

Systematic palaeontology (invertebrate palaeontology)

A remarkable new genus of Procercopidae (Hemiptera: Cercopoidea) from the Middle Jurassic of China

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Abstract

Jurocercopis grandis, a new genus and species belonging to Procercopidae (Hemiptera: Cercopoidea), is described, based on seven specimens from the Middle Jurassic of Daohugou, China. It differs distinctly from other genera as follows: body and wings obviously large; pronotum with posterior margin straight; tegmen with costal margin convex at about basal 0.4 wing length; hind basitarsomere with a row of apical small teeth. **To cite this article:** B. Wang, H. Zhang, C. R. Palevol 8 (2009).

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Résumé

Un remarquable nouveau genre de Procercopidae (Hemiptera : Cercopoidea) du Jurassique moyen de Chine. *Jurocercopis grandis*, un nouveau genre et espèce appartenant aux Procercopidae (Hemiptera : Cercopoidea), est décrit, sur la base de sept spécimens du Jurassique moyen de Daohugou, Chine. Il se distingue des autres genres de la manière suivante : corps et ailes manifestement grands ; pronotum avec bord postérieur rectiligne ; aile antérieure à bord costal convexe, à environ 0,4 de la longueur basale de l'aile ; basitarsomère postérieur avec rangée de petites dents apicales. **Pour citer cet article :** B. Wang, H. Zhang, C. R. Palevol 8 (2009).

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Mots clés : Procercopidae ; Hemiptero ; Nouvelle espèce ; Jurassique moyen ; Daohugou ; Chine

1. Introduction

Procercopidae Handlirsch, 1906 is an extinct family of hemipterous insects from the Late Triassic to Early

Cretaceous in Euro-Asia and Australia [2–12,17]. So far, about 15 species within 10 genera of Procercopidae have been reported from the Jurassic and Lower Cretaceous of China [4,9,11,17]. It is probable, however, that the high diversity of Chinese procercopids has been overestimated, and the fossil record needs exhaustive reinvestigation. A detailed review of Chinese Procercopidae will be published in another paper. The Middle

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Jurassic Daohugou Biota yielded abundant cicadomorph insects, including Procercopidae, Palaeontinidae, Tettigarctidae and Hylcellidae. These insects, except for some palaeontinids, however, have not yet been given a detailed description [15]. Being a common group in the Daohugou Biota, the Procercopidae have a comparatively low diversity and are known to be attributed to *Anthoscytina* Hong, 1983, which was previously referred to the family Scytinopteridae Handlirsch, 1906, and later transferred to the Procercopidae by Shcherbakov [11]. Most fossil and extant Cercopoidea are tiny insects, their body is rarely longer than 13 mm [7,16]. Here, we describe a remarkable new genus of Procercopidae, which is much larger than other procercopids.

2. Material and methods

There is no consensus on the interpretation of vein nomenclature in Cicadomorpha. We tentatively followed the traditional terminologies with slight modifications [1,13,14]. Specimens were examined dry and under alcohol, using a Nikon SMZ1000 stereomicroscope and drawings were made with the aid of a camera lucida. The photographs were prepared using a NIKON D100 digital camera, and the line drawings were readjusted on photographs using image-editing software (CorelDraw 13.0 and Adobe Photoshop CS). All specimens are deposited in the Nanjing Institute of Geology and Palaeontology (NIGP), Chinese Academy of Sciences.

3. Systematic palaeontology

Order Hemiptera Linnaeus, 1758.

Suborder Cicadomorpha Evans, 1946.

Superfamily Cercopoidea Leach, 1815.

Family Procercopidae Handlirsch, 1906.

Genus *Jurocercopis* gen. n.

Type species. *Jurocercopis grandis* sp. n.; here designated.

Type horizon and locality. Middle Jurassic; Daohugou Village, Ningcheng County, Chifeng City, Inner Mongolia, China.

Etymology. The generic name is from the geological period “Jurassic” and the generic name *Cercopis*. Gender: feminine.

