

***Sphenocratus xinjiangensis* Liang, sp. nov., the first authentic record of the dictyopharid subfamily Orgeriinae (Hemiptera: Fulgoroidea: Dictyopharidae) in China**

AI-PING LIANG^{1,2,*}, ZHI-SHUN SONG¹ & GUO-MEI JIANG¹

¹Department of Entomology, Institute of Zoology, Chinese Academy of Sciences, 19 Zhongguancun Road, Beijing 100080, P.R. China. E-mail: liangap@ioz.ac.cn

²Key Lab of Insect Evolution & Environmental Changes, Capital Normal University, Beijing 100037, P.R. China

*Corresponding author

Abstract

A new dictyopharid planthopper species, *Sphenocratus xinjiangensis* Liang, **sp. nov.** (subfamily Orgeriinae), is described and illustrated from Xinjiang in northwestern China. This represents the first authentic record of the genus *Sphenocratus* Horváth, 1910 as well as of the subfamily Orgeriinae in China. The new species extends the range of the genus *Sphenocratus* and the subfamily Orgeriinae southeastward considerably.

Key words: Hemiptera, Dictyopharidae, Orgeriinae, *Sphenocratus*, new species, China

Introduction

The planthopper subfamily Orgeriinae, a distinct lineage within the family Dictyopharidae, is mainly characterized by morphological reduction and adaptation to arid conditions (Emeljanov & Kuznetsova, 2005). Species of the subfamily can be distinguished by the following combination of characters: body nymphlike, brachypterous; fore wings shortened, much shorter than abdomen, without claval suture; hind wings and tegulae absent; ocelli absent or minute; and abdomen lacking areas of wax glands. Currently the subfamily comprises 185 species in 38 genera of four tribes, Ranissini (7 genera, 43 species), Colobocini (1 genus, 1 species), Almanini (20 genera, 104 species), and Orgeriini (10 genera, 37 species) (Emeljanov & Kuznetsova, 2005). Members of the subfamily have been recorded mainly from the arid and semi-arid regions of Europe, Asia, North America, Africa, and Australia; they have not been found in the wet tropics of the

Oriental and Neotropical regions (Melichar, 1912; Metcalf, 1946; Woodward, 1960; Fennah, 1962; Emeljanov, 1969; Emeljanov & Kuznetsova, 2005). There are no authentic records of species of this group in China.

The dictyopharid fauna of China remains inadequately studied. Fennah (1956) published a key to ten genera of Chinese Dictyopharidae but only provided notes on five Chinese species. Chou *et al.* (1985) published the only comprehensive treatment of Chinese Dictyopharidae in their Dictyopharidae volume of the Economic Insect Fauna of China, which deals with 8 species distributed in 5 genera. The number of described species probably represents only a small fraction of the actual diversity of the entire Chinese dictyopharid fauna, when one considers the vast territory and variety of habitats of China.

While sorting and identifying Dictyopharidae from material in the Insect Collection of the Institute of Zoology, Chinese Academy of Sciences, Beijing (IZCAS), the senior author found an undescribed species of genus *Sphenocratus* Horvath, 1910 from Xinjiang Autonomous Region in northwestern China. The new species represents the first authentic record of the genus *Sphenocratus* as well as of the subfamily Orgeriinae, in China; and its discovery broadens our knowledge of the morphology and biogeography of the genus. We herein describe and illustrate the new species, *Sphenocratus xinjiangensis* Liang, sp. nov.

The genus *Sphenocratus* includes fewer than 20 known species, mainly recorded from Europe and central Asia (Oshanin, 1913; Metcalf, 1946; Emeljanov, 1969, 1979; Mityaev, 2002). Oshanin (1913) listed a Turkestan species, *Sphenocratus megacephalus* (Oshanin, 1879), from Sinkiang [=Xinjiang], China, and this record was included in Metcalf's (1942) catalogue of world Dictyopharidae but has never been verified.

Sphenocratus belongs to the tribe Ranissini whose origin is associated with the formation of subtropical savannah in Central Asia (Kashgaria) after a more humid epoch of dry savannah meadows (Paleocene – Eocene) (Emeljanov & Kuznetsova, 2005). The ancestor of Ranissini, possibly Dictyopharini or Orthopagini, is unclear at the present time (Emeljanov & Kuznetsova, 2005).

Sphenocratus species can be distinguished from other Ranissini by the frons with intermediate carinae equidistant from its margins and from the median carina at least on the lower part of the frons, where they are invariably sharp; ovipositor with the ventral lobe of third valve having a broad lobelike appendage lying in the plane of the valve; and aedeagus with its hamulus tricuspid or dentate (Emeljanov, 1969)

Materials and methods

The specimens studied in the course of this work are deposited in the Insect Collection of the Institute of Zoology, Chinese Academy of Sciences, Beijing, China (IZCAS).

Morphological terminology follows that of Kramer (1950) and Liang & Jiang (2005).

Taxonomy

Sphenocratus xinjiangensis Liang, sp. nov.

(Figures 1–10)

Description

Male, brachypterous, nymphlike, length (from apex of cephalic process to tip of genitalia) 3.32–3.52 mm; length of head 0.69–0.72 mm, width (including eyes) 1.09–1.16 mm; length of fore wings 1.70 mm. General color ochraceous, marked with fuscous or brown.

Head (Figs. 1–3) short and broad, not produced into a cephalic process. Vertex (Fig. 1) somewhat spatulate anteriorly; anterior margin convex, lateral margins carinate and converging anteriorly, posterior margin slightly concave; median longitudinal carina distinct and complete. Frons (Fig. 2) broad and elongate; anterior margin arched, lateral margins carinate and nearly parallel-sided, posterior margin strongly concave; median longitudinal carina distinct, lateral longitudinal carinae nearly parallel, approaching frontoclypeal suture. Postclypeus (Fig. 2) and anteclypeus convex medially, with a distinct median carina. Rostrum long, reaching beyond hind coxa. Eyes (Figs. 1–3) oval, brown. Ocelli absent. Antennae (Figs. 2, 3) with scape very small; pedicel large and subglobose, with more than 20 distinct sensory plaque organs distributed over entire surface; flagellum long, setuliform.

Pronotum (Fig. 1) shorter than mesonotum in middle line; disc broad, area between eyes slightly arched anteriorly, lateral marginal areas straight and sloping, posterior margin nearly straight, scarcely angulate mesially; median longitudinal carina distinct, lateral discal carinae obscure and only elevated anteriorly, lateral pits beyond median longitudinal carina big and distinct. Mesonotum (Fig. 1) inversely triangular, tricarinate on disc; lateral carinae short and indistinct, median carina sharp. Fore wings (Fig. 4) leathery, semihyaline, short and broad, reaching posterior margin of 3rd abdominal segment, lateral edges curved ventrally; secondary veins sharp, carinate. Legs elongate, fore femur not dilated, without spines near apex; hind tibia with 3–5 lateral spines, spinal formula 7–(11–12)–(11–13).

Abdominal tergites (Fig. 1) III–VII with sharp medial carina and lateral carinae. Tergite III each side with 1 sensory pit and tergites IV–VII each side with 5 pits respectively.

Male genitalia: pygofer (Figs. 5–7) narrow and high, wider dorsally than ventrally, dorsal posterior margin angularly produced posteriorly in lateral view (Fig. 5); ratio of length of upper margin to lower margin about 1:3; posterior margin straight and anterior margin broadly arched posteriorly in lateral view; dorsal margin deeply excavated to accommodate anal tube, dorsal lateral margins angularly produced posteriorly in dorsal view (Fig. 5). Anal tube relatively short and small in dorsal view and nearly triangular in lateral view (Figs. 5, 7), outline of apical part ring-like in dorsal view (Fig. 7). Anal style short and broad. Parameres (Figs. 5, 6) relatively elongate, large and broad in ventral view

(Fig. 6), apical half expanded and relatively broad in lateral view with dorsal margin with one stout, anterodorsally directed tooth near middle and one smaller, ventrally directed tooth on the inner side of the stout tooth (Fig. 5). Aedeagus (Figs. 5, 8–10) large and stout; phallobase with a pair of sclerotized, pigmented, sword-like processes on venter (Figs. 8, 9) and 3 pairs of membranous, sac-like processes on back (Figs. 5, 8–10): upper pair long and large, produced anteroventrally in lateral view (Figs. 5, 9); middle pair short and small, produced laterally in lateral and dorsal views (Figs. 9, 10) and lower pair small and pigmented, produced anterodorsally in lateral and dorsal views (Figs. 5, 9, 10); phalli distinctly forked over apical half, the two arms diverging laterally and directed posteroventrally in lateral view (Fig. 5), apex pigmented and sclerotized, apical, inner edge of arms with 2 or 3 spinelike processes (Figs. 5, 8, 10).

Female: Unknown.

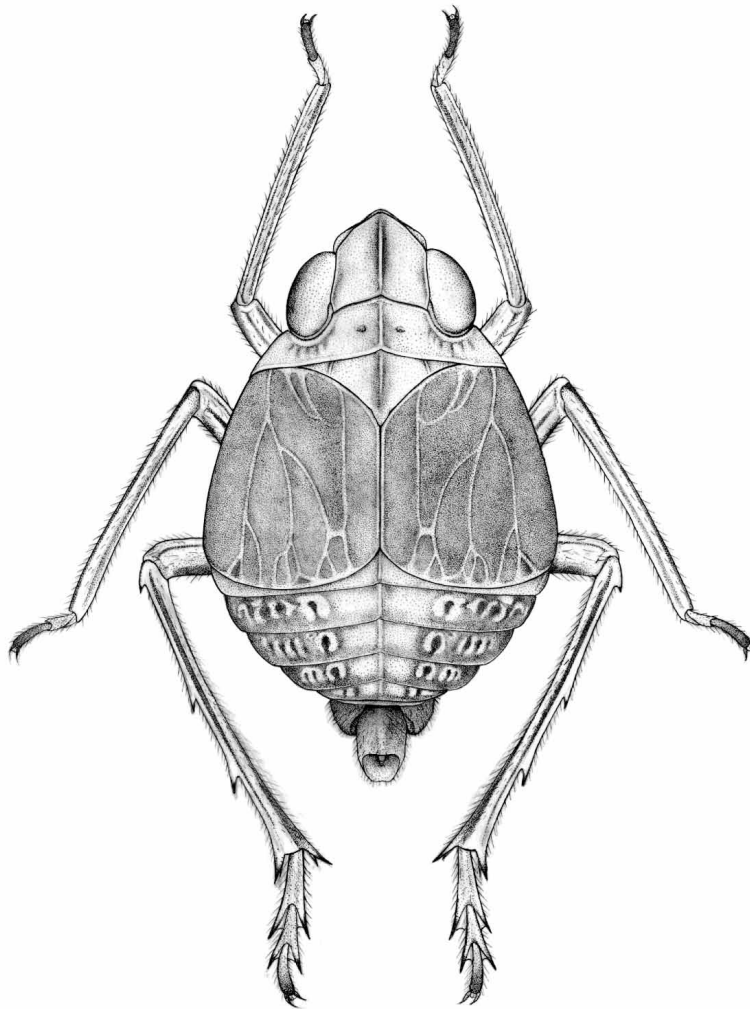
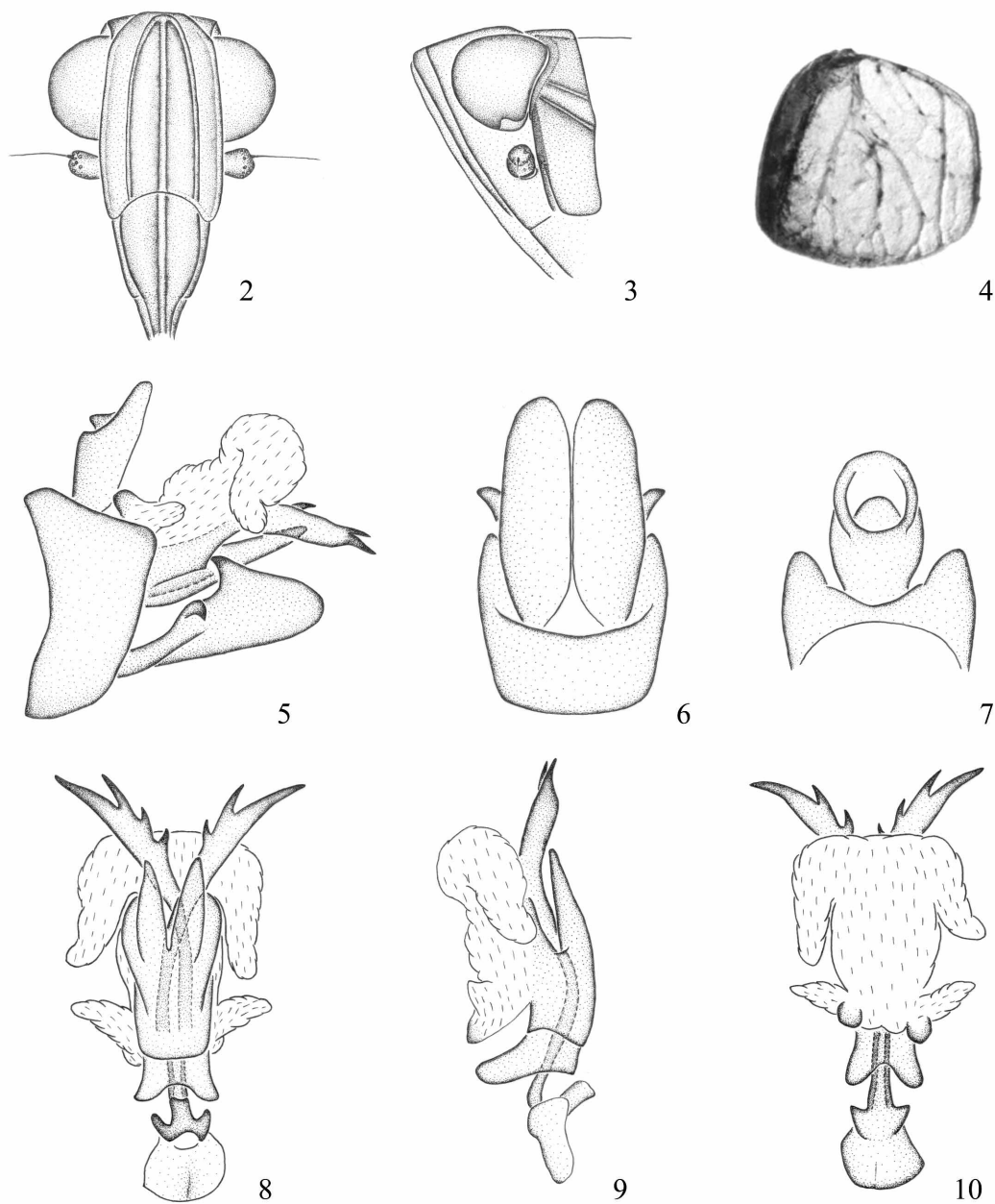


FIGURE 1. *Sphenocratus xinjiangensis* Liang, **sp. nov.** (China: Xinjiang, IZCAS): male, dorsal habitus.



FIGURES 2–10. *Sphenocratus xinjiangensis* Liang, **sp. nov.** (China: Xinjiang, IZCAS): 2. head (ventral view). 3. head and pronotum (lateral view). 4. left fore wing. 5. genitalia (lateral view). 6. pygofer and parameres (ventral view). 7. pygofer and anal tube (dorsal view). 8. aedeagus (ventral view). 9. aedeagus (lateral view). 10. aedeagus (dorsal view). 11. aedeagus (dorsal view).

Etymology

The species is named for its occurrence in Xinjiang Autonomous Region in northwestern China.

Materials examined

Holotype: male, Northwestern China: Xinjiang Autonomous Region, Tuoli, 20.VI.1955 (S.-J. Ma, K.-L. Xia & Y.-L. Chen) (IZCAS). *Paratype*. 1 male, Northwestern China: same data as holotype (IZCAS).

Distribution

Northwestern China (Xinjiang). The discovery of this species in Xinjiang Autonomous Region in northwestern China has extended the range of the genus *Sphenocratus* and the subfamily Orgeriinae southeastward considerably.

Remarks

This species is related to *S. megacephalus* (Oshanin, 1879) from Turkestan but can be distinguished from the latter by its distinctly smaller body size and by the minutiae of the male genitalia, especially the aedeagus with the phalli with 2 or 3 spinelike processes on the apical, inner edge of the forked arms (Figs. 5, 8, 10) (also see Mityaev 2002, Fig. 4–17–19).

