

A new genus and species of Cixiidae (Homoptera: Fulgoroidea) from Lower Cretaceous amber

R. G. FENNAH

*c/o CAB International Institute of Entomology, c/o British Museum
(Natural History), Cromwell Road, London SW7 5BD*

(Accepted 17 November 1986)

Mundopoides aptianus gen. et sp. nov. (Homoptera: Fulgoroidea: Cixiidae) is described on the basis of a fossil of an adult female preserved in Lebanese amber of Lower Cretaceous (Aptian) age, and is compared with modern genera.

KEYWORDS: Cixiidae, Cretaceous amber, Fossil Homoptera, new genus and species.

Introduction

Members of the family Cixiidae are regarded as the most primitive of the Fulgoroidea, and their present distribution is worldwide. The life history is comparatively uniform: the eggs are inserted into the roots of the host plant, or they are laid in a cluster in crevices in the soil near by, and the larval stages are passed through underground; the adults are macropterous, and normally feed above ground on stem tissue.

Notwithstanding their current success, the ancestry of modern genera is virtually undocumented in the fossil record. Fossil impressions of a tegmen and wing in the Lower Cretaceous Weald Clay have shown sufficient agreement with those in recent *Cixius* to justify the assignment of the fossil to this genus (Fennah, 1961), and examples of forms corresponding closely with recent Oecleinae and Oliarinae Cixiidae have been found in amber of Oligocene-Miocene age (Fennah, 1963). The cixiid species described below is of Lower Cretaceous age, and exhibits specialized characters that, in combination, are not found in recent cixiids, but occur separately in a very few genera. The clarity and extent of the structural details available for study are unmatched in any fossil cixiid of similar age and provide an acceptable basis for meaningful comparison with recent genera.

The material on which this study is based consists of a female cixiid embedded in amber, with the head and pronotum detached, the tegmina and wings open, the abdomen apparently complete, but distorted and collapsed, and the anal segment and one of the third valvulae of the ovipositor slightly detached. The anatomical details available for scrutiny are more than those described for taxonomic purposes below, but do not appear to show any features at marked variance from corresponding features in modern species of Cixiidae.

Description and diagnosis

Family CIXIIDAE

Mundopoides gen. nov.

Frons longer medially than broad at widest part; lateral margins diverging to below

level of antennae, then converging to frontoclypeal suture; disc not depressed; median carina fine, forked basally, with arms curving on to upper surface of head. Postclypeus about as long as frons, slightly inflated. Rostrum apparently attaining post-trochanters. Eye semiglobular. Antenna with second segment globose; third segment with a short spine-like sensillum apically in addition to flagellum. Vertex short, much broader than long, narrower anteriorly than at hind margin, transversely carinate apically. Pronotum short; anterior margin weakly convex between eyes, posterior margin weakly concave; median carina obsolete, lateral carinae fine and weak, closely following hind margin of eyes, not approaching posterior margin and not strongly incurved below eyes. Mesonotum about as long as broad, finely tricarinate; lateral fields strongly declivous; median disc, including mesoscutellum, twice as long as wide between bases of lateral carinae; metanotum with disc subtriangular, as long medially as broad at base, deeply rounding distally. Legs rather slender; post-tibia laterally unarmed, apically apparently with six teeth. Basal metatarsal segment with seven teeth; second segment with seven to eight teeth. Tegmen longer than broad at widest part (about 2.6:1), widest at level of apex of clavus; costal margin not sinuate, apical margin evenly rounding. Sc + R fork at basal quarter of tegmen, M fork near middle, M1 + 2 fork much basad of apical line of cross-veins, Cu₁ fork slightly basad of Sc + R fork; cross-veins R-M and M-Cu at middle of tegmen, each almost perpendicular to the veins that they unite; vein Sc 2-branched, enclosing stigma; stigma longer than broad (about 5:1), with anterior margin only slightly widened; M1 + 2 forking level with stigma, M3 + 4 simple to apex; Cu_{1a} forking just basad of distal M-Cu crossvein, Cu_{1b} simple; clavus with PCu uniting with first anal vein near middle of clavus, the common vein entering commissural margin before apex of clavus. Wing with R forking once, much distad of R-M cross-vein; M forking once, basad of level of R fork; Cu₁ forking before junction with M-Cu cross-vein, Cu_{1a} forking basad of level of M fork, Cu_{1b} simple to apex. Anal segment of female subtubular, apically truncate. Ovipositor ensiform, almost straight. Second valvifers apparently tumid.

Type-species, *Mundopoides aptianus* sp. nov., here designated.

