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The first maguviopseids (Hemiptera, Cicadomorpha, Prosboloidea) from the Triassic of China

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The extinct hemipteran superfamily Prosboloidea Handlirsch, 1906 comprises two ancient families (*viz.*, Prosbolidae Handlirsch, 1906 and Maguviopseidae Shcherbakov, 2011) reported from the Permian (Artinskian) to the Jurassic (Callovian) (Szwedo, 2018). The Triassic family Maguviopseidae was established by Shcherbakov (2011) with relatively high generic diversity, including eleven genera within two subfamilies: Sacvoyageinae Shcherbakov, 2011; and Maguviopseinae Shcherbakov, 2011 comprising two tribes, occurring from the Middle to Upper Triassic Madygen Formation of Madygen, Kyrgyzstan. The known maguviopseids show diversified tegminal shapes with sculptured ornamentations on surface, and some genera with highly convex costal margin are considered as an adaptative to mimicry among their hostplants (probably seeds or buds) in order to avoid predators (Shcherbakov, 2011).

Here, a new genus and species of Maguviopseidae, *Archaeomaguviopsis magicus* **gen. et sp. nov.**, is described and illustrated on the basis of a forewing specimen from the lower parts of the Middle-Upper Triassic Yanchang Formation of Hejiafang Village, Jinsuoguan Township, Tongchuan City, Shaanxi Province, North China. The new data represents the first record of Maguviopseidae from China, adding valuable information on morphological disparity of this Triassic family.

Material and methods

The holotype (NIGP179643) with part and counterpart was preserved in greenish grey shale, collected from the lower parts of the Middle-Upper Triassic Yanchang Formation (= Tongchuan Formation in previous palaeontological studies), at the lacustrine deposit near Hejiafang Village, Jinsuoguan Township, Yintai District, Tongchuan City, Shaanxi Province, China (for detailed location of fossil site, see Fu *et al.*, 2021, figure 1). The studied specimen was carefully

prepared using a sharp blade. Photographs were taken with a Zeiss AxioZoom V16 stereoscope. The line drawing was drafted with Adobe Illustrator CC 2018. The material studied here is deposited in the Nanjing Institute of Geology and Palaeontology (NIGP), Chinese Academy of Sciences (CAS), Nanjing, China. Wing venation terminology and cell nomenclature follow Shcherbakov (2011), Nel *et al.* (2012), and Bourgoïn *et al.* (2015).

Systematic palaeontology

Order Hemiptera Linnaeus, 1758

Suborder Cicadomorpha Evans, 1946

Superfamily Prosboloidea Handlirsch, 1906

Family Maguviopseidae Shcherbakov, 2011

Subfamily Maguviopseinae Shcherbakov, 2011

Tribe Maguviopseini Shcherbakov, 2011

Genus *Archaeomaguviopsis* gen. nov.

Type species. *Archaeomaguviopsis magicus* **sp. nov.**; by present designation and monotypy.

Etymology. The generic name derives from a combination of the Greek word *archaios* (meaning ‘ancient’), and *Maguviopsis*, the type genus of Maguviopseinae. Gender: masculine.

Diagnosis. Tegmen broad, covered evenly with large areolae; truncate apically without emargination, apparently produced posterodistally, nearly at medial area; costal margin smooth, weakly convex distally; commissural margin highly cristate; basal cell absent; postcostal cell narrow; hyposubcostal carina (= basal section of ScP) strongly convex; stems ScP+R and ScP+RA subparallel to costal margin; RA unbranched; stem CuA closely subparallel to CuP at base; A₁ simple, independent of Pcu; crossvein *ir* absent, *mp-cua* distinctly basad of MP forking.

Archaeomaguviopsis magicus sp. nov.

(Figs 1–3)

Material. Holotype, NIGP179643, an isolated tegmen; deposited in the Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences, Nanjing, China.

Etymology. The specific epithet is derived from the Greek word *mageia*, meaning ‘magic’.

Diagnosis. As for the genus with additional characters: large and dense areolate ornamentations evenly distributed over tegmen surface, including marginal membrane but

apparently smaller; RP with four terminal branches; MP forked apicad of terminal CuA; MP_{1+2} with two terminal branches.

Type locality and horizon. Hejiafang Village, Jinsuoguan Township, Yintai District, Tongchuan City, Shaanxi Province, China; lower parts of the Yanchang Formation; Middle Triassic.

Description. Tegmen length 7.6 mm, broadest at apex; costal margin smoothly arched; apical margin truncate, with widely rounded anterior angle and apparently angulate posterior angle; posterior margin convex at level of termination of CuA, creating apical portion obviously

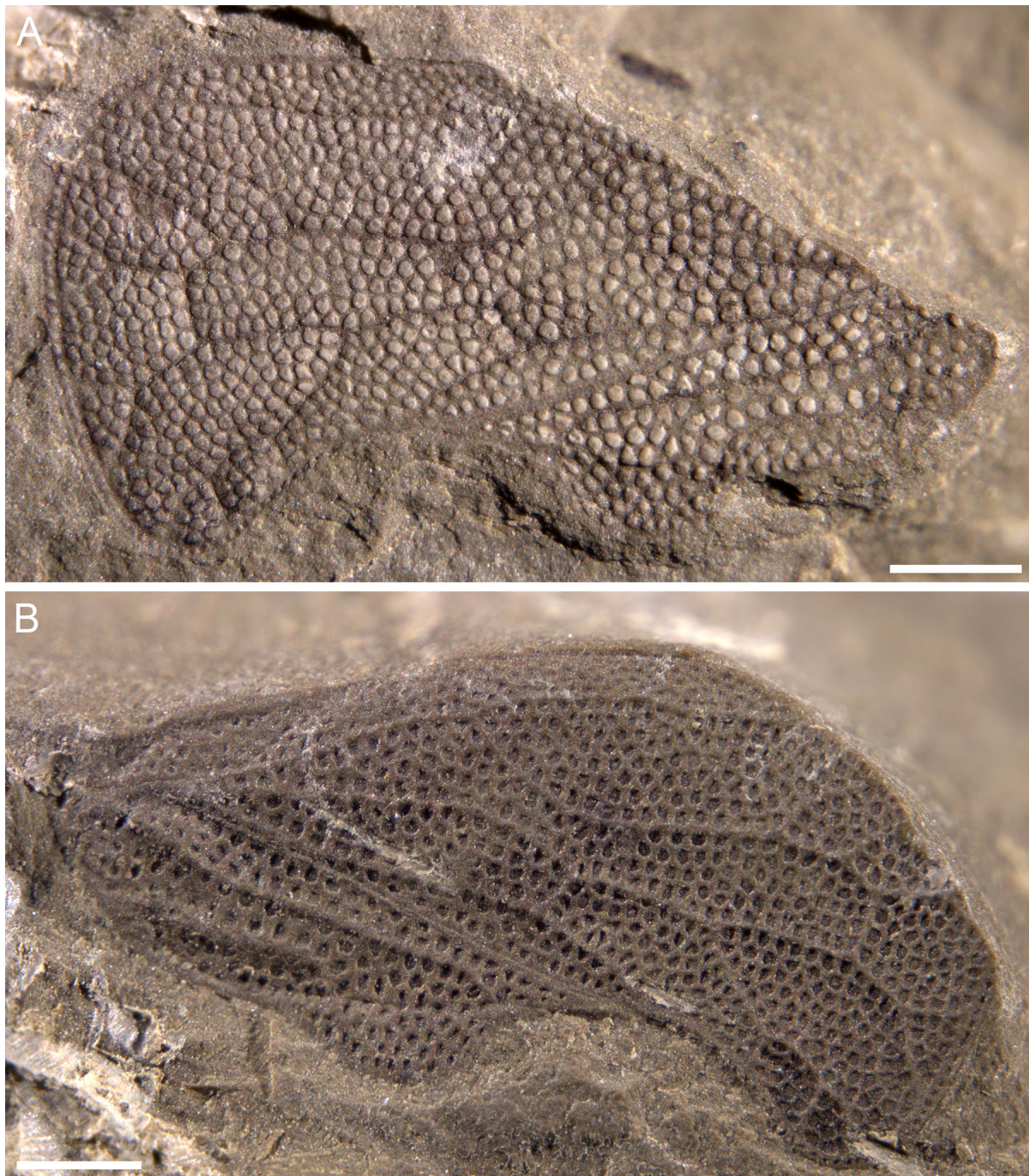


FIGURE 1. *Archaeomaguviopsis magicus* gen. et sp. nov., photographs of holotype, from the Yanchang Formation, Shaanxi Province, North China. **A**, Part. **B**, Counterpart. Scale bars = 1 mm.

