TWO NEW SPECIES OF CARISTIANUS
(HEMIPTERA: FULGOROIDEA: ACHILIDAE) FROM MAOLAN NATIONAL NATURE RESERVE IN GUIZHOU, CHINA

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ABSTRACT

Two new species of Caristianus Distant (Hemiptera: Fulgoroidae: Achilidae), C. maolanensis Chen and Li sp. nov. and C. liaoi Chen and Tsai sp. nov., are described from specimens collected in Maolan National Nature Reserve in Guizhou Province, China. Male genitalia of the new species are illustrated and a dorsal habitus is provided for the male of C. maolanensis. A key for identifying the species of Caristianus is included.

Key Words: Caristianus, new species, Achilidae, Hemiptera, Southwest China

RESUMEN

Se describen dos nuevas especies de Caristianus Distant (Hemiptera: Fulgoroidae: Achilidae), C. maolanensis Chen y Li sp. nov. y C. liaoi Chen y Tsai sp. nov., de especímenes recolectados en la Reserva Natural Nacional de Maolan en la Provincia de Guizhou, China. Las genitales de los machos de estas especies nuevas son ilustradas y se provee una ilustración del hábitus dorsal del macho de C. maolanensis. Se incluye una clave para identificar las especies del género Caristianus.

The genus Caristianus was established by Distant (1916) based on specimens of C. indicus Distant from Ceylon. Ten species, including 1 variety, were formerly recorded in the world, mainly in the Oriental region and the Palearctic region (China, Borneo, Ceylon, India, Philippines, Sarawak, Kalimantan, Afghanistan and Japan) (Distant 1916; Fennah 1949, 1950, 1956, 1965; Ishihara 1954; Dlabola 1957; Chou et al. 1985, 1994; Chen & Lin 2001).

To date, the majority of species in the genus, with the exception of C. japonicus Ishihara (Japan: Shikoku) and C. cardinalis Fennah (Philippines: Luzon), are described from specimens collected in China, namely C. indicus Distant (Jiangxi), C. ulyses Fennah (Sichuan, Yunnan), C. fopingensis Chou et al. (Shaanxi), C. ziyangensis Chou et al. (Shaanxi, Yunnan), C. asymmetrics Chou et al. (Yunnan), C. symmetricus Chou et al. (Yunnan), C. nigripectus Chou et al. (Jilin) (Fennah 1956; Chou et al. 1985, 1994; Chen & Lin 2001).

During the course of studying biodiversity in Maolan National Nature Reserve in Guizhou Province, southwest China, two fulgorid specimens belonging to the unknown species of the genus Caristianus Distant were found. The purpose of this paper is to describe two new species and to provide an identification key to the species of Caristianus.

MATERIALS AND METHODS

Morphological techniques and terminology follows Fennah (1950) and Chou et al. (1994). Specimens examined are deposited in the Insect Collection at the Institute of Entomology, Guizhou University, Guiyang, Guizhou Province, China (IEGU).

DESCRIPTIVE TAXONOMY

Caristianus Distant

Caristianus Distant, 1916, 6: 63. Type species: C. indicus Distant, 1916, by original designation.

Caristianus Distant: Fennah, 1950, Bull. Brit. Mus. (N.H.) Ent., 1:103.

Caristianus Distant: Chou et al., 1994, Entomotaxonomy, 16(1): 38.

The distinctive characters used by Fennah (1950) and Chou et al. (1994) are modified as follows:

Head with eyes distinctly narrower than pronotum. Vertex slightly declivous, longer in
middle than broad across base (1.2-1.9:1), produced before eyes for about half of their length; median carina present, obsolete distally; disk strongly depressed; anterior margin carinate, strongly convex; lateral margins carinate, straight, diverging basad; posterior margin transverse. Frons moderately convex in profile, longer in middle line than broad (1.3-1.9:1), widest part about three times as wide as base; basal margin convex-truncate; median carina distinct, percurrent; lateral margins carinate, sinuately diverging to level of antennae then gradually incurved to suture, rather obliquely foliately; disk of frons not depressed. Clypeus more than half as long as frons, medially and laterally carinate. Rostrum with subapical segment shorter than apical. Antennae subglobose, not sunk in a depression. Ocelli touching eyes. Eyes distinctly excavate beneath, only slightly overlapping pronotum.

Pronotum moderately short, about as long behind eyes as in middle line; anterior margin of disk truncate, posterior margin angulately excavate; median carina present; lateral carinae of disk straight, diverging basad, attaining hind margin, each not quite as long as median carina; two incomplete carinae between eye and tegula; pronotum lateral of disk slightly inclined anteroventrally; ventral margin of lateral lobes slightly oblique. Mesonotum longer than vertex and pronotum together; tricarinate, lateral carinae straight, weakly divergent. Tegulae not carinate. Posttibiae with a single spine basad of middle.

