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The enigmatic arthropod *Duraznovis gallegoi* from the Late Triassic of Argentina is a cicadomorphan head (Insecta: Hemiptera: Auchenorrhyncha)

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Recently, Lara *et al*. (2020a, b) described a new fossil taxon, *Duraznovis gallegoi*, based on two specimens from the Upper Triassic Potrerillos Formation at Quebrada del Durazno, Cuyana Basin of Argentina. This fossil is considered to be an enigmatic arthropod closely resembling the living and fossil representatives of xiphosurans (Chelicerata) and notostracans (Branchiopoda), two completely different arthropod groups with convergent body plans. Some distinctive combination of features, however, makes the systematic position of these specimens indeterminate (Lara *et al*., 2020a, b).

Material and methods

The fossil procercopid (NIGP173203) was collected from the Middle–Upper Jurassic Daohugou Bed at Daohugou, Wuhua Township, Ningcheng County, Chifeng City, Inner Mongolia, northeastern China. Additionally, two extant species of cercopoids, *Cosmoscarta heros* and *Aphrophora horizontalis* were collected by Ziwei Yin from Tianmu Mountain of Zhejiang Province, China. All specimens studied herein show head structures of cercopoids for comparison with *Duraznovis gallegoi*.

Photographs were taken using a digital camera attached to a Zeiss Discovery V16 microscope, and some were moistened with 70% ethanol to show fine details; stacked using Helicon Focus 6 software; line drawing was drafted with Adobe Illustrator CC 2018 graphic software. The material studied here is deposited in the Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences, Nanjing, China.

Result

According to the morphological characteristics of *Duraznovis gallegoi*, it can be clearly differentiated from the Xiphosura by following combination of characters: 1) absence of the distinct prosomal shield and fused opisthosomal tergites; 2) absence of paired walking legs and genal spines; and 3) abnormal 'tail-like structure' along midline of *D. gallegoi* (the telson is sword-shaped, not divided into two parts in xiphosurans). Additionally, *D. gallegoi* is unequivocally unrelated to notostracans because of the absence of slender abdomen with numerous exposed segments as well as the number of leaf-like appendages, and obviously different 'tail-like structure' (*e.g*., Liao *et al*., 2020a, b: Figure 2c).

Based on the figures 3, 4 in Lara *et al*. (2020a, b), the so-called enigmatic arthropod is apparently a head of a fossil cicadomorphan insect, which probably can be ascribed to the stem group of Clypeata, Hylicelloidea Evans, 1956. Both specimens of *D. gallegoi* finely preserve ventral features of the head, including compound eyes, antennal pit, postclypeus, anteclypeus, lorum, and labium (Fig. 1F). 'The impression of two undetermined structures' on the anterior section of *D. gallegoi* from the plates 5.1, 5.2 (a) in Lara *et al*. (2020a, b) is considered to be similar to xiphosuran compound eyes, but it in fact is an antennal pit of Cicadomorpha, located between the compound eyes (Fig. 1). The 'six segments' from the plates 5.1, 5.2 (b, se) in Lara *et al*. (2020a, b) is considered to be related to walking appendages of Xiphosura, is actually a postclypeus with transverse grooves of Clypeata (Fig. 1). The plates 5.1, 5.2 (f, g) in Lara *et al*. (2020a, b) are interpreted as the position of 'gill' and a 'heart-shaped plate', respectively, they are truly anteclypeus and part of bugling labium of Cicadomorpha (Fig. 1). A broad area in plates 5.1, 5.2 (opm) is considered to resemble the opisthosomal margin of Xiphosura, and is in reality a lorum (Fig. 1), and the 'tail-like structure' is the rostrum of Cicadomorpha (Fig. 1). The rostrum likely divided into two lobes along labial suture in Cicadomorpha that apparently differs from the sword-like