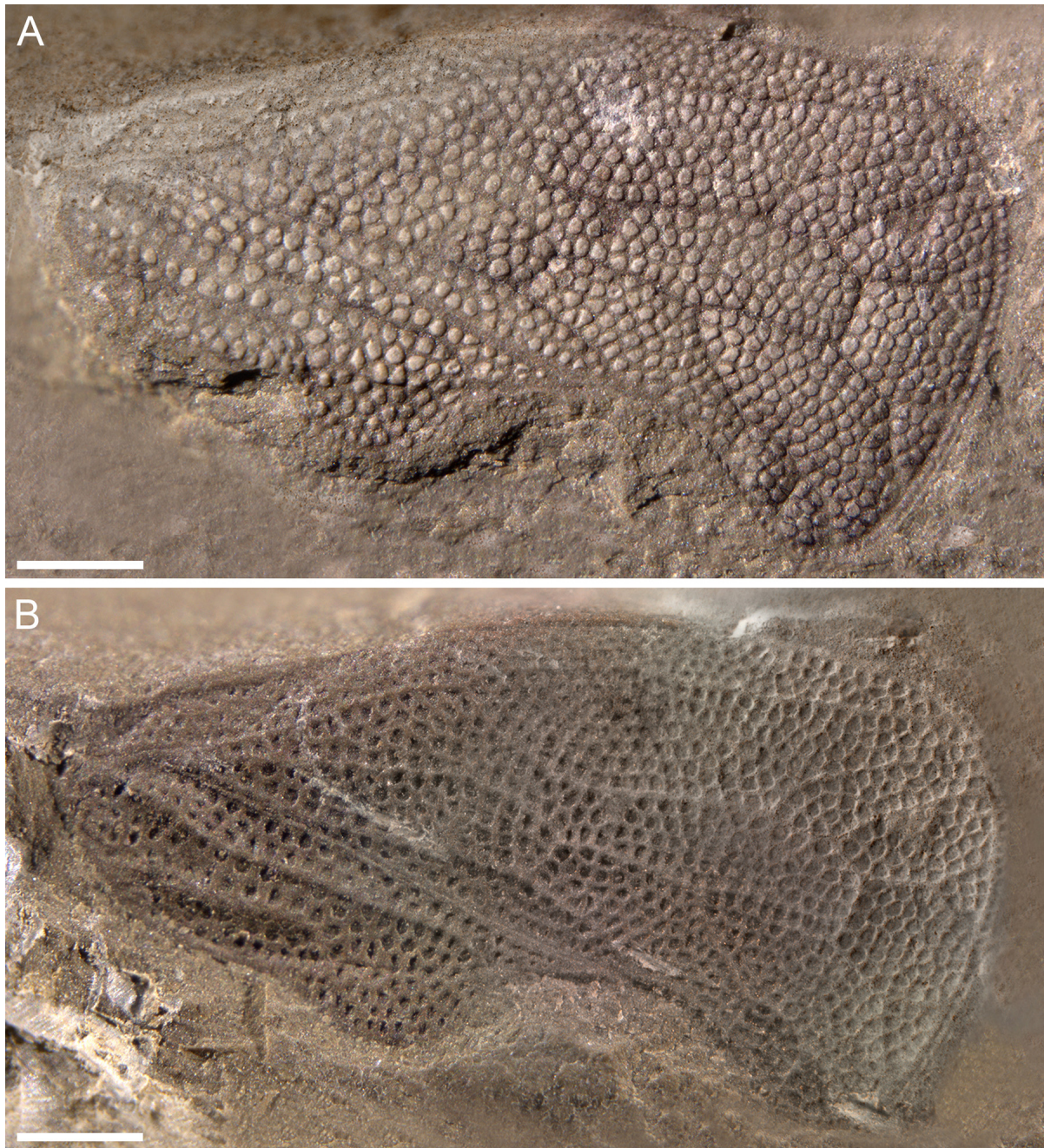


FIGURE 2. *Archaeomaguviopsis magicus* **gen. et sp. nov.**, computer combined images of part and counterpart (A, B). Scale bars = 1 mm.

widened; commissural margin carinate; basal cell absent; postcostal cell nearly as wide as the widest portion of median cell and narrower than radial cell; venation distinct; stem R almost straight, diverged from common stem R+MP at about 1/6 of tegmen length; stem ScP+R apparently longer than ScP+RA, forked at basal 0.42 of tegmen length; RA₁ simple; RP distinctly arched, with four terminal branches; stem MP sinuous, forked distinctly apicad of ScP+RA forking and slightly basad of RP forking, at basal 0.70 of tegmen length; MP₁₊₂ dichotomous; stem CuA closely subparallel to CuP, then bent strongly towards stem MP; CuA₁ entirely fused to stem MP and crossvein *mp-cua* replaced by free base of CuA₁

(MP+CuA₁ referred to below as MP₃₊₄); crossvein *mp-cua* inclined, shorter than *rp-mp*; CuP straight, thickened; Pcu slightly sinuous and nearly turning vertically to postclaval margin; A₁ arcuate; marginal membrane wide.