Diagnostics. Tegmen large and slender, length about 20 mm, length/width ratio 2.8–3.0; costal margin convex at about basal 0.4 wing length (basal 0.3 wing length in *Cretocercopis* Ren, 1995); vein Sc + RA arising from vein Sc + R at about basal third of wing; vein RA with some branches; vein M with more than four branches; crossvein m absent (crossvein m present in *Procercopina*

Martynov, 1937); vein CuA branching distinctly basal of vein M branching (CuA branching at the same level of M branching in *Sinocercopis* Hong, 1982); branch CuA₁ a little longer than branch CuA₂ (CuA₁ about twice as long as CuA₂ in *Anthoscytina*).

Antennae half the length of fore tibia. Rostrum moderate, extending to mid coxae. Pronotum hexagon, widest at middle; its posterior margin straight. Fore femur shorter than hind femur. Hind tibia slender, about 1.8 times as long as hind femora. Hind tibia with a short lateral spine at 3/5 its length. Hind tibia with two rows of apical denticles, and each row consisting of about six teeth. Both basitarsomere and mid tarsomere of hind tarsi with a row of small teeth apically. Ovipositor slender, curved upwards.

Discussion. The main source of wing characters is based on tegmina due to the lack of complete hindwings. This genus differs distinctly from other genera by the body and wings larger. Furthermore, it differs from *Anthoscytina* (tegmen length about 13–15 mm) by the following characters: pronotum with posterior margin straight; hind basitarsomere with a row of apical small teeth; tegmen with costal margin convex at about basal 0.4 wing length, and vein M with more than four branches; from *Procercopina* (tegmen length about 12 mm) in possessing the tegmen with costal margin convex at about basal 0.4 wing length and vein M with more than four branches; from *Sinocercopis* (tegmen length about 8 mm) in having the tegmen with vein CuA branching distinctly basal of vein M branching, and the hindwing with vein M 2-branched; and clearly from *Cretocercopis* (tegmen length 14–25 mm) in having the tegmen shape different.

Jurocercopis grandis sp. n. (Figs. 1–3).

Diagnostics. As for genus, it is the only included species.

Description. Holotype NIGP149549. Body strongly deformed with tegmen and hindwing overlapped; tegmen complete with basal part destroyed; hindwing poorly preserved; trace of coloration preserved.

Tegmen elongate, length 20.5 mm, width 7.1 mm, length/width ratio 2.9. Costal margin convex at about basal 0.4 wing length. Posterior margin convex at distal third of the wing. Vein Sc obscure, arched and fused with vein R + M at basal 0.18 wing length. Stem R + M branching into veins Sc + R and M at the point of vein Sc fused with vein R + M. Vein Sc + R branching into veins Sc + RA and RP at basal 0.35 wing length. Branch Sc + RA sinuous, with six branches, and connected with vein RP by a transverse crossvein r at basal 0.87 wing length. Branch RP connected with branch M₁₊₂ by a transverse crossvein r-m at basal 0.81 wing length, and

