

**TWO NEW SPECIES OF *CIXIUS* FROM CALIFORNIA  
(HOMOPTERA : FULGOROIDEA : CIXIIDAE), WITH  
A REVISED KEY TO THE SPECIES  
OF THE GENUS**

SHUN-CHERN TSAUR

*Institute of Zoology, Academia Sinica,  
Nankang, Taipei, Taiwan 11529  
Republic of China*

(Accepted September 6, 1989)

**Shun-Chern Tsaaur** (1990) Two new species of *Cixius* from California (Homoptera : Fulgoroidea : Cixiidae), with a revised key to the species of the genus. *Bull. Inst. Zool., Academia Sinica* 29(1): 49-55. Two new *Cixius* species from California are described. Kramer's (1981) key to *Cixius* in the United States is modified for their inclusion.

**Key words:** Cixiidae, *Cixius krameri*, *Cixius prominens*.

The planthopper genus *Cixius* in the United States had been intensively revised by Kramer in 1981. Twenty-five species were recognized distributing in the United States. This paper adds two new species which were kindly sent by Mr. Yu-Feng Hsu from California, bringing the total number of cixiid species in the United States up to 176 species belonging to 13 genera.

**MATERIALS AND METHODS**

All the materials studied were kindly sent by Mr. Yu-Feng Hsu from California. They were collected by sweeping. For each species the male genitalia have been dissected and illustrated. The dried specimen is soaked and boiled in 10% KOH for minutes till the specimen became clear, then dissected. The dissected genitalia placed on a cavity slide containing a small amount of glycerin and examined under a compound microscope.

Tegmina are mounted in micro slides with few drops of Hoyer's solution. Figures are made with drawing tube. In order to preserve the dissected materials, glycerin is used. Adult dried specimens were measured with a binocular microscope.

The materials are deposited at the Insect Museum of the Department of Plant Pathology and Entomology, National Taiwan University, Taipei, Taiwan, Republic of China. All the scale used here are in mm.

**SYSTEMATIC ACCOUNTS**

**Genus *Cixius* Latreille, 1804**

Type species: *Cicada nervosa* Linnaeus  
(Subsequent designation by Curtis).

***Cixius krameri* sp. nov.**

(Fig. 1)

*Specimens examined:* Two males and two females were used for measurement.

	Male	
	Mean	Range
Length of body:	4.32	(4.05-4.41) mm
Length of tegmen:	3.57	(3.33-3.80) mm
Width of mesonotum:	1.29	(1.24-1.33) mm

	Female	
	Mean	Range
Length of body:	4.30	(4.18-4.41) mm
Length of tegmen:	3.62	(3.52-3.71) mm
Width of mesonotum:	1.38	(1.33-1.43) mm

*Holotype*: Male, Monterey Co., California, 24-III-1989 Y. F. Hsu.

*Paratypes*: 1 ♂ and 2 ♀♀, same data as for holotype.

*Diagnosis*: *C. krameri* is closely allied to *C. vandykei* Van Duzee by the shape of aedeagal processes but can be distinguished by the shapes of genital styles and the anal segment.

General coloration black. Body slightly covered with powdery wax. Lateral carinae of vertex each with a roundly yellowish macula on basal third. Median carina of face, transverse carina between face and vertex all dull brown. Ocelli tawny. Bases of legs yellow. Tegmina of male hyaline, of female with several black markings as figured, with prominent black pustules.

Vertex 1.1 times as wide at level of basal emargination as long in middle line. Rostrum attaining hind coxae. Tegmen with 10 apical cells, sub-parallel sided on basal two-thirds. Chaetotaxy of hind tarsi 7-8/5-8.

*Male genitalia*: Pygofer roundly U-shaped in ventral view; and dorsoapical margin truncate produced caudad in lateral view, medioventral process large in ventral view, triangular; sharp triangular in lateral view. Anal segment with dorsal margin concave near base, apical projection gently curving ventrad in lateral view, and slightly asymmetrical in caudal view, apical projection widely separated,

apical margin slightly concave medially, anal style slender, with scale-like sculptures. Genital styles symmetrical and narrowed at middle in ventral view, distal lobe nearly quadrate, roundly narrowing to apex, and slightly curving dorsad to distal lobe in lateral view, roundly produced caudad at apex. Aedeagus slender, with basoventral surface indented, with a total of three spinose processes, all visible in left side orientation: the shortest one implanted on lateroapical angle acuminating, gently curving dorsad at tip; the stout one originating basad of former process, gently curving to left side at apex; the slender one inserted on right side at lateroapical angle, curving downward and across ventral margin of aedeagus at apical fourth initially then turning about 45 degrees dorsad then ventrad near apex, and hook-shaped in lateral view.