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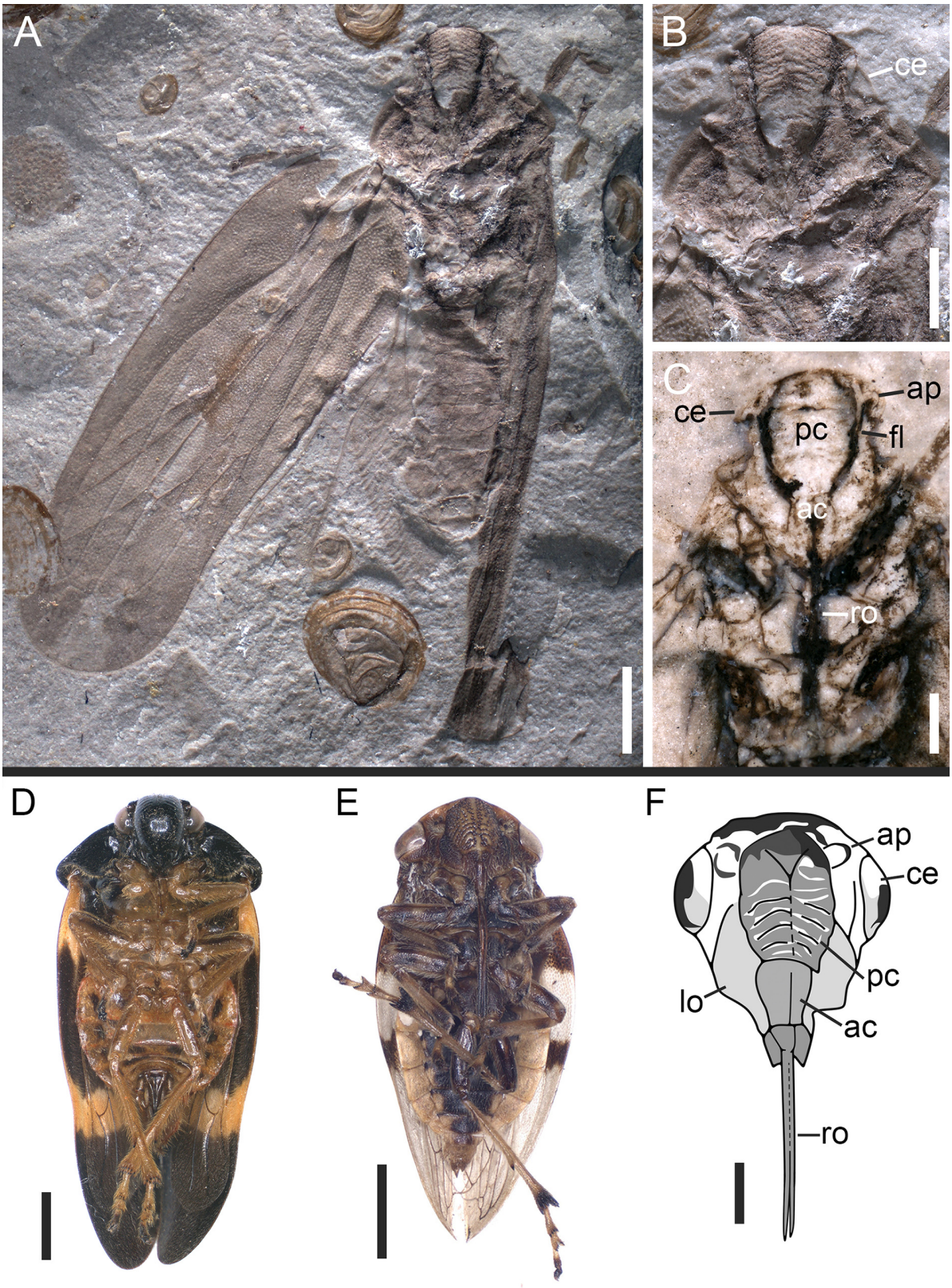

FIGURE 1. Fossil and extant froghoppers and line drawing of *Duraznovis gallegoi*. **A**, General habitus of the fossil procercopid froghopper (NIGP173203), *Anthoscytina* sp. in ventral view, from the Middle to Late Jurassic Daohugou biota of northeastern China. **B**, Enlargement of A, showing details of head structure. **C**, Enlargement of A, moistened with 70% ethanol. **D**, General habitus of extent cercopid species, *Cosmoscarta heros* in ventral view. **E**, General habitus of extent aphrophorid species, *Aphrophora horizontalis* in ventral view. **F**, Line drawing of the holotype (IANIGLA-PB 203) of *Duraznovis gallegoi* from the Triassic of Argentina after Lara *et al*. (2020a, b). Abbreviations: ce, compound eyes; ap, antennal pit; fl, flagellum; pc, postclypeus; ac, anteclypeus; lo, lorum; ro, rostrum. (Scale bars = 2 mm in **A**, **D**, **E**; 1 mm in **B**, **C**, **F**).

telson of Xiphosura, and the completely separated caudal furcas of Notostraca.

Fragmentary body structure of cicadomorphan insects are often mistakenly treated as animals or plants. For example, Huang (2015) indicated that a purported fossil tadpole from the Daohugou biota of northeastern China, but in fact it is an anterior part of a cicadomorphan insect. The Upper Triassic Potrerillos Formation at the Quebrada del Durazno locality in Mendoza Province of Argentina yielded abundant fossil insects, attributed into 10 orders (Hemiptera, Odonatoptera, Coleoptera, Mecoptera, Diptera, Miomoptera, Orthoptera, Plecoptera, Hymenoptera, and Grylloblattida) (Lara & Wang, 2016; Lara *et al*., 2017, 2020a, b, c). Hemiptera is the most diverse among them, attributable mainly to Cicadomorpha, *e.g*., Dysmorphoptilidae Handlirsch, 1906, Chiliocyclidae Evans, 1956, and Eoscarterellidae Evans, 1956 (Lara & Wang, 2016). However, little is known about the body structures of fossil cicadomorphan insects from the Potrerillos Formation of Argentina due to the fact that these fossils are mostly described from isolated forewings, the reason behind confusing some parts of the body as 'enigmatic arthropod'. The two specimens of fossil cicadomorphan head in Lara *et al*., (2020a, b) are probably synonymous, and *D. gallegoi* should be regarded as invalid.

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