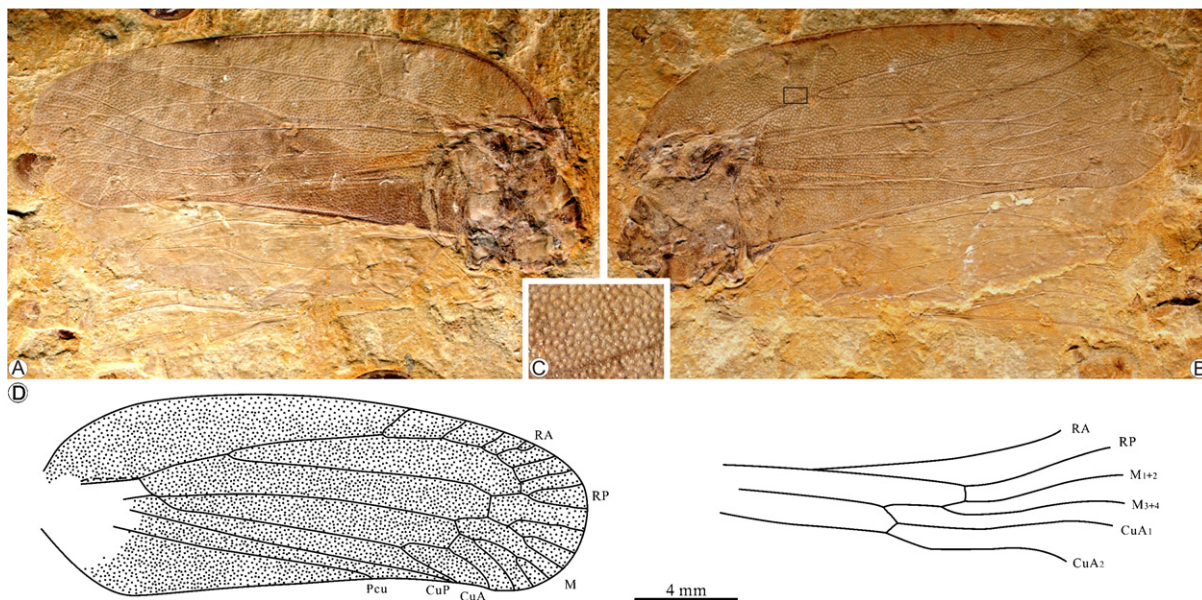


Fig. 1. *Jurocercopsis grandis* sp. n., holotype. A. Photograph of counterpart, NIGP149549b. B. Photograph of part, NIGP149549a. C. Photograph of granules in NIGP149549. D. Illustrations of tegmen and hindwing based on NIGP149549. A, B and D to scale.

Fig. 1. *Jurocercopsis grandis* sp. n., holotype. A. Photographie d'une empreinte, NIGP149549b. B. Photographie d'une partie, NIGP149549a. C. Photographie de granules en NIGP149549. D. Dessins de l'aile antérieure et de l'aile postérieure d'après NIGP149549. A, B et D sont à l'échelle.

bifurcating just distal of crossvein r. Vein M fused with vein CuA for a very short distance, and then branching into veins M₁₊₂ and M₃₊₄ at basal 0.76 wing length. Vein M₁₊₂ bifurcating at basal 0.86 wing length. Vein M₃₊₄ bifurcating at basal 0.80 wing length. Vein M₃₊₄ connected with vein CuA₁ by an oblique crossvein m-cua at basal 0.77 wing length. Vein CuA curved anteriorly at crossvein m-cua, branching into veins CuA₁ and CuA₂ at basal 0.66 wing length. Vein CuA₁ curved anteriorly, and a little longer than vein CuA₂. Vein CuP straight, ending at the beginning of the distal fourth of the wing, forming a long clavus. Vein Pcu slightly curved, ending at basal 0.6 wing base. Tegmen membrane with distinct granules.

Hindwing partly preserved. Vein R branching into veins RA and RP at about basal fourth of the wing. Vein M bifurcating into veins M₁₊₂ and M₃₊₄ at about middle of wing. Vein RP connected with branch M₁₊₂ by a crossvein r-m slightly distal of bifurcation of vein M. Vein CuA branching into veins CuA₁ and CuA₂ basal of bifurcation of vein M. Branch CuA₁ connected with vein M by a crossvein m-cua just distal of bifurcation of vein CuA.

Paratype NIGP149550. Almost complete adult in lateral aspect with wings preserved at top of the body. Body dark, length about 21 mm. Ocelli invisible. Eyes oblong, higher than wide. Antennae half the length

of fore tibia; scape thick and short; pedicel thinner than scape; flagellum with probable five segments. Vertex shorter than pronotum. Postclypeus convex, with distinct transverse grooves (muscle attachments). Rostrum moderate, extending to mid coxae. Pronotum rugose, hexagon, widest at middle, posterior margin almost straight. Tegmen length 20.1 mm, width 6.8 mm, length/width ratio 3.0. Abdomen pointed posteriorly, eight segments visible. Fore femur shorter than hind femur. Fore tibia about twice as long as fore femur. Hind tibia slender, about 1.8 times as long as hind femur. Hind tibia with a short lateral spine at 3/5 its length.