Acknowledgments

We extend our appreciation to Prof. Dr. A. F. Emeljanov, Zoological Institute, Russian Academy of Sciences, St. Petersburg, Russia, for several discussions during the preparation of this manuscript. We express our thanks to Mrs. Shu-Ming Ma for the habitus illustration of figure 1. We also wish to thank Prof. Dr. Carl W. Schaefer, Department of Ecology and Evolutionary Biology, University of Connecticut, Storrs, Connecticut, USA, for his very kind editorial help with this paper. The work on which this paper is based was supported by the following sources: the Hundred Talent Program from the Chinese Academy of Sciences (grant number A2903077), the National Natural Science Foundation of China (grant number 30370187) and the National Science Fund for Fostering Talents in Basic Research (NSFC-J0030092), all awarded to the senior author.

References

- Chou, I., Lu, J.S., Huang, J. & Wang, S.Z. (1985) *Economic Insect Fauna of China. Fasc. 36. Homoptera: Fulgoroidea*. Science Press; Beijing, China, 152 pp., 2 pls. [In Chinese, English summary p. 137.]
- Emeljanov, A.F. (1969) Reclassification of Palaearctic planthoppers of the subfamily Orgeriinae (Homoptera, Dictyopharidae). *Entomologicheskoye Obozreniye*, 48, 324–339. [In Russian] [Translated in *Entomological Review*, 48, 189–198.]
- Emeljanov, A.F. (1979) A new species of the genus *Sphenocratus* (Homoptera, Dictyopharidae) from Tadzhikistan // *Trudy VEO* [Proceedings of the Allunion Entomological Society], 61,

- 21–24. [In Russian]
- Emeljanov, A.F. & Kuznetsova, V.G. (2005) Phylogeny and evolution of the subfamily Orgeriinae (Homoptera, Dictyopharidae). Abstracts of the 12th International Auchenorrhyncha Congress and the 5th International Workshop on Leafhoppers and Planthoppers of Economic Importance. University of California, Berkeley, California, USA. 8–12 August 2005. [Unpaginated]
- Fennah, R.G. (1956) Fulgoroidea from southern China. *Proceedings of the California Academy of Sciences*, (4)28, 441–527.
- Fennah, R.G. (1962) New Orgeriine Dictyopharidae from South Africa (Homoptera). *Annals of the Natal Museum*, 15(18), 219–245.
- Horváth, G. (1910) Ad cognitionem Dictyopharinarum regionis palaearticae. *Annales Historico-Naturales Musei Nationalis Hungarici*, 8, 175–184.
- Kramer, S. (1950) The morphology and phylogeny of auchenorrhynchous Homoptera (Insecta). *Illinois Biological Monographs*, 20, 1–109, pls. 1–15.
- Liang, A.-P. & Jiang, G.-M. (2005) *Dictyophara nekkana* Matsumura (Hemiptera: Fulgoroidea: Dictyopharidae): Discovery of the type series, lectotype designation, and new distributional records. *Journal of the Kansas Entomological Society*, 78(2), 118–123.
- Melichar, L. (1912) Monographie der Dictyophorinen (Homoptera). *Abhandlungen der K. K. Zoologisch-Botanischen Gesellschaft in Wien*, 7(1), 1–221, pls. 1–5.
- Metcalf, Z.P. (1946) *Fulgoroidea, Dictyopharidae. General Catalogue of the Hemiptera. Fasc. 4, Part 8*. Smith College, Northampton, Mass., USA, 246 pp.
- Mityaev, I. (2002) Fauna, ecology and zoogeography of leafhoppers (Homoptera, Cicadinea) of Kazakhstan. *Tethys Entomological Research*, 5, 1–168. [In Russian]
- Oshanin, V.T. (1879) Materials for the study of the fauna of the Hemiptera of Turkestan. *Annales de la section du Turkestan de la Société des Amis des Sciences Naturelles, de l'Anthropologie et de l'Ethnographie*, 1, 99–163. Separate paged 1–65. [In Russian]
- Oshanin, V.T. (1913) Synopsis der Tribus Orgeriaria der Russischen Fauna. (Hemiptera-Homoptera). *Revue Russe d'Entomologie*, 13, 135–147.
- Woodward, T.E. (1960) Studies on Queensland Hemiptera. Part IV. The first record of Orgeriinae (Fulgoroidea; Dictyopharidae) from Australia. *University of Queensland Papers*, 1(10), 149–156.

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