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New archaeorthopteran insects from the Late Carboniferous of the Nord and Pas-de-Calais basins in northern France (Insecta: Cnemidolestodea, Panorthoptera)

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Abstract

New polyneopteran insects are described from Pennsylvanian (Bashkirian, Moscovian) compressed fossils from the North of France (Insecta: Archaeorthoptera). Discovery of wing apex with distinct venation, e.g., apical fusion of RA with RP, numerous parallel posterior branