Two new species of the bamboo-feeding leafhopper genus Abrus Dai & Zhang (Hemiptera, Cicadellidae, Deltocephalinae) from China

Lin Yang¹,²†, Xiang-Sheng Chen¹,²‡

¹ Institute of Entomology, Guizhou University, Guiyang, Guizhou, 550025, P.R. China ² The Provincial Key Laboratory for Agricultural Pest Management of Mountainous Region, Guizhou University, Guiyang, Guizhou, 550025, P.R. China

† urn:lsid:zoobank.org:author:17FAF564-8FDA-4303-8848-346AB8EB7DE4
‡ urn:lsid:zoobank.org:author:D9953BEB-30E6-464A-86F2-F325EA2E4B7C

Corresponding author: Xiang-Sheng Chen (chenxs3218@163.com)

Academic editor: Allen Sanborn | Received 16 June 2013 | Accepted 24 July 2013 | Published 29 July 2013

Citation: Yang L, Chen X-S (2013) Two new species of the bamboo-feeding leafhopper genus Abrus Dai & Zhang (Hemiptera, Cicadellidae, Deltocephalinae) from China. ZooKeys 318: 81–89. doi: 10.3897/zookeys.318.5799

Abstract
Two new species of the bamboo-feeding genus Abrus Dai & Zhang, 2002, A. xishuiensis sp. n. and A. langshanensis sp. n., are described and illustrated from Guizhou and Hunan, South China. A checklist and a key to 13 known species are given.

Keywords
Bamboo leafhopper, Cicadomorpha, distribution, Homoptera, taxonomy

Introduction
The bamboo-feeding leafhopper genus Abrus was established by Dai and Zhang (2002) with six species from Hunan, Guangxi, Fujian, Guangdong and Gansu of China (type species: Abrus hengshanensis Dai & Zhang, 2002). To date, 11 species are recognized in the genus (Dai and Zhang 2002; Li and Wang 2006; Dai and Zhang 2008; Li et al.
2011) from southern China. Of them, *A. brevis* Dai & Zhang, *A. coneus* Dai & Zhang and *A. leigongshanensis* Li & Wang, were recorded feeding on bamboo (Li et al. 2011).

During on-going studies on species biodiversity of the bamboo-feeding leafhoppers in China, some specimens belonging to undescribed species of the genus *Abrus* were found. The purpose of this paper is to describe two new species and to provide an identification key to the known species of *Abrus*.

**Material and methods**

In the present paper, terminology follows Li et al. (2011). Dry specimens were used for the description and illustration. External morphology was observed under a stereoscopic microscope and characters were measured with an ocular micrometer. Measurements are given in millimeters; body length is measured from the apex of the head to the apex of the forewing in repose. The genital segments of the examined specimens were macerated in 10% KOH, washed in water and transferred to glycerine. Illustrations of the specimens were made with a Leica MZ 12.5 stereomicroscope. Photographs of the types were taken with a Leica D-lux 3 digital camera. The digital images were then imported into Adobe Photoshop 8.0 for labeling and plate composition. The type specimens and material examined are deposited in the Institute of Entomology, Guizhou University, Guiyang, China (IEGU).

**Taxonomy**

*Abrus* Dai & Zhang, 2002

http://species-id.net/wiki/Abrus

*Abrus* Dai & Zhang, 2002: 304; Dai and Zhang 2008: 38; Li et al. 2011: 16.

**Type species.** *Abrus hengshanensis* Dai & Zhang, 2002, by original designation.

**Diagnosis.** For the diagnosis and relationships of *Abrus* see Dai and Zhang (2008: 38) and Zahniser (2007–present).

**Distribution.** China (Gansu, Hunan, Fujian, Guizhou, Guangxi and Guangdong).

**World checklist of species of *Abrus* Dai & Zhang**

*Abrus bifurcatus*: Dai and Zhang 2002; China (Guangdong).

*Abrus biprocessus*: Li et al. 2011, Li and Wang 2006; China (Guizhou).

*Abrus breviolus*: Dai and Zhang 2008; China (Zhejiang).