Tegmina 3 times as long as broad, costal margin slightly convex; Sc+R fork near basal quarter, based of union of claval veins; M forked level with node; Cu1 fork based of apex of clavus and distad of union of claval veins; 7 apical areoles distad of stigma. Clavus terminating distad of middle.

**KEY TO SPECIES OF CARISTIANUS DISTANT**

1. Pronotum and mesonotum with lateral areas outside lateral carinae blackish brown or purplish brown, central areas ivory-yellow or milky white (Fig. 1; Chou et al. 1994: Fig. 1: E; Ishihara 1954: Fig. 16: 1); costal areas of tegmina with ivory-yellow longitudinal band, enlarging from base to apex (Fig. 1; Chou et al. 1994: Fig. 1: E; Distant 1916: Fig. 48) .......................................................... 2

--- Pronotum and mesonotum blackish or stramineous (Fig. 8); costal areas of tegmina without ivory-yellow longitudinal band, but with some milky white markings (Fig. 10; Ishihara 1954: Fig. 16: 4; Fennah 1965: Fig. 68) .......................................................... 10

2. Frons almost blackish brown or brown (Fig. 2; Chou et al. 1994: Fig. 1: F; Distant 1916: Fig. 48) .......................................................... 3

--- Frons blackish brown or purplish brown, except apically with yellowish white transverse band (Fig. 9; Ishihara 1954: Fig. 16: 2; Fennah 1965: Fig. 66) .......................................................... 7

3. Median carina of frons distinct, percurrent; clypeus without yellow transverse markings or only with 1 small yellow or milky white markings at apical-lateral angle .......................................................... 4

--- Median carina of frons only basal ¼ distinct; clypeus with 1 grayish white transverse marking basally (Chou et al. 1994: Fig. 1: F) .......................................................... C. fopingensis

4. Sc+R of tegmina fork near base; costal areas with ivory-yellow longitudinal band from near base to near apex, long and broad (Fig. 1) .......................................................... 5

--- Sc+R of tegmina fork at middle; costal areas with ivory-yellow longitudinal band from near middle to near apex, short and narrow, and with 1 small ivory-yellow triangular marking before this band .......................................................... C. asymmetries

5. The apical cells of tegmina banded with grayish white color (Distant 1916: Fig. 48) .......................................................... C. indicus

--- The apical cells of tegmina banded with red color .......................................................... 6

6. Clypeus with apex ivory-yellow (Fig. 2); tegmina with 1 small blackish brown marking near apex of Sc1 (Fig. 1); body smaller (length including tegmina 3.8 mm) .......................................................... C. maolanensis

--- Clypeus purplish brown (Chou et al. 1994: Fig. 6: F); tegmina without blackish brown marking near apex of Sc1 (Chou et al. 1994: Fig. 6: A); body larger (length including tegmina 6.9 mm) .......................................................... C. jilinensis

7. The yellowish white transverse band of frons broad (more than ½ of frons); styles of aedeagus symmetrical .......................................................... 8

--- The yellowish white transverse band of frons narrow (only 1/5 of frons); styles of aedeagus asymmetrical (Chou et al. 1994: Fig. 4: A, B) .......................................................... C. symmetries

8. Frons with apical ⅓ yellowish white (Ishihara 1954: Fig. 16: 2); Sc+R of tegmina fork near basal 2/5, costal areas with 1 small triangular marking before ivory-yellow longitudinal band (Ishihara 1954: Fig. 16: 4); body dark brown .......................................................... C. japonicus
9. Styles of aedeagus with 1 larger tooth near apex; aedeagus with 5 or 6 teeth on each side
   (Chou et al. 1994: Fig. 2: A) ................................................. C. ziyangensis

—Styles of aedeagus and aedeagus without teeth (Fennah 1956: Fig. 15: K) .................. C. ulysses

10. Vertex longer in middle than broad at about 1.9:1 (Fennah 1965: Fig. 65); tegmina with 4 short
longitudinal fuscous-piceous stripes at apical margin (Fennah 1965: Fig. 68); body of male light
yellowish brown, of female scarlet ........................................ C. cardinalis

—Vertex longer in middle than broad at about 1.25-1.4:1 (Fig. 8); tegmina without short longitudinal
fuscous-piceous stripes at apical margin (Fig. 10); body blackish brown. .................. 11

11. Frons purplish black; costal areas of tegmina with 3 small white markings; apex of aedeagus
with 1 slender process on each side, directed laterad; styles of aedeagus as long as aedeagus,
with apices crossing each other (Chou et al. 1994: Fig. 5: A) .......................... C. nigripexus