*Female genitalia*: Pygofer rounded triangularly concave basomedially in caudal view, without wax secreting plate. Anal style quadrate in dorsal view, longer than wide.

*Distribution*: United States.

*Remarks*: *krameri* is named in honor of the US Homopterist Dr. James P. Kramer.

### *Cixius prominens* sp. nov.

(Fig. 2)

	Male
Length of body:	5.13 mm
Length of tegmen:	4.28 mm
Width of mesonotum:	1.43 mm

*Holotype*: ♂, Monterey Co., California, 24-III-1989 Y. F. Hsu.

*Diagnosis*: *C. prominens* somewhat resembles *C. dislogicus* Kramer by the shape of male pygofer but can be distinguished from the rest of its American congeners by the needle-like process beside flagellum

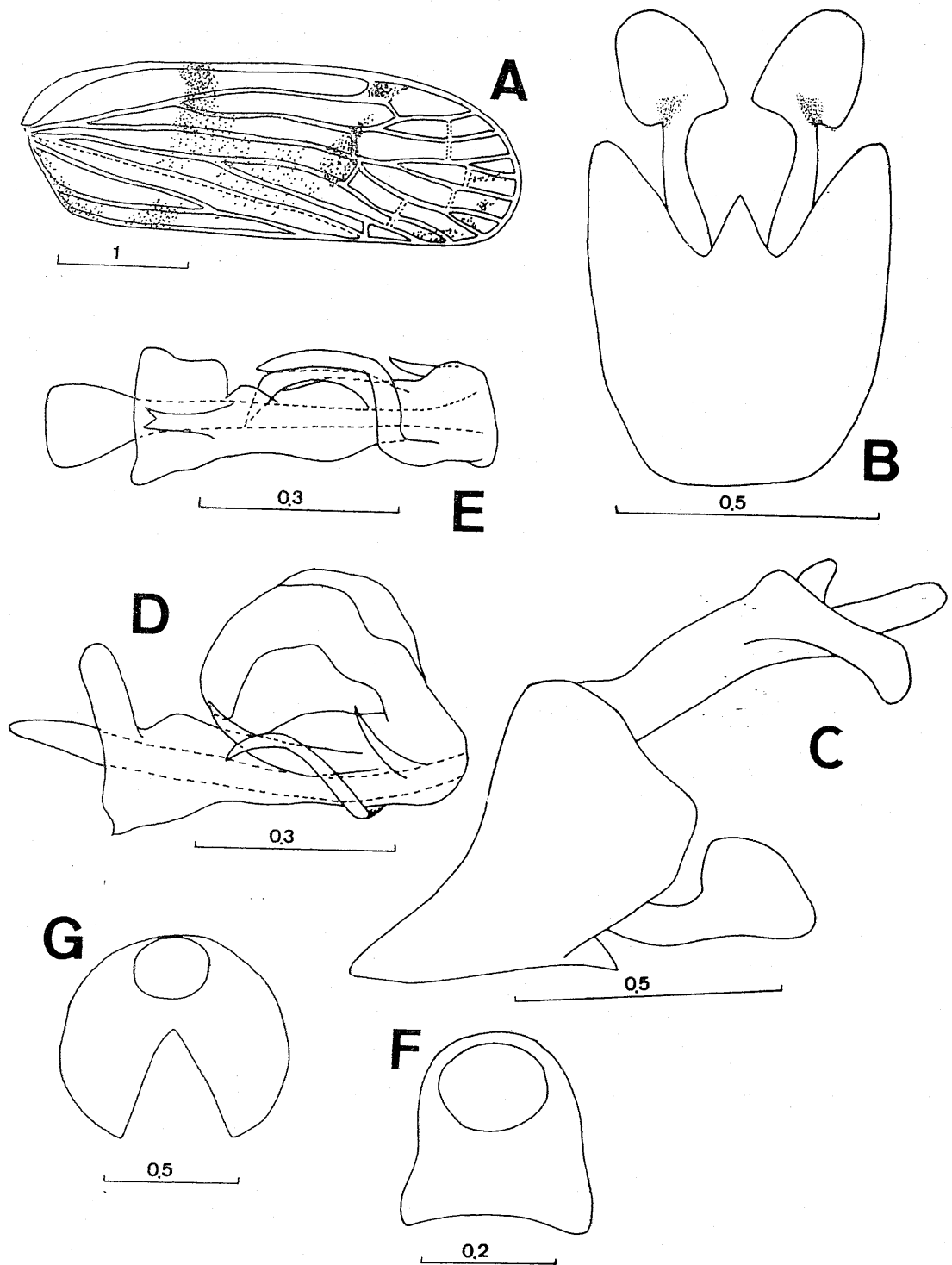


Fig. 1. *Cixius krameri* sp. nov. A, tegmen; B-C, male genitalia: B, ventral view; C, lateral view; D-E, aedeagus: D, lateral view; E, ventral view; F, male anal segment, caudal view; G, female pygofer, caudal view.

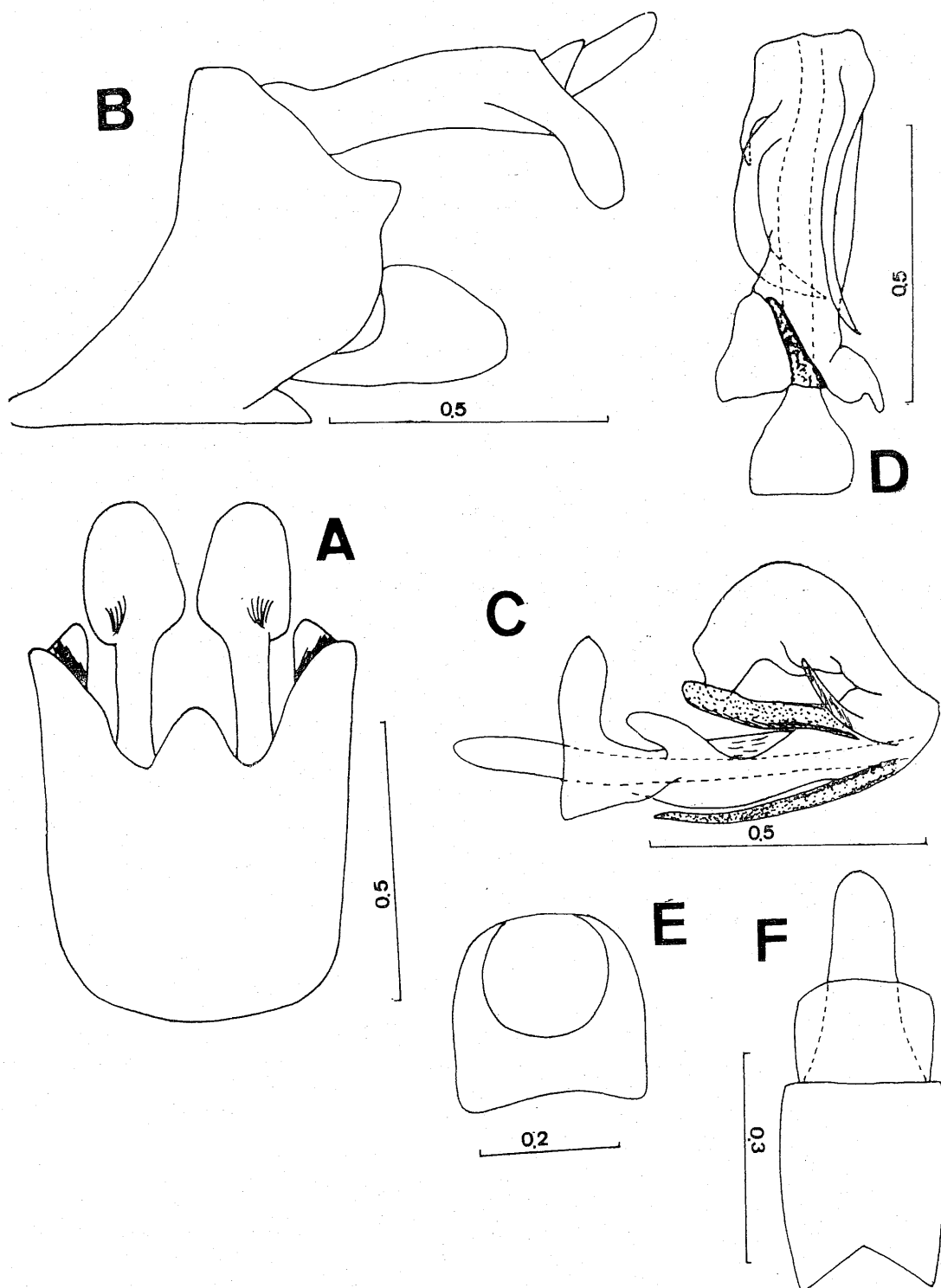


Fig. 2. *Cixius prominens* sp. nov. A-B, male genitalia: A, ventral view; B, lateral view; C-D, Aedeagus: C, lateral view; D, ventral view; E, male anal segment, caudal view; F, female anal segment, dorsal view.

and the thin and slender process of ventroapical angle.

