



<http://dx.doi.org/10.11646/zootaxa.3904.3.2>

<http://zoobank.org/urn:lsid:zoobank.org:pub:EA840547-EE36-43E3-9FFE-90C055112BD6>

## Review of species of the *Scaphoideus albovittatus* group (Hemiptera, Cicadellidae, Deltocephalinae) from China, with a checklist and distribution summary for Chinese species in the genus

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### Abstract

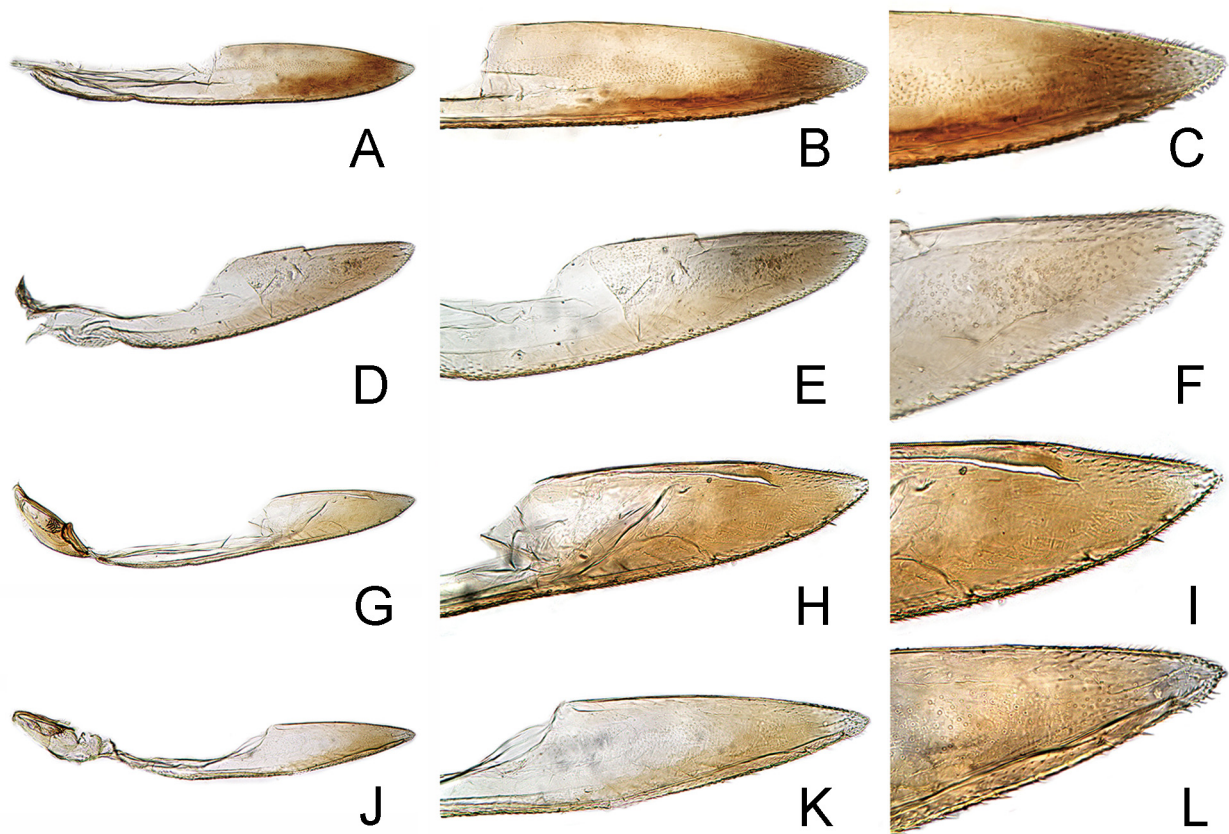
The thirteen known leafhopper species of the *Scaphoideus albovittatus* species group, characterized by the presence of a dorsal white longitudinal stripe, are recognized. Eight species, including three new species, are reported in this group from China: *S. albovittatus* Matsumura (China: Guangxi, Guizhou, Hainan, Hebei, Henan, Hubei, Hunan, Shaanxi, Shandong, Sichuan, Xizang, Yunnan; Japan, Korea, Russia), *S. coniceus* Li (China: Hainan, Yunnan), *S. intermedius* Matsumura (China: Taiwan), *S. kumamotonis* Matsumura (China: Anhui, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangxi, Shaanxi, Sichuan, Xizang, Yunnan, Zhejiang; Japan), *S. maai* Kitbamroong & Freytag (China: Yunnan, Hainan; Thailand), *S. rostratus* **sp. nov.** (China: Yunnan), *S. sagittatus* **sp. nov.** (China: Yunnan) and *S. yuani* **sp. nov.** (China: Guangxi). The detailed morphology of the new species is described; photographs of external habitus and male and female genitalia of the species from China are given. A checklist and a key to the species in this group are also provided, as well as a checklist with distribution summaries for all valid species in the genus from China.

