 subgenera (Zahniser 2007) and the subgenus *Scleroracus* includes 44 described species, of which 32 species are Nearctic (McKamey 2001). During a leafhopper collection trip in 2016, we collected *Changwhania* and *Limotettix* species for the first time from Pakistan which suggests that subfamily Deltocephalinae is widely distributed and more collecting effort will reveal additional new taxa.

The material examined is deposited in Entomological Museum of Northwest A&F University (NWAUFU), Yangling, Shaanxi, China.

Taxonomy

Changwhania Kwon, new record to Pakistan

Changwhania Kwon, 1980: 96, 97; Webb & Heller, 1990: 452.

Type species: *Aconura terauchii* Matsumura, 1915 by original designation.

For detailed description of genus check Zhang *et al.*, 2009.

Distribution. Palearctic Region; Asia; Austro-Oriental Region.

Changwhania ceylonensis (Baker, 1925) (Figs. 1–14), new record to Pakistan

Deltocephalus bimaculatus Melichar, 1903: 204, Sri Lanka; Kuoh, 1966: 128, China.

Deltocephalus ceylonensis Baker, 1925: 537. Replacement name for *Deltocephalus bimaculatus* Melichar.

Cicadula bipunctatus Singh-Pruthi, 1930: 59, plate V, fig. 3. India. Synonymised by Webb & Heller, 1990: 8.

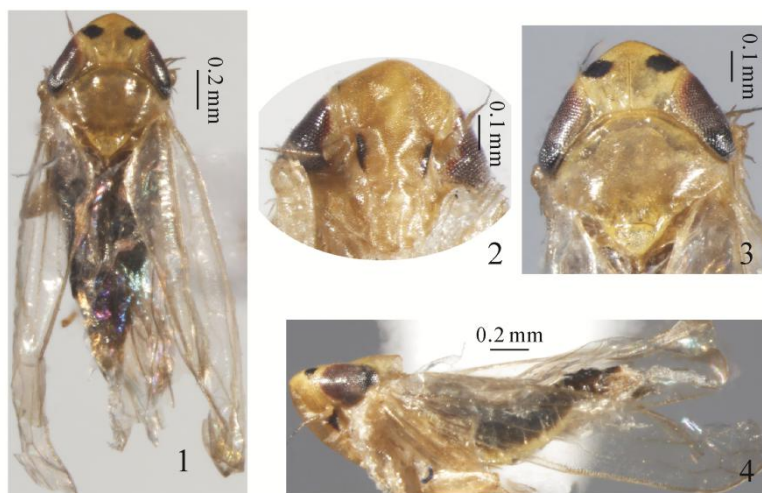
Changwhania changwhani Kwon, 1980: 99, figs. 1–8. Korea. Synonymised by Webb & Heller, 1990: 8.

Changwhania ceylonensis Baker, Webb & Heller, 1990: 452.

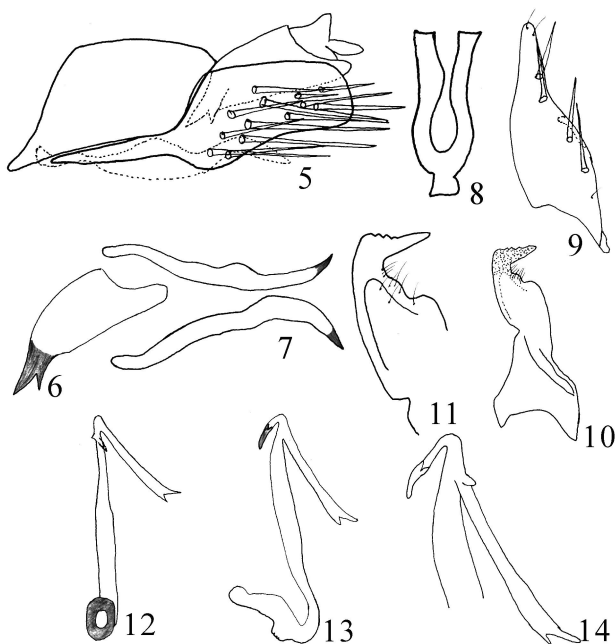
Coloration and morphology. Pale yellowish to sordid yellow. Vertex pale with orange hues, with two transversely oblong black markings near coronal margin (Figs. 1, 3). Frontoclypeus with two black oblique markings just beneath antennal sockets on lateral margins (Figs. 2, 4). Pronotum and scutellum light brownish yellow. Rostrum tip dark (Fig. 2). Forewings yellowish, subhyaline (Fig. 1). Legs pale yellowish orange to light brownish yellow.