—Frons with apical half milky white (Fig. 9); costal areas of tegmina with 1 large and 1 small marking,
ivory-yellow (Fig. 10); aedeagus with subapically 2 processes, directed basad; styles of aedeagus
shorter obviously than aedeagus, with apices diverging (Figs. 14-16) ...................... C. liaoi

Caristianus maolanensis Chen et Li sp. nov.
(Figs. 1-7)

Description. Body length (from apex of vertex to tip of abdomen): male 2.4 mm; including tegmen:
male 3.8 mm; tegmen length: male 3.1 mm. Vertex subrectangular (Fig. 1), longer in middle
than broad across base (1.3:1). Frons narrow triangular (Fig. 1), longer in middle
than broad (1.7:1), median carina with apical 4/5 distinct (Fig. 2). Rostrum long, surpassing trochanter of median leg. Mesonotum longer than vertex and pronotum together (1.6:1). Sc+R of tegmina fork near basal
½. Post-tarsomeres with segment I longer than II and III together (1.3:1).

Anal segment of male broad at base and narrow at apex, distal margin convex, notched at middle. Pygofer with each lateral margin produced near middle in 1 twisted digitate process, with 1 small tooth on its outer side (Figs. 3 and 4). Medioventral process deeply bifid, each limb long spine-like, diverging distally, with 1-2 small teeth on each outer side near basal ½ (Fig. 4). Aedeagus swelling at apex, lateral margin sinuate, with 7-8 small teeth on each side. In ventral view, aedeagus with 2 strong processes produced from apex, directed ventrocephalad. Styles of aedeagus symmetrical, as long as aedeagus, diverging at middle and closing to each other distally (Figs. 6 and 7). Genital styles moderately expanding distad, sinuate on ventral and dorsal margin, with 2 simple teeth near middle and apex of dorsal margin, one slender, sinuate process originating from ventral margin and directed dorsal (Fig. 5).

Vertex yellowish brown, except for two stripes laterally, and 1 stripe on each side of median carina distally brown. Frons blackish brown, except for apical angle milky white and 5 spots on lateral margin yellowish brown. Eyes blackish brown, ocelli yellowish brown, marginally tinted with red. Antenna blackish brown. Clypeus blackish brown, except for apex ivory-yellow. Rostrum yellow, but apex blackish brown. Pronotum and mesonotum blackish brown, except for lateral carinae and areas between them yellowish brown. Tegmina infuscate, middle of costal area with 1 milky white longitudinal band, in which 1 small brown spot near Sc; posterior margin of clavus milky white, inside of second claval vein with 5 small milky white spots; with veins in this area concolorous, except those veins of apical half of tegmina red. Wings slightly tinged light brown, with veins dark brown. Legs ivory-yellow. Abdomen blackish brown.

Etymology. This new species is named after the type locality, Maolan National Nature Reserve in Guizhou Province.

Distribution. Southwest China (Guizhou).

Specimens examined. Holotype male, CHINA: Guizhou, Maolan National Nature Reserve (25°40’N, 108°05’E), 600 m, 24-X-1998 (X.-S. Chen) (IEGU).

Remarks. This new species is similar to C. asymmetries Chou et al., but differs from the latter in: smaller body; tegmina with Sc+R fork near basal ½; veins of apical half red; apical half aedeagus symmetry; genital styles with slender process near base.

Caristianus liaoi Chen et Tsai sp. nov.
(Figs. 8-16)

Description. Body length (from apex of vertex to tip of abdomen): male 2.2 mm, female 2.8 mm;
including tegmen: male 3.7 mm, female 4.7 mm; tegmen length: male 3.0 mm, female 3.9 mm.

Vertex triangular, longer in middle than broad across base (1.4:1), with median carina, posterior
margin slightly sinuate (Fig. 8). Frons broad triangle, longer in middle line than broad (1.3:1),
median carina with apical ⅓ distinct (Fig. 9). Ros- 
trum long, surpassing trochanter of median leg. 
Mesonotum longer than vertex and pronotum to- 
gether (1.5:1). Sc+R of tegmina forking near basal 
2/5. Post-tarsomeres with I segment longer than 
II and III together (1.2:1).

Anal segment of male broad at base and nar- 
row at apex, distal margin concave roundly. Py- 
gofer with each lateral margin produced near 
middle into tooth (Figs. 11). Medioventral process 
deeply bifid, each limb broad at base, acuate at 
apex, diverging distally (Fig. 12). Aedeagus swell- 
ing at apex, lateral margin slick, anterior margin 
with groove. In ventral view, aedeagus with 2 
strong processes produced from subapical mar- 
gin, directed ventrocephalad. Styles of aedeagus 
symmetrical, shorter than aedeagus, diverging 
distally (Figs. 14-16). Genital styles moderately 
expanding distad, sinuate on ventral margin, 
with 2 large cone-shaped teeth near apex of dor- 
sal margin (Fig. 13).