General coloration black. Body covered with powdery wax. Lateral carinae of vertex each with a roundly yellowish macula on basal one-third. Keels of head brown. Posterior margin of pronotum yellow. Tegulae yellowish brown. Ocelli light yellow. Tegmina hyaline, with black pustules.

Vertex 1.1 times as wide at level of basal emargination as long in middle line. Rostrum attaining hind coxae. Tegmen with 10 apical cells. Chaetotaxy of hind tarsi 7/7.

*Male genitalia:* Pygofer with dorso-lateral angles curving inward in ventral view, and dorsoapical angle with a pair of thumb-shaped projections in lateral view, margin below this projection smoothly rounded, medioventral process triangular, with a rounded vertical angle in ventral view, and acutely triangular in lateral view. Anal segment with dorsal margin slightly concave near base in lateral view, apical projection rounded; apical margin slightly concave medially in caudal view. Genital styles symmetrical, parallel-sided basad of distal lobe in ventral view, distal lobe shovel-shaped, and widening to distal lobe in lateral view. Aedeagus with three processes, all visible in left-side orientation: the shortest one needle-like, originating from lateroapical angle, curving dorsad, directed dorsocephalad, the stout one implanted basad of former process, gently turning to left side, the longest one inserted on ventroapical angle, thin and slender, very slightly curving laterad at apex, basoventral surface without any projection.

Female unknown.

*Distribution:* United States.

*Remarks:* *prominens* is named because of the projection at the dorsoapical angle of pygofer in male.

**Key to the United States species of male *Cixius*, modified from Kramer, 1981**

1. Aedeagal shaft with 2 processes ....2  
Aedeagal shaft with 3 or more processes.....7
2. Apical portion of anal tube not decurved in lateral view; flagellum forked nearly symmetrically at apex.....*C. meridionalis*  
Apical portion of anal tube decurved in lateral view; flagellum unforked or asymmetrically forked at apex.....3
3. Flagellum simple; ventral margin of aedeagus with subquadrangular projection near base in lateral view ..... *C. nervosus*  
Flagellum with one or two acute processes at apex or subapex; ventral margin of aedeagus without projection as above.....4
4. Flagellum with two acute processes; processing on left side of shaft semicircularly hooked distally.....  
.....*C. nike*  
Flagellum with one acute process; processing on left side of shaft not semicircularly hooked distally.....5
5. Process on right side of aedeagus nearly as long as shaft; ventrobasal area of aedeagus not concave.....  
.....*C. caldwelli*  
Process on right side of aedeagus half or shorter length of shaft; ventrobasal area of aedeagus concave .....6
6. Apical portion of anal tube triangular; process on right side of aedeagus arising near the base of flagellum; medioventral process of pygofer broader and bluntly triangular.....*C. quebecensis*  
Apical portion of anal tube aviccephaliform; process on right side of aedeagus arising behind the base of flagellum; medioventral process of pygofer roundly produced.....  
.....*C. apicalis*