Paratype NIGP149551. Adult in dorsal aspect with wings obscured. Body dark, length about 21 mm. Head narrower than pronotum. Pronotum rugose, hexagon, widest at middle, width about 6 mm; median length 3.2 mm, about twice of length of vertex in mid line; its posterior margin almost straight. Mesoscutellum triangular, median length 2.2 mm. Tegmen length 20.8 mm.

Paratype NIGP149552. Body strongly deformed with a hind leg visible. Tegmen and hindwing overlapped. Tegmen with apex missing and basal part destroyed, length about 22 mm, width 7.2 mm, length/width ratio 3.0. Venation in general as in holotype. Hind tibia with a short lateral spine at 3/5 its length. Two rows of

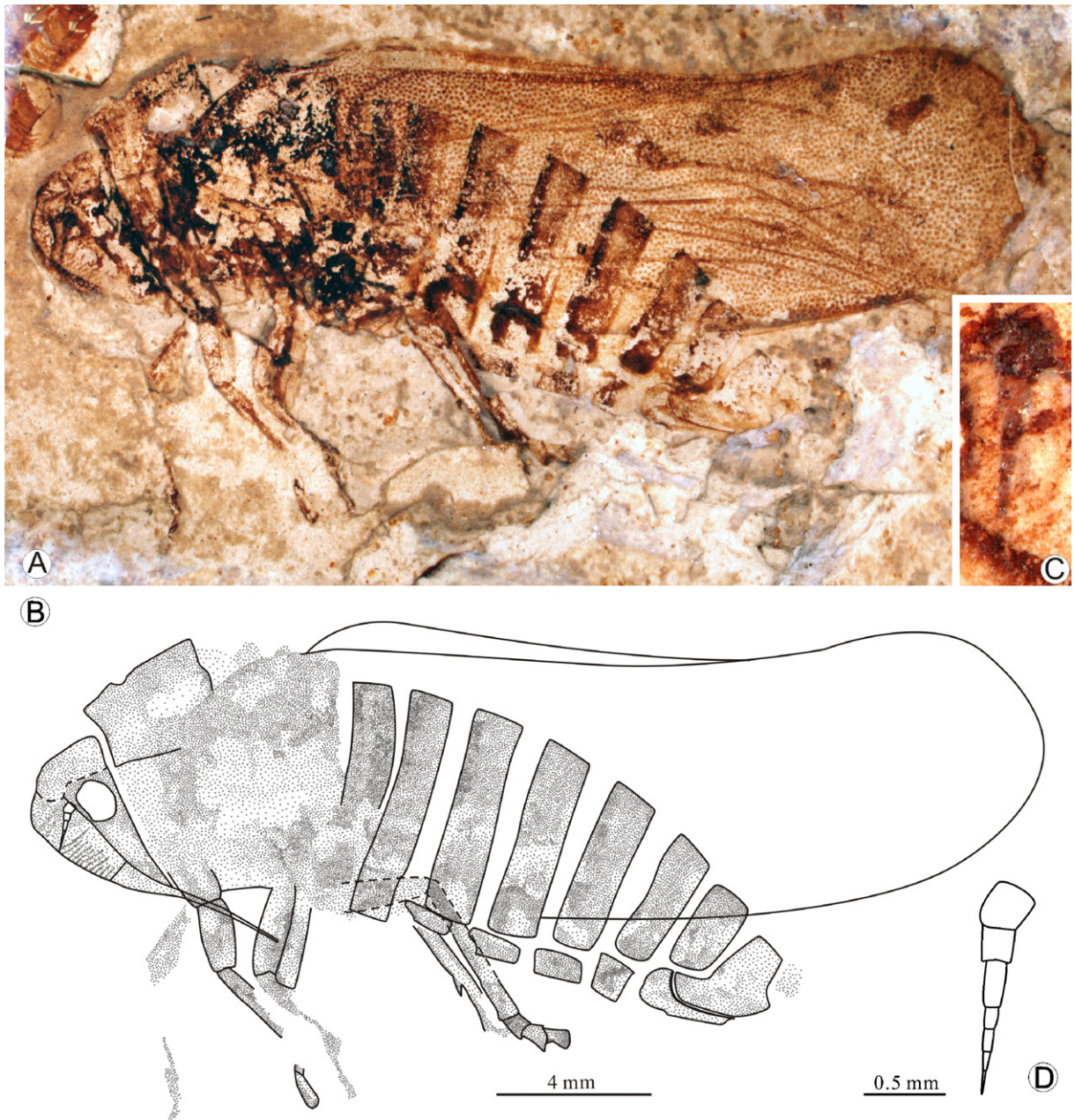


Fig. 2. *Jurocercopis grandis* sp. n., paratype. A. Photograph of NIGP149550. B. Illustration based on NIGP149550. Both A and B to scale. C. Photograph of enlarged antennae. D. Illustration of enlarged antennae. Both C and D to scale.

Fig. 2. *Jurocercopis grandis* sp. n., paratype. A. Photographie de NIGP149550. B. Dessin d'après NIGP149550. A et B sont à l'échelle. C. Photographie des antennes agrandies. D. Dessin d'une antenne agrandie. C et D sont à l'échelle.

apical denticles in hind tibia, and each row consisting of about six teeth. Both basitarsomere and mid tarsomere of hind tarsi with a row of smaller teeth apically (about 10 teeth); basitarsomere slightly longer than mid tarsomere; basitarsomere slightly shorter than apical tarsomere.

Specimen NIGP149553. Body and tegmina obscure. Tegmen length about 18.9 mm, width 6.7 mm, length/width ratio 2.8.

Specimen NIGP149554. Almost complete adult in lateral aspect with wings preserved at top of the body. Body dark, length about 20 mm. Abdomen pointed