*Abrus brevis*: Dai and Zhang 2002; China (Guangxi).

*Abrus concavelus*: Li and Wang 2006; China (Fujian).
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**Abrus coneus**: Dai and Zhang 2002; China (Gansu, Guizhou and Hubei).

**Abrus graciaedeagus**: Li et al. 2011; China (Guangxi).

**Abrus hengshanensis**: Dai and Zhang 2002; China (Hunan).

**Abrus huangi**: Dai and Zhang 2002; China (Guangxi).

**Abrus leigongshanensis**: Li and Wang 2006; China (Guizhou).

**Abrus langshanensis** sp. n.; China (Hunan).

**Abrus wuyiensis**: Dai and Zhang 2002; China (Fujian, Sichuan and Zhejiang).

**Abrus xishuiensis** sp. n.; China (Guizhou).

### Key to species of the genus *Abras* (male)

(Modified from Dai and Zhang 2008)

| Step | Description | Species |
|------|-------------|---------|
| 1    | Basal projection of aedeagal shaft shorter than half length of shaft, reduced or absent (Fig. 23) | ... |
|      | Basal projection of aedeagal shaft equal to or longer than half length of shaft (Fig. 11) | ... |
| 2    | Subgenital plate short, with posterior margin truncate | *A. breviolus* |
|      | Subgenital plate moderately long, with posterior margin rounded (Fig. 19) | *A. langshanensis* sp. n. |
| 3    | Aedeagal shaft about half length of basal projection, apical appendages extended posterad | *A. brevis* |
|      | Aedeagal shaft as long as or longer than basal projection, apical appendages extended basolaterad (Figs 11, 12) | ... |
| 4    | Pygofer with one long process at each posterodorsal margin | *A. wuyiensis* |
|      | Pygofer without processes at posterodorsal margin (Fig. 6) | ... |
| 5    | Pygofer with one pair of processes at each posteroventral margin | *A. biprocessus* |
|      | Pygofer with one process or without processes at each posteroventral margin | ... |
| 6    | Apical appendages of aedeagus branched at apex (Figs 11, 12) | ... |
|      | Apical appendages of aedeagus not branched at apex | ... |
| 7    | Apical appendages of aedeagus with small process at base | ... |
|      | Apical appendages of aedeagus without process at base (Figs 11, 12) | ... |
| 8    | Pygofer with long process at posteroventral corner; basal projection of aedeagus short, about half length of shaft | *A. xishuiensis* sp. n. |
|      | Pygofer without long process at posteroventral corner, basal projection of aedeagus as long as shaft | ... |
| 9    | Basal projection of aedeagus with pair of triangular appendages laterally at midlength, aedeagal shaft without ventral flange at apex | *A. bifurcatus* |
|      | Basal projection of aedeagus without appendage laterally at midlength, aedeagal shaft with ventral triangular flange at apex | ... |
| 10   | Pygofer without process at ventral margin | ... |
Pygofer with process at ventral margin

11 Apical appendages of aedeagus directed dorsally, basal projection of aedeagus without lateral appendages in ventral view ........................................... A. leigongshanensis

Apical appendages of aedeagus directed lateroventrally, basal projection of aedeagus with lateral appendages in ventral view .................. A. graciaedeagus

12 Pygofer with process at caudoventral margin; basal projection of aedeagus dentate along ventral margin and with lateral appendages directed ventrally. ......................................................... A. huangi

Pygofer with digitate process in the middle of ventral margin; basal projection of aedeagus with a long process subapically and lateral appendages directed dorsally ......................................................... A. hengshanensis

Abrus xishuiensis sp. n.
urn:lsid:zoobank.org:act:236C1818-2ED6-4197-953E-F64BE108CEF1
http://species-id.net/wiki/Abrus_xishuiensis
Figs 1–12

Type material. Holotype: ♂, China: Guizhou, Xishui, Changqiangou (106°12’N, 28°19’E), 700m, on bamboo, 29 Sep. 2000, X.-S. Chen; paratypes: 3 ♂♂, 3 ♀♀, same data as holotype.