Genitalia. Pygofer lobe dorsoventrally flattened, longer than high with numerous macrosetae at posterior half (Fig. 5). Style broad at base, preapical lobe moderately-developed,

apical process foot-like or beak-like with fine tooth-like serrations (Figs. 10, 11). Aedeagal shaft with rounded apex (Figs. 12–14); dorsal apodeme well-developed; with one short and one long apical process, with or without a notch near midlength (Figs. 12–14).



Figures 1–4. External morphology of *Changwhania ceylonensis* Baker. 1. Habitus, dorsal view; 2. Face; 3. Anterior dorsum; 4. Habitus, lateral view.



Figures 5–12. Male genitalia of *Changwhania ceylonensis* Baker. 5. Pygofer lobe, lateral view; 6. Anal appendage, lateral view; 7. Pygofer processes, ventral view; 8. Connective; 9. Subgenital plate, dorsal view; 10. Style, dorsal view; 11. Apex of style; 12. Aedeagus, dorsal view; 13. Aedeagus, lateral view; 14. Apex of aedeagus, lateral view.

Female seventh sternum produced lobe-like medially on posterior margin.

Specimens examined. 2♂1♀, **Pakistan**, Azad Jammu & Kashmir: Muzaffarabad, 737 m, 12-VII-2016, coll. Naveed HASSAN. 4♂11♀, Azad Jammu & Kashmir: Rawalakot, 1638 m, VII-2017, coll. Naveed HASSAN.

Remarks. This species can be distinguished from others in having the oblong dark spots at vertex and oblique black spot on the frontoclypeal margins below each antennal pit. Furthermore, the male genitalia differ in possessing a foot-like apical process of the style with small tooth-like serrations and the apical position of one or both of the aedeagal processes.

Distribution. Korea; Japan; Nepal; India; Sri Lanka; China; Pakistan; Thailand; Philippines; Papua New Guinea; New Caledonia.

Subgenus *Scleroracus* Van Duzee, 1894, new record to Pakistan

Scleroracus Van Duzee, 1894: 136 (Type species: *Athysanus anthracinus* Van Duzee, 1894).

Ophiola Edwards, 1922: 206 (Type species by subsequent designation: Ball, 1928; *Cicadula striatulus* Fallén, 1806). Synonymy by Oman, 1949.

Limotettix (*Scleroracus*) Ribaut, 1952: 156 (reduced to subgenus).

Omaniella Ishihara, 1953: 197 (Type species: *Omaniella flavopictus* Ishihara, 1953).

Body tan brown to black in colour generally. Head wider than pronotum. Discal margin of crown radially shagreen. Frontoclypeus tapered towards apex, shagreen. Clypellus parallel sided, apex following the normal curve of genae. Lorum narrower at base than clypellus. Antennae arising near middle corner of eyes. Antennae short, ledges absent. Ocelli close to eyes on anterior margin of head. Pronotum with lateral margins carinate and shorter than basal width of eyes. Forewings macropterous with three anteapical cells, appendix not exceeding anal margin, veins prominent, not raised, A₁–A₂ crossvein absent. Profemur with AM1 seta present, intercalary row with series of five fine setae, row AV with few small, stout setae. Profemur rounded and convex dorsally. Metafemur setae formula 2+2+1. Metatarsomere I not expanded at apex.

Pygofer with few macrosetae, basolateral membranous cleft present. Subgenital plates articulated with valve, with few irregularly arranged, stout macrosetae and numerous fine setae near lateral margin. Style with robust base, subtriangular, median anterior lobe pronounced. Valve broadly triangular. Connective “Y”-shaped, articulated with aedeagus. Aedeagus with basal processes absent, without basal hinge, with a sclerotized dorsal connective, sclerotization of dorsal connective ventrally emarginated.

Remarks. This species of the genus *Limotettix* can be differentiated from other deltocephalines by aedeagus having a sclerotized dorsal connective. Furthermore, the subgenus *Limotettix* (*Scleroracus*) has the sclerotization of the dorsal connective ventrally emarginated.

Distribution. Worldwide.

***Limotettix* (*Scleroracus*) *cacheolus* (Ball, 1928)** (Figs. 15–26), new record to Pakistan

Ophiola stratula var. *cacheola* Ball, 1928: 189.

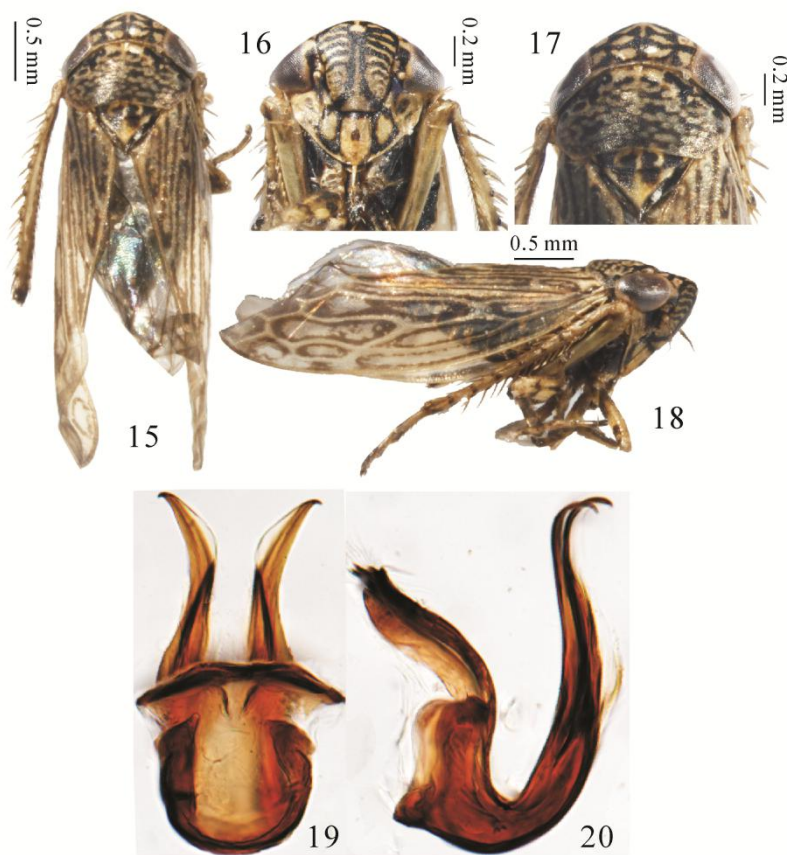
Limotettix (*Scleroracus*) *cacheolus* Oman, 1947: 205.

Limotettix (*Scleroracus*) *cacheolus* Hamilton, 1994: 122.

Limotettix (*Scleroracus*) *cacheolus* McKamey, 2001: 705.

Coloration and Morphology. Tan brown with black markings (Fig. 15). Vertex with dark

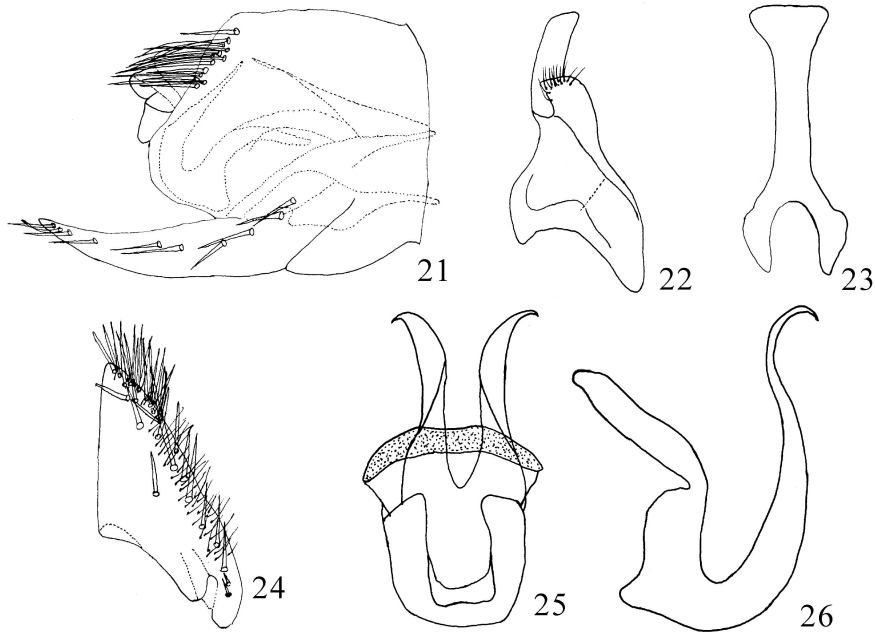
transverse bands with a median joint, not reaching anterior margin of head (Fig. 17). Ocelli surrounded by dark bands. Pronotum with irregular dark transverse markings (Fig. 17). Scutellum yellow with pair of dark longitudinal bands (Fig. 17). Forewings brownish with prominent yellowish veins (Fig. 18). Face brown. Frontoclypeus with pair of longitudinal dark bands diverging apically, transverse dark streaks present along with longitudinal dark bands; anteclypeus normally dark edged and with median black spot (Fig. 16). Legs yellowish with brown spots at profemur. Head broader than pronotum. Distance between eyes nearly two times more than vertex median length. Ocelli at anterior margin of vertex, separated from eye by nearly three times distance of their own diameter. Forewings longer than abdomen (Fig. 15). Other external features as in generic description.



Figures 15–20. *Limotettix (Scleroracus) cacheolus* Ball. 15. Habitus, dorsal view; 16. Face; 17. Head; 18. Habitus, lateral view; 19. Aedeagus, dorsal view; 20. Aedeagus, lateral view.

Genitalia. Pygofer lobe longer than broader, with few macrosetae near the posterior margin, posteriorly truncate, with ventral lobe fused (Fig. 21). Valve broadly triangular. Connective “Y”-shaped, with stem longer than arms (Fig. 23). Subgenital plates triangular, tapering towards apex, rounded apically, with irregularly arranged macrosetae and numerous fine setae (Fig. 24). Style bilobed at base with finger-like apophysis, slightly curved laterad, with rounded moderately-developed preapical lobe (Fig. 22). Aedeagus with atrium

constricted strongly near aedeagal shaft laterally (Figs. 20, 26). Aedeagal shaft with lateral margins subparallel, longer than broad posteriorly, distally attenuated and recurved, directed dorsoposterad and laterad (Figs. 19–20, 25–26). Dorsal connective with narrow emargination, deep, with parallel sides.



Figures 21–26. Male genitalia of *Limotettix (Scleroracus) cacheolus* Ball. 21. Pygofer lobe, lateral view; 22. Style, dorsal view; 23. Connective; 24. Subgenital plate, ventral view; 25. Aedeagus, dorsal view; 26. Aedeagus, lateral view.

Specimens examined. 1♂2♀, **Pakistan**, Khyber Pakhtunkhwa: Babusar Top, 4173 m, VIII-2016, Naveed HASSAN.

Remarks. The species *Limotettix (Scleroracus) cacheolus* is similar to *Limotettix (Scleroracus) arctostaphyli* in the male genital characters but differs in the forewing exceeding abdomen in both sexes. Although this species from Pakistan is brown with dark markings dorsally rather than the dark coloured specimen described from USA, the genital characters and forewing length characters are the same in both species. Therefore we treat this as a new record specimen of *Limotettix (Scleroracus) cacheolus* from the Indian subcontinent.

Distribution. Pakistan; USA.

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