Vertex yellowish brown, except for 2 stripes 
laterally, and a stripe on each side of median car- 
ina distally brown (Fig. 8). Frons with basal half 
blackish brown, apical half milky white and 5 
spots on lateral margin yellowish brown. Eyes 
reddish brown, ocelli yellowish brown. Antenna 
blackish brown. Clypeus blackish brown, except 
for basal margin ivory-yellow and apex yellowish 
brown. Rostrum yellowish brown, but apex black- 
ish brown. Pronotum and mesonotum blackish 
brown, except for lateral carinae of pronotum yel- 
lowish brown (Fig. 8). Tegmina infuscate, middle 
of costal area with 1 large milky yellow marking 
and 1 small milky yellow marking; posterior mar- 
gin of clavus yellowish brown, inside of second 
claval vein with 3 milky white spots; with veins in 
this area concolorous (Fig. 10). Wings slightly 
tinged light brown, with veins dark brown. Legs 
yellowish brown. Abdomen blackish brown.

Etymology. This new species is named in honor 
of Ms. Q.-R. Liao, collector of the type specimens.

Distribution. Southwest China (Guizhou).

Specimens examined. Holotype male, CHINA: 
Guizhou, Maolan National Nature Reserve 
(25°40'N, 108°05'E), 600 m, 25-X-1998 (Q.-R. 
Liao) (IEGU). Paratype 3 females, same data as 
holotype.
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Remarks. This species is similar to C. cardina-lis Fennah, but differs from the latter in: vertex shorter (longer in middle than broad across base about 1.4×, not 1.9×); on tegmina, the base of costal cell without ivory yellow spots and the apical cells without short longitudinal fuscous-piceous stripes; pygofer with each lateral margin produced near middle in a tooth, not long process; medioventral process deeply bifid; aedeagus with two strong processes produced from subapical margin, directed ventrocephalad.

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REFERENCES CITED

CHEN, D.-H., AND Y.-J. LIN. 2001. Caristianus indicus Distant: a new record to China. Jiangxi Plant Protection 24(4): 116.

CHOU I., J.-S. LU, J. HUANG, AND S.-Z. WANG. 1985. Economic Insect Fauna of China, Fasc. 36, Homoptera Fulgoroidea. Science Press, Beijing, China. 152 pp.

CHOU I., F. YUAN, AND Y.-L. WANG. 1994. Descriptions of the Chinese species of the genus Caristianus Distant (Homoptera: Achilidae). Entomotaxonomia 16(1): 38-50.

DISTANT, W. L. 1916. Rhynchota. Homoptera: Appendix. The Fauna of British India, including Ceylon and Burma 6: 1-248.

DLABOLA, J. 1957. Die Zikaden Afghanistans (Homopt-Auchenorrhyncha) nach den Ergebnissen der von Herrn J. Klapperich in den Jahren 1952-1953 nach Afghanistan unternommenen Expedition. Mitt. Munch Ent. Ges., Munich 47: 265-303.

FENNAH, R. G. 1949. New exotic Fulgoroidea. Annals of Natural History, or Magazine of Zoology, Botany and Geology 2(12): 585-606.

FENNAH, R. G. 1950. A generic revision of Achilidae (Homoptera: Fulgoroidea) with descriptions of new species. Bull. Brit. Mus. (Nat. Hist.) Ent. 1(1): 1-169.

FENNAH, R. G. 1956. Fulgoroidea from Southern China. Proc. California Acad. Sci., Ser. 4 28(13): 441-527.

FENNAH, R. G. 1965. New Achilidae (Homoptera: Fulgoroidea) from Central America, South Africa and South East Asia. Zool. Beitr., Berlin (N.S.) 11: 77-102.

ISHIHARA, T. 1954. Homoptera notes. Sci. Rep. Matsu-yama Agric. College 14: 1-27.

Figs. 8-16. Caristianus liaoi Chen et Tsai sp. nov. 8. head and thorax, dorsal view; 9. frons and clypeus; 10. tegmen; 11. pygofer and anal segment, left side; 12. medioventral process of pygofer; 13. right genital style, lateral view; 14. aedeagus, ventral view; 15. aedeagus, dorsal view; 16. aedeagus, lateral view. Scale bars = 0.5 mm (Figs. 8-9); 1 mm (Fig. 10); 0.2 mm (Figs. 11-16).