***Mundopoides aptianus* sp. nov.**

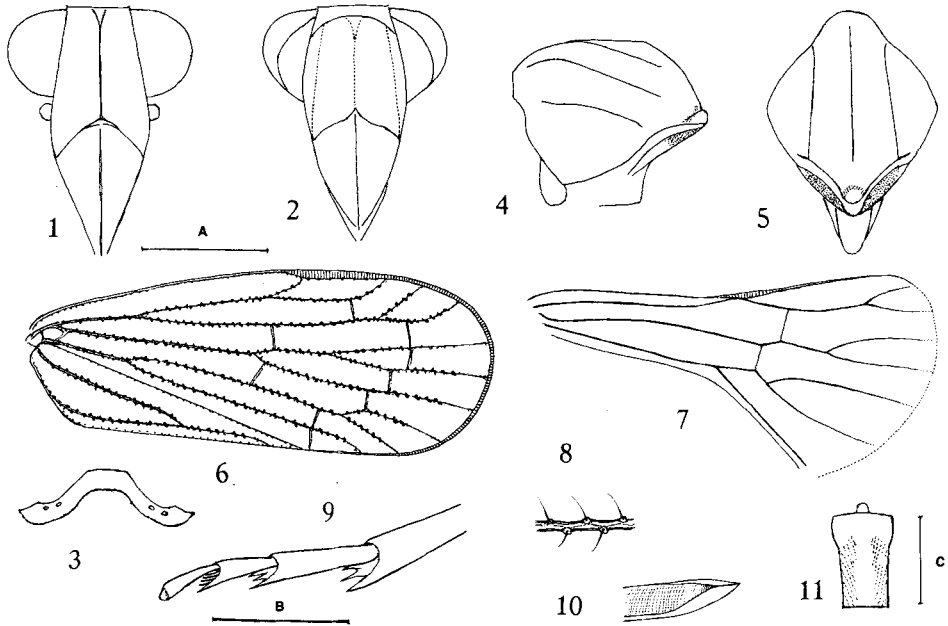
Frons longer medially than broad (1.2:1). Rostrum with apical segment longer than broad in side view (6.7:1). Mesoscutellum ecarinate, posteriorly raised in a small boss. Post-tibia longer dorsally than wide at middle (15:1). Tegmen longer than broad at widest part (2.6:1); all veins, except cross-veins, very densely setose. Anal segment of female longer than broad at middle (2:1). Ovipositor longer than broad in side view (9:1).

Tegmen hyaline, with margins and veins light-hued, possibly greyish white in life.

Female. Length (estimated) 2.8 mm; tegmen (measured) 3.7 mm.

HOLOTYPE ♀, Lebanon: in amber of Lower Cretaceous (Aptian) age (about 120 million years BP) in British Museum (Natural History).

In Muir's key to the genera of Cixiidae (1925) this fossil species runs to *Ptoleia* or *Mundopa*, depending on the attitude of the tegmina in repose. It differs from *Ptoleia* in its relatively shorter vertex, less deeply excavate hind margin of the pronotum, the evenly rounded apical margin of the tegmen, and the non-sinuate basal third of the costal margin. From *Ptoleia* and *Mundopa* it differs in the fewer branches of R and M in the tegmen, and from the latter also in the much less sinuate costal margin and less oblique M-Cu cross-vein in the wing. The exceptionally narrow costal margin at the stigma and the paucity of apical branches of M in the tegmen in combination cannot be



FIGS 1-11. *Mundopoides aptianus*. (1) Head, anterior view. (2) Head, posterior view. (3) Pronotum (freehand reconstruction of dorsal surface from twisted original). (4) Mesonotum, dorsoposterolateral view. (5) Mesonotum, dorsal view. (6) Tegmen. (7) Anterior lobe of wing. (8) Portion of tegminal vein. (9) Metatarsus and apex of post-tibia, posterodorsolateral view. (10) Apex of first and second valvulae of ovipositor, dorso-lateral view. (11) Anal segment of female, dorsal view. Scale bars: (1-7) 1.0 mm (A); (9) 0.5 mm (B); (11) 0.2 mm (C). (8, 10) Not to scale.



FIG. 12. *Mundopoides aptianus* tegmen and (upper middle) post-tarsus.

matched in any modern cixiid genus with an ampliate tegminal membrane, but the distal forking of Cu_1 in the tegmen is an occasional substitution for the normal simple condition in modern species, and is exemplified in the type specimen of *Mundopa fasciata* Distant. A median vein with only three apical branches occurs in the tegmen of the New Zealand genera *Tiriteana*, *Malpha* and *Huttia*, but this condition is associated with an abnormal width of the anterior cells, including the stigmatal cell, or with a general reduction in the relative size of the membrane. Of characters not used in Muir's key, the relative lengths of the corium and membrane of the tegmen, the relative proximity of the forks of $Sc+R$ and Cu_1 to the base, the relative lengths of the apical and subapical cells of R and M , and the exceptional density of the granulation along the tegminal veins, combined with the dentition of the post-tibia support the conclusion that *Mundopa* is a close modern relative of this fossil genus, and clearly demonstrate that in this section of the Cixiidae morphological change since Lower Cretaceous times has been very slight.

Acknowledgment

The writer's thanks are tendered to Dr P. E. S. Whalley, of the Palaeontological Section, Department of Entomology, British Museum (Natural History), for the privilege of studying this informative specimen from the material in his charge.

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