7. Aedeagal shaft with 3 processes ....8  
 Aedeagal shaft with 4 or more processes .....21
8. Anal tube with proximal portion not elongated and stalk-like or apical margin of anal tube truncated or subtruncated.....9  
 Anal tube with proximal portion elongated and stalk-like and its apical margin variably acute to rounded .....14
9. Flagellum unusually long, with sharp needle-like process near middle of outer margin .....*C. stigmatus*  
 Flagellum not unusually long, without needle-like process.....10
10. Dorsal margins of aedeagal shaft with large and prominent quadrate or subquadrate elevations in lateral view; flagellum with acute process protruding at apex .....11  
 Dorsal margins of aedeagal shaft at most slightly convex in lateral view; flagellum without acute process .....12
11. Lower process on right side of shaft subequal to or shorter than upper process; aedeagus strongly convex at basoventral margin .....*C. pini*  
 Lower process on right side of shaft about twice length than upper process; aedeagus convex or not at basoventral margin.....*C. coloepeum*
12. Veins of forewings with dark pustules .....13  
 Veins of forewings without dark pustules.....*C. praecox*
13. With only one of the aedeagal processes directed dorsally in lateral view; both right and left positioned processes tapered to acute apices and curved to the right in ventral view .....*C. cultus*  
 With two of the aedeagal processes directed dorsally in lateral view; both right and left positioned processes not as above in ventral view ..... *C. ephratus*
14. Aedeagus stout in lateral view, ventral margin indented near middle to form a pair of subequal lobes .....15  
 Aedeagus variable, ventral margin not as above.....16
15. Ventral process on right side of aedeagus about half length than other aedeagal processes; dorsal processes on right side and left side and left side of aedeagus abruptly tapered distally .....*C. prodotes*  
 Ventral process on right side of aedeagus at least as long as other aedeagal processes; dorsal processes on right and left side of aedeagus gradually tapered distally.....  
 .....*C. procrustes*
16. With one process on left side of aedeagal shaft.....17  
 With two processes on left side of aedeagal shaft.....18
17. Aedeagus with broad elevation on left dorsal margin in lateral view and irregular subquadrate elevation on right dorsal margin; ventral margin of aedeagus somewhat irregular but not strongly convex.....  
 ..... *C. angustatus*  
 Aedeagus with comparatively simple dorsal margins in lateral view, ventral margin of aedeagus strongly convex.....*C. misellus*
18. Styles bilobed apically in ventral view .....*C. knulli*  
 Styles entire apically in ventral view .....19
19. Aedeagal shaft with a curved process from right side passing through ventral margin to left side.....20  
 Aedeagal shaft without above process .....21
20. Aedeagus with longest process nearly straight (Fig. 2C), basoventral surface indented; pygofer with a pair of thumb-shaped dorsoapical projections.....*C. prominens*

- Aedeagus with longest process hook-shaped (Fig. 1D), basoventral margin not indented; dorsoapical angle of pygofer not as above....*C. krameri*
21. Apical portion of anal tube decurved in lateral view.....22  
Apical portion of anal tube not decurved in lateral view....*C. evexus*
22. Upper process on left side of shaft and inconspicuous; posterior margin of pygofer vertical.....*C. vandykei*  
Upper process on left side of shaft long and conspicuous; posterior margin of pygofer oblique.....  
.....*C. narke*
23. Aedeagal shaft with 5 processes; styles bilobed apically ...*C. chisosus*  
Aedeagal shaft with 4 processes; styles not bilobed apically.....24
24. Apical portion of anal tube stout and tapered to a slender tip in lateral view .....*C. cinctus*  
Apical portion of anal tube narrow and tapered to a slender tip in lateral view.....25
25. Apex of anal tube asymmetrically notched; ventral-most process on right side of aedeagus extended basad beyond midlength of shaft..  
.....*C. comptus*  
Apex of anal tube symmetrically notched; ventral-most process on right side of aedeagus extended barely to midline of shaft.....26
26. Posterior margin of pygofer smoothly rounded in lateral view; longest aedeagal process bowed in distal one-third.....*C. balli*  
Posterior margin of pygofer not smoothly rounded in lateral view; longest aedeagal process sharply down-turned in distal third.....  
.....*C. clitellus*

**Acknowledgements:** I would like to express my sincere gratitude to Mr. Yu-Feng Hsu, Department of Entomological Sciences, University of California, Berkeley, USA for sending the specimens, to Dr. James P. Kramer, National Museum of Natural History, Washington D.C., USA for kindly sending me his publication. I would like to extend my thanks to Prof. Fei-Jann Lin, Institute of Zoology, Academia Sinica, Taipei, Taiwan, Republic of China for his critical comments and constant encouragements. Without their most generous support this work would not have been possible.

#### REFERENCES

- Kramer, J.P. (1981) Taxonomic study of the planthopper genus *Cixius* in the United States and Mexico (Homoptera: Fulgoroidea: Cixiidae). *Trans. Amer. Ent. Soc.* **107**: 1-68.
- Tsaur, S.C. (1989) Cixiidae of Taiwan. Ph.D. dissertation, National Taiwan University, 473pp.

## 美國加州菱飛蝨科 *Cixius* 屬之兩新種

曹 順 成

美國菱飛蝨科 *Cixius* 屬昆蟲，至今共 25 種，本文補充兩種採集自加州之種類，並修正 Kramer (1981) 之檢索表。