**Key words:** Hemiptera, Auchenorrhyncha, Cicadina, leafhoppers, *Scaphoideus*

### Introduction

*Scaphoideus*, first described by Uhler in 1889, is one of the larger leafhopper genera (Zahniser & Dietrich, 2013), with 194 previously described species (per. stat.). The species of this genus feed and breed on grasses, herbs, shrubs, and trees. Species occur in both the New World and the Old World, and one Nearctic species, *S. titanus* Ball, now established in Europe, is implicated in the transmission of the grapevine phytoplasma disease causing flavescence dorée (Bertin *et al.*, 2007). Several other species in the genus are also known to transmit plant pathogens, and all are capable of inflicting injury to plants (Baker, 1948; Nielson, 1985; Rosenberger and Jones, 1978).

Recent reviews of the species of *Scaphoideus* from Thailand (Kitbamroong & Freytag, 1978), Japan (Kamitani & Hayashi, 2013), the Indian subcontinent (Viraktamath & Mohan, 2004) and China (Li *et al.*, 2011) have resulted in a better understanding of the distribution of the species in Asia. In China, the genus is represented by 76 species (see Appendix 1), many of which are apparently endemics (Matsumura, 1914, Freytag, 1976; Kuoh, 1986; Li, 1988, 1990a,b, 1993, 1999; Li & Wang, 1991, 2002, 2005; Li & Kuoh, 1993; Cai *et al.*, 1998, 2001; Cai & Huang, 1999; Cai & Shen, 1999; Li & Zhang, 2005; Li & Liang, 2005; Li *et al.*, 2011; Chen *et al.*, 2013; Yang *et al.*, 2013). *Scaphoideus* comprises forms differing widely in colour and male genitalia. Among them, three species (*S. albovittatus*, *S. intermedius* and *S. kumamotonis*) were described from Taiwan by Matsumura (1914), which have a dorsal white longitudinal stripe extended from the head apex to the forewing clavus and two black spots near the eyes on the vertex. Later, three similar species: *S. maai* Kitbamroong & Freytag and *knappi* Kitbamroong & Freytag from Thailand, and *S. katraini* Rao & Ramakrishnan from India were described. Viraktamath & Mohan (2004) also described three related species from India. Recently, three species with similar color pattern: *coniceus* Li, 2011, from China, *ryukyuensis* Kamitani & Hayashi, 2013, from Japan and *viraktamathi* Meshram, 2014, from



**FIGURE 16.** Third valvulae of female ovipositor. A, D, G, J. Third valvulae of female ovipositor, lateral view; B, E, H, K. Apical half of third valvulae; C, F, I, L. Enlarged view of third pair of valvulae in apex; A–C. *Scaphoideus albovittatus*; D–F. *Scaphoideus coniceus*; G–I. *Scaphoideus kumamotois*; J–L. *Scaphoideus maai*.

### Acknowledgements

We thank Dr. Chandra Viraktamath (Department of Entomology, University of Agricultural Sciences, India) for comments on an earlier draft of this paper. We also thank National Digital Archives Program/ National Museum of Natural Science (NMNS) for permission to use images of specimens in their care. Thanks are also due to the Dr. Chris Dietrich and two reviewers who have greatly improved the manuscript with their suggestions. This project was supported by the National Natural Science Foundation of China (Nos. 30970385, 31093430, 31272343) and the “Program for New Century Excellent Talents in University (NCET-10-0690)”, and the “Chinese Universities Scientific Fund (PY200908)”.

### References

- Baker, W.L. (1948) Transmission by leafhoppers of the virus causing phloem necrosis of American elm. *Science*, 108, 307–308.  
<http://dx.doi.org/10.1126/science.108.2803.307>
- Barnett, D.E. (1977) External morphology of adult leafhoppers of the genus *Scaphoideus*. *Transactions of the Kentucky Academy of Science*, 38 (1&2), 26–37.
- Bertin, S., Guglielmino, C.A., Karam, N., Gomulski, L.M., Malacrida, A.R. & Gasperi, G. (2007) Diffusion of the Nearctic leafhopper *Scaphoideus titanus* Ball in Europe: a consequence of human trading activity. *Genetica*, 131, 275–285.  
<http://dx.doi.org/10.1007/s10709-006-9137-y>
- Cai, P. & Huang, B.K. (1999) Homoptera: Cicadelloidea: Cicadellidae. In: Huang, B.K. (Ed.), *Fauna of Insects, Fujian Province of China. Vol. 2*. Fujian Science Press, Fuzhou, pp 270–307. [In Chinese with English summary]
- Cai, P. & Shen, X.C. (1999) Six new species of insect from Dabie Mountains (Homoptera: Cicadellidae). In: Shen, X.C. & Pei,