Discussion

The placement of *Archaeomaguviopsis* **gen. nov.** into the extinct family Maguviopseidae is mainly supported by the presence of tegmen evenly areolate, stems ScP+R and

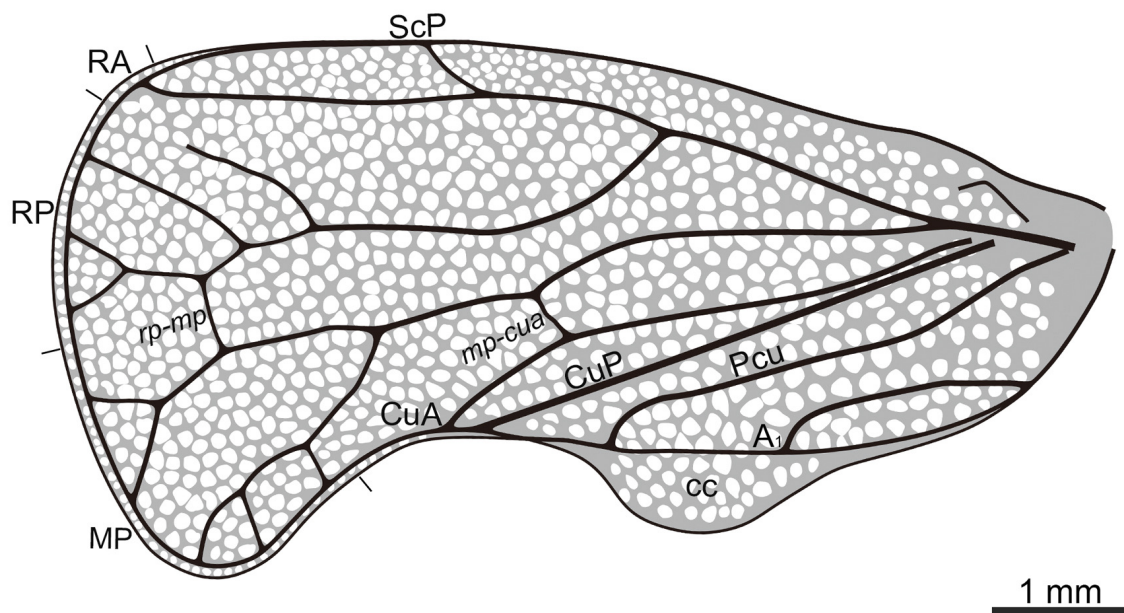


FIGURE 3. Line drawing of *Archaeomaguviopsis magicus* gen. et sp. nov., holotype.

ScP+RA without a prenodal branch, ScP+R forked slightly basad of tegminal mid-length, MP forked distally, and the marginal membrane is distinct (Shcherbakov, 2011), but the phylogenetic position of the family is unknown. The new genus can be assigned to the subfamily Maguviopseinae on the basis of having vein CuA₁ of the tegmen entirely fused to stem MP, and further tentatively assignment to the tribe Maguviopseini is supported by having the tegmen broad, apparently produced posteroapically, with a cristate commissural margin rather than the tegmen being narrow, regular elongate-oval in shape with apical margin rounded, and postnodal part scarcely projected as in the tribe Nonescytini; and the basal cell absent instead of well developed, closed with the junction of MP and CuA as in Nonescytini (Shcherbakov, 2011). However, *Archaeomaguviopsis* gen. nov. has several forewing characteristics of two genera of Nonescytini (*viz.*, *Nevicia* and *Nonescyta*), sharing with them a smooth costal margin that is weakly convex (costal margin often distinct sinuous and convex apically in Maguviopseini); the postcostal cell is narrower than the radial cell (postcostal cell widened in most genera of Maguviopseini); and vein A₁ is independent of Pcu, which is the same with *Nevicia* of Nonescytini but differs from all members of Maguviopseini, raising new questions about the taxonomic units. Furthermore, the new genus exhibits the high similarity in appearance with *Fasolinka*, *Sitechka*, *Krendelia*, *Phyllotexta*, and *Maguviopsis* of Maguviopseini, but further differs from these five genera as follows: 1) tegmen without emargination apically, while emarginate at RP and MP₁₊₂ in *Krendelia* and *Phyllotexta*, respectively; 2) crossvein *ir* absent, while *ir* present in

Krendelia, *Phyllotexta*, and *Maguviopsis*; 3) crossvein *mp-cua* distinctly basad of MP forking, while *mp-cua* connected to the branch point of MP in *Fasolinka* and *Sitechka*, and *mp-cua* connected to MP₃₊₄ in *Phyllotexta* and *Maguviopsis*; 4) stem CuA closely subparallel to CuP at base, while MP and CuA formed X-like junction at base in *Phyllotexta*, and short MP+CuA anastomosis present in *Fasolinka* and *Krendelia*.

The discovery of the new taxon, *Archaeomaguviopsis magicus* gen. et sp. nov., further explores the palaeodiversity of Cicadomorpha in Tongchuan entomofauna, and expands the biogeographic distribution of Maguviopseidae to the Ordos Basin of China, suggesting that this Triassic family was likely widespread in Eurasia during the Middle to Late Triassic, which provides valuable information for understanding its historical distribution.

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