Etymology. The species is named after the type locality, Xishui, Guizhou Province in China.

Measurement. Body length including forewing male 9.02–9.25 mm (N = 4), female 9.35–9.90 mm (N = 3); forewing length male 7.62–8.10 mm (N = 4), female 8.00–8.40 mm (N = 6).

Coloration. Orange to yellowish brown (Figs 1–5). Crown with two pairs of similar blackish brown spots on anterior margin, along suture pale reddish orange. Eyes blackish brown, anterior angle pale reddish brown. Pronotum with pair blackish brown spots on anterior part, with short pale reddish orange stripe centrally. Scutellum with reddish orange marking centrally, transverse suture pale reddish orange. Inner and central antapical cells at apex, third and fourth apical cells at base each with a dark brown spot.

Head and thorax. Crown length 0.7× medial width between eyes. Pronotum length 1.93× medial length of crown. Scutellum length 0.93× medial length of pronotum. Forewing length 3.87× medial width at widest part.

Male genitalia. Pygofer (Fig. 6) trapeziform in shape, with macrosetae along posterior margin and midventrally; posterior margin truncate; posteroventral process broad at base, acute apically, slightly curved dorsad, directed posterodorsad; membranous process at inner apex, slightly curved ventrally, broad at base, acute apically, apex acute. Genital valve (Fig. 7) broad triangular, posterior margin rounded, basal width 2.02× median length. Subgenital plate (Fig. 8) broad and short; outer margin rounded; with many macrosetae on lateral region. Style (Fig. 9) long; broad at base;
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Figures 1–12. *Abrus xishuiensis* sp. n. 1 Male habitus, dorsal view 2 Same, lateral view 3 Head and thorax, dorsal view 4 Same, lateral view 5 Face 6 Pygofer, lateral view 7 Valve 8 Subgenital plate 9 Style 10 Connective 11 Aedeagus, lateral view 12 Same, posteroventral view.
narrow at middle; apex slightly widening; apical margin rounded. Connective (Fig. 10) Y-shaped, shaft robust, arms well developed, shaft length 0.65× length of arm. Aedeagus (Figs 11, 12) with developed basal projection dorsally, about 2/3 length of aedeagal shaft; apex branched in dorsal view; dorsal margin with a stout tooth subapically, grooved at apical third; aedeagal shaft in profile (Fig. 11) slightly curved dorsad, slender, long, tapering apically; dorsal margin of apex with pair small processes, beak-like, directed dorsally; shaft with pair of lateral appendages subapically, each with apex branched. Phalottreme apical on ventral surface.

**Host plant.** Bamboo (*Chimonobambusa angustifolia* C. D. Chu & C. S. Chao).

**Distribution.** Southwest China (Guizhou).

**Remarks.** This species resembles *A. biprocessus* Li, 2011 in appearance, but can be distinguished by body size ♂ 9.02–9.25 mm, ♂ 9.35–9.90 mm (♂ 8.1 mm, ♀ 8.2 mm in *biprocessus*); pygofer with one process at posteroventral corner (with two processes in *biprocessus*); basal projection of aedeagus with apical appendages stout and short (slender and long in *biprocessus*); subapical appendages of aedeagal shaft branched at apex, without a small branch basally (not branched at apex, with a small branch at basal third in *biprocessus*).

**Abrus langshanensis** sp. n.

urn:lsid:zoobank.org:act:EDFF6A6F-7337-4AAE-915F-FB2631FDE451
http://species-id.net/wiki/Abrus_langshanensis
Figs 13–27

**Type material.** Holotype: ♂, China: Hunan, Xinning, Langshan (110°49’E, 26°22’N), on bamboo, *Indocalamus* sp., 6 Oct. 2010, X.-S. Chen and L. Yang; paratypes 1 ♂, 1 ♀, data same as holotype; paratype 1 ♂, Hunan, Xinning, Langshan, on bamboo, *Indocalamus* sp., 2 Oct. 2011, X.-S. Chen and L. Yang.