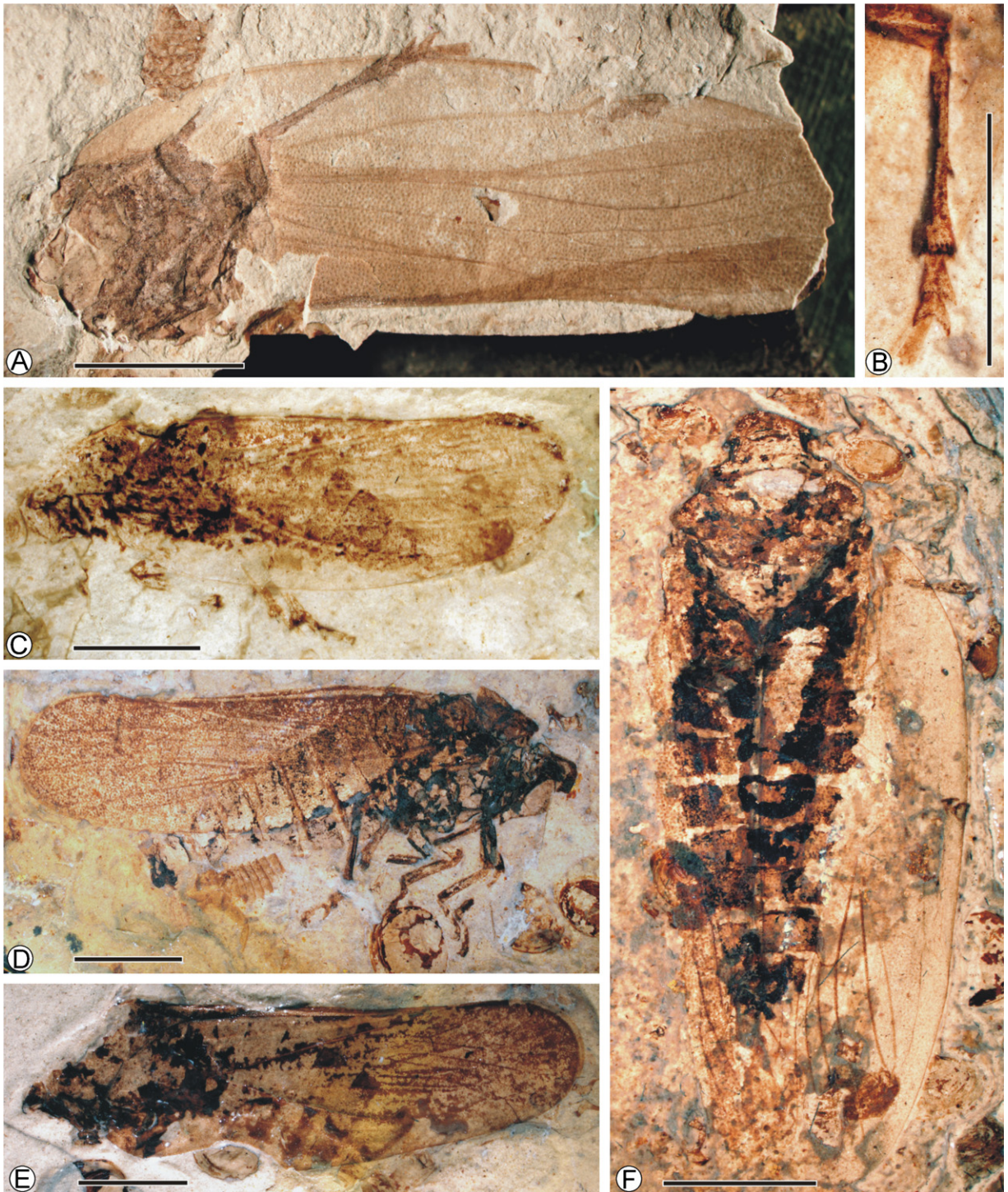


Fig. 3. *Jurocercopsis grandis* sp. n. A. Photograph of NIGP149552a. B. Photograph of enlarged hind leg in NIGP149552a. C. Photograph of NIGP149553. D. Photograph of NIGP149554. E. Photograph of NIGP149555. F. Photograph of NIGP149551. Scale bars represent 5 mm.

Fig. 3. *Jurocercopsis grandis* sp. n. A. Photographie de NIGP149552a. B. Photographie de patte arrière agrandie en NIGP149552a. C. Photographie de NIGP149553. D. Photographie de NIGP149554. E. Photographie de NIGP149555. F. Photographie de NIGP149551. Les barres d'échelle représentent 5 mm.

posteriorly. Tegmen length 19.4 mm, width 6.4 mm, length/width ratio 3.0.

Specimen NIGP149555. Body and tegmina obscured. Tegmen length about 22 mm, width 7.8 mm, length/width ratio 2.8.

Discussion. The length/width ratio of tegmen is slightly different among several specimens (e.g. 2.8 in specimen NIGP149553, while 3.0 in paratype NIGP149554). This character is highly variable in Daohugou impression fossils because of the deformation of sedimentary rocks [15]. Considering their almost identical tegmen venation and size, it is reasonable to assign these specimens to the same species.

Etymology. Specific epithet is from the Latin *grandis* for the large body.

Material. Holotype: NIGP149549a, b. Paratypes: NIGP149550, NIGP149551 and NIGP149552a, b. Other material: NIGP149553, NIGP149554 and NIGP149555a, b.

Age and occurrence. Middle Jurassic; Daohugou Village, Chifeng City, Inner Mongolia, China.

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