- H.C. (Eds.), *Insect Fauna Study of Henan vol 4, Insect of the Mountains Funiu and Dabie Regions*. China Agriculture Press, Beijing, pp. 36–44. [In Chinese with English summary]
- Cai, P. & Shen, X.C. (1999) Homoptera: Cicadellidae. In: Shen, X.C. & Pei, H.C. (Eds.), *The fauna and taxonomy of insects in Henan. Vol. 4. Insect of the Mountains Funiu and Dabie Regions*. China Agricultural Sciencetech Press, Beijing, pp. 236–248. [In Chinese with English summary]
- Cai, P. & Shen, X.C. (2002) Homoptera: Cicadellidae. In: Shen, X.C. & Zhao, Y.Q. (Eds.), *The fauna and taxonomy of insects in Henan. Vol. 5. Insect of the Mountains Taihang and Tongbai Regions*. China Agricultural Sciencetech Press, Beijing, pp. 269–279. [In Chinese with English summary]
- Cai, P., He, J.H. & Gu, X.L. (2001) Homoptera: Cicadellidae. In: Wu, H. & Pan, C.W. (Eds.), *Insect of Tianmushan National Nature Reserve*. Science Press, Beijing, pp. 185–218. [In Chinese with English summary]
- Cai, P., He, J.H. & Zhu, G.P. (1998) Homoptera: Cicadellidae. In: Wu, H. (Ed.), *Insect of Longwangshan Nature Reserve*. China Forestry Publishing House, Beijing, pp. 64–75. [In Chinese with English summary]
- Chen, X.S., Yang, L. & Li, Z.Z. (2013) *Bamboo-feeding leafhoppers in China*. China Forestry Publishing House, Beijing, 218 pp. [In Chinese with English summary]
- Freytag, P.H. (1976) A new species of *Scaphoideus* from Formosa (Homoptera: Cicadellidae). *Entomological News*, 87, 171–175.
- Ishihara, T. (1961) Homoptera of Southeast Asia collected by the Osaka City University Biological Expedition to Southeast Asia 1957–58. *Nature and Life in Southeast Asia*, 1, 225–257.
- Kamitani, S. & Hayashi, M. (2013) Taxonomic study of the genus *Scaphoideus* Uhler (Hemiptera, Cicadellidae, Deltocephalinae) from Japan. *Zootaxa*, 3750 (5), 515–533.  
<http://dx.doi.org/10.11646/zootaxa.3750.5.5>
- Kitbamroong, N.A. & Feytag, P.H. (1978) The species of the genus *Scaphoideus* (Homoptera: Cicadellidae) found in Thailand, with descriptions of new species. *Pacific Insects*, 18, 9–31.
- Kuoh, C.L. (1986) Nine new species of forest leafhoppers from Yunnan. (Homoptera: Cicadellidae). *Entomotaxonomia*, 8 (3), 195–207. [In Chinese with English summary]
- Li, Z.Z. & Dai, R.H. (2004) Descriptions of six new species of *Scaphoideus* from China (Homoptera: Cicadellidae: Euscelinae). *Acta Zootaxonomica Sinica*, 29 (2), 281–287. [In Chinese with English summary]
- Li, Z.Z. & Chen, X.S. (2002) Homoptera: Cicadellidae: Euscelinae and Nirvaninae. In: Li, Z.Z. & Jin, D.C. (Eds.), *Insects from Maolan Landscape*. Guizhou Science and Technology Publishing House, Guiyang, pp. 195–205. [In Chinese with English summary]
- Li, Z.Z. & Kuoh, C.L. (1993) Two new species of the genus *Scaphoideus* from China. *Journal of Guizhou Agricultural College*, 12 (1), 37–40. [In Chinese with English summary]
- Li, Z.Z. & Wang, L.M. (1991) *The agriculture and forestry insect fauna of Guizhou. Vol. 4. (Homoptera: Cicadellidae)*. Guizhou Science and Technology Press, Guiyang, 304 pp. [In Chinese with English summary]
- Li, Z.Z. & Wang, L.M. (2002) Notes on Chinese species of *Scaphoideus* with descriptions of nine new species (Homoptera: Cicadellidae: Euscelinae). *Acta entomologica Sinica*, 27, 101–115. [In Chinese with English summary]
- Li, Z.Z., Wang, L.M. & Liang, A.P. (2005) Descriptions of four new species of *Scaphoideus* Uhler from China (Homoptera, Cicadellidae, Euscelinae). *Acta Zootaxonomica Sinica*, 30 (1), 130–134. [In Chinese with English summary]
- Li, Z.Z. & Wang, Y.J. (2006) Homoptera: Cicadellidae: Evacanthinae, Nirvaninae, Coelidiinae, Iassininae and Escelinae. In: Li, Z.Z. & Jin, D.C. (Eds.), *Insects from Leigongshan Landscape*. Guizhou Science and Technology Publishing House, Guiyang, pp. 188–196. [In Chinese with English summary]
- Li, Z.Z. & Xing, J.C. (2010) Hemiptera: Cicadellidae: Euscelinae. In: Chen, X.S., Li, Z.Z. & Jin, D.C. (Eds.), *Insects from Mayanghe Landscape*. Guizhou Science and Technology Publishing House, Guiyang, pp. 132–145. [In Chinese with English summary]
- Li, Z.Z. (1988) Three new species of Fanjingshan Mountains from Guizhou, China (Homoptera: Cicadelloidea). *Guizhou Science*, 51, 87–91. [In Chinese with English summary]
- Li, Z.Z. (1990) Four new species of the genus *Scaphoideus* (Homoptera: Euscelidae). *Acta Zootaxonomia Sinica*, 15 (4), 464–470. [In Chinese with English summary]
- Li, Z.Z. (1990) Four New Species of the Genus *Scaphoideus* (Homoptera: Euscelidae) from Guizhou, China. *Entomotaxonomia*, 12 (2), 97–102. [In Chinese with English summary]
- Li, Z.Z. (1993) A new species of *Scaphoideus* (Homoptera: Euscelidae) from Mx. Emei, Sichuan, China. *Entomotaxonomia*, 15 (1), 45–47. [In Chinese with English summary]
- Li, Z.Z., Dai, R.H. & Xing, J.C. (2011) *Deltocephalinae from China (Hemiptera: Cicadellidae)*. Popular Science Press, Beijing, China, 336 pp. [In Chinese with English summary]
- Li, Z.Z. & Zhang, B. (2005) Homoptera: Cicadellidae: Hecalinae, Coelidiinae, Iassininae, Nirvaninae, Evacanthinae, Escelinae, Hylicinae and Ulopinae. In: Yang, M.F. & Jin, D.C. (Eds.), *Insects from Dashahe nature reserve of Guizhou*. Guizhou Science and Technology Publishing House, Guiyang, pp. 153–159. [In Chinese with English summary]
- Li, Z.Z., Zhang, B. & Wang, Y.J. (2007) Homoptera: Cicadellidae: Hecalinae, Coelidiinae, Iassininae, Nirvaninae, Evacanthinae, Escelinae, Hylicinae and Ulopinae. In: Li, Z.Z., Yang, M.F. & Jin, D.C. (Eds.), *Insects from Leigongshan Landscape*. Guizhou Science and Technology Publishing House, Guiyang, pp. 146–167. [In Chinese with English summary]
- Matsumura, S. (1914) Die Jassinen und einige neue Acocephalinen Japans. *The journal of the College of Agriculture*, 5 (7),

165–240.

- Meshram, N.M. (2014) Three new species of the genus *Scaphoideus* (Hemiptera: Cicadellidae) with notes on the female of *Scaphoideus varna* from India. *Zootaxa*, 3754 (2), 185–194.  
<http://dx.doi.org/10.11646/zootaxa.3754.2.7>
- Meshram, N.M., Viraktamath, C.A. & Ramamurthy, V.V. (2012) A new deltocephaline *Scaphoideus subsculptus* sp. nov. (Hemiptera: Cicadellidae) with redescription of *S. harlani* from India. *Oriental Insects*, 46 (2), 153–162.  
<http://dx.doi.org/10.1080/00305316.2012.699266>
- Nielson, M.W. (1985) Leafhopper systematics. In: Nault, L.R. & Rodriguez, J.G. (Eds.), *The Leafhoppers and Planthoppers*. Wiley, New York, pp. 11–39.
- Okada, T. (1977) Redescriptions of four Japanese *Scaphoideus* species (Homoptera, Cicadellidae). *Kontyû*, 45, 192–198.
- Oman, P.M. (1949) The Nearctic leafhoppers (Homoptera: Cicadellidae). A generic classification and check list. *Memoirs of the Entomological Society of Washington*, 3, 1–253. [plates.1–44]
- Rao, V.R.S. & Ramakrishnan, U. (1988) Two new species of *Scaphoideus* Uhler (Homoptera: Cicadellidae) from India. *Journal of Entomological Research*, 12, 69–73.
- Rosenberger, D.A. & Jones, A.L. (1978) Leafhopper vectors of the peach X-disease pathogen and its seasonal transmission from chokecherry. *Phytopathology*, 68, 782–790.  
<http://dx.doi.org/10.1094/Phyto-68-782>
- Uhler, P.R. (1889) New genera and species of American Homoptera. *Transactions of the Maryland Academy*, 1, 33–44.
- Viraktamath, C.A. & Mohan, G.S. (2004) A revision of the deltocephaline leafhopper genus *Scaphoideus* (Hemiptera: Cicadellidae) from the Indian subcontinent. *Zootaxa*, 578, 1–48.
- Viraktamath, C.A. & Mohan, G.S. (1994) Description of *Scaphodhara*, a new genus related to *Scaphoideus* (Homoptera: Cicadellidae) and five new species from South India. *Entomon*, 19, 13–22.
- Webb, M.D. & Viraktamath, C.A. (2007) Three new Old World species of the leafhopper genus *Scaphoideus* Uhler (Hemiptera: Auchenorrhyncha: Cicadellidae). *Zootaxa*, 1457, 49–55.
- Yang, L., Chen, X.S. & Li, Z.Z. (2013) Review of the bamboo-feeding species of genus *Scaphoideus* (Hemiptera: Cicadellidae: Deltocephalinae) from China, with description of one new species. *Zootaxa*, 3619 (5), 557–568.  
<http://dx.doi.org/10.11646/zootaxa.3619.5.5>
- Zahniser, J.N. & Dietrich, C.H. (2013) A review of the tribes of Deltocephalinae (Hemiptera: Auchenorrhyncha: Cicadellidae). *European Journal of Taxonomy*, 45, 1–211.

#### APPENDIX 1. Checklist of species of *Scaphoideus* from China.

- acutistyleus* Li & Zhang, 2005:157 Guizhou  
*alboguttatus* Matsumura, 1914: 221 Taiwan  
*albomaculatus* Li, 1990:466 Guizhou, Yunnan, Sichuan, Fujian, Taiwan  
*albovittatus* Matsumura, 1913:68 Taiwan, Guizhou, Sichuan, Yunnan, Tibet, Shaanxi, Hebei; Japan, Korea  
*anlongensis* Chen, Yang & Li, 2012:85 Guizhou  
*annulatus* Li [In Li, Dai & Xing, 2011:248] Jiangxi  
*apicalis* Li [In Cai & Huang, 1999:232] Fujian, Sichuan, Guizhou  
*aurantiacus* Kuoh, 1986:196 Yunnan, Henan  
*bannaensis* Li [In Li, Dai & Xing, 2011:249] Yunnan  
*bilineus* Li [In Li, Dai & Xing, 2011:250] Guangxi  
*bimaculatus* Li & Wang, 2002: 112 Yunnan  
*bipedis* Cai & He, 1998:71 Henan, Zhejiang  
*biprocessus* Li, Song, & Song, 2007:683 Yunnan  
*breviplateus* Li [In Li, Dai & Xing, 2011: 251] Guizhou  
*changjinganus* Li, 1990:100 Hunan, Henan, Guizhou, Yunnan, Zhejiang, Jiangsu; Burma  
*colilateralis* Li [In Li, Dai & Xing, 2011:252] Shaanxi  
*conicaplateus* Li & Dai, 2004:283 Guizhou  
*coniceus* Li [In Li, Dai & Xing, 2011:252] Hainan  
*curvanus* Li & Wang [In Li, Wang & Liang, 2005:131] Yunnan  
*curvatureus* Li, Song, & Song, 2007:682 Yunnan  
*dentaedeagus* Li & Wang, 2002:106 Guizhou  
*dentatistyleus* Li & Wang, 2002:107 Guizhou  
*diminutus* Matsumura, 1914:226 Taiwan  
*erythraeous* Li, 1990: 464 Guizhou, Yunnan  
*exsertus* Li, 1993:45 Sichuan, Guizhou  
*fanjingensis* Li & Dai, 2004:284 Guizhou  
*festivus* Matsumura, 1902:384 Guizhou, Sichuan, Yunnan, Shaanxi, Ningxia, Hunan, Beijing, Hebei, Henan, Jiangxi, Fujian, Guangdong, Guangxi, Hainan, Taiwan, Zhejiang; India, Japan, Korea, Sir lanka