**Etymology.** This species is named after the type locality, Langshan, Xinning, Hunan Province in China.

**Measurement.** Body length including forewing male 9.10–9.60 mm (N = 3), female 9.55 mm (N = 1); forewing length male 7.70–8.10 mm (N = 3), female 7.85 mm (N = 1).

**Coloration.** General color pale yellowish orange (Figs 13–17). Crown with two pairs of similar blackish brown spots on anterior margin. Eyes blackish brown, ocelli pale yellowish white. Face pale yellowish white. Inner and central anteapical cells at apex, third and fourth apical cells at base each with a dark brown spot.

**Head and thorax.** Crown medial length 0.58× width between eyes. Pronotum length 2.03× medial length of crown. Scutellum length 0.87× medial length of pronotum. Forewing length 4.00× medial width at widest part.

**Male genitalia.** Pygofer in lateral view (Fig. 18) narrower posteriorly; covered with macrosetae posteriorly, with several basoventrally dorsad of ventral margin; dorsal margin sinuate; ventral margin concave medially; with a small papillae posteriorly. Genital valve (Fig. 19) broad triangular; posterior margin slightly acute and rounded;
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Figures 13–23. *Abrus langshanensis* sp. n. 13 Male habitus, dorsal view 14 Same, lateral view 15 Head and thorax, dorsal view 16 Same, lateral view 17 Face 18 Pygofer, lateral view 19 Valve and subgenital plate 20 Style 21 Connective 22 Aedeagus, posteroventral view 23 Same, lateral view.
basal width 1.95× medial length. Subgenital plate (Fig. 19) broad and short; outer margin roundedly curved; with many macrosetae on lateral region. Style (Fig. 20) long; broad at base; narrowing apically; apex slightly recurved; apical margin acute and rounded. Connective (Fig. 21) Y-shaped; stem robust; arms well developed; length of stem 0.44× that of arm. Aedeagus (Figs 22, 23) without basal projection dorsally; aedeag al shaft in lateral view (Fig. 23) almost S-shaped; apex produced into a robust hook-like process. Phallotrem e apical on ventral surface.
Host plant. Bamboo (*Indocalamus* sp.).

Distribution. South China (Hunan).

Remarks. This new species is similar to *A. breviolus* Dai & Zhang, 2008 in aedeagus having reduced or small basal projection dorsally, but can be distinguished by posterior margin of male pygofer without process (with stout process dorsally in *breviolus*); apical margin of subgenital plate rounded (truncate in *breviolus*); aedeagal shaft with apex hook-like, without pair of subapical appendages (with pair of subapical appendages laterally in *breviolus*).

Acknowledgements

We are grateful to Dr. Ji-Chun Xing (Institute of Entomology, Guizhou University, China) for preparing figures of *A. langshanensis*. We also thank Dr. Guang-Qian Gou (College of Life Science, Guizhou University, China) for identifying bamboo species. This research was supported by the National Natural Science Foundation of China (No. 30560020, 31160163, 31260178), China Postdoctoral Science Foundation (No. 2005037111), and the International Science and Technology Cooperation Program of Guizhou (20107005).

References

Dai W, Zhang YL (2002) A new genus and six new species of Deltocephalinae from China (Hemiptera: Cicadellidae). Acta Zootaxonomica Sinica, 27: 313–322. [In Chinese with English summary]

Dai W, Zhang YL (2008) A review of the genus *Abrus* Dai & Zhang (Hemiptera: Cicadellidae, Deltocephalinae) from China with description of one new species. Zootaxa, 1688: 37–53.

Li ZZ, Dai RH, Xing JC (2011) Deltocephalinae from China (Hemiptera: Cicadellidae). Beijing: Popular Science Press. [In Chinese with English summary]

Li ZZ, Wang LM (2006) Descriptions of two new species of the genus *Abrus* from China (Hemiptera, Cicadellidae). Acta Zootaxonomica Sinica, 31: 840–842. [In Chinese with English summary]

Zahniser JN (2007–present) An Interactive Key to Tribes of Deltocephalinae. Available from: http://imperialis.inhs.illinois.edu/zahniser/taxahelp.asp?hc=89&key=Delt&lng=En [accessed June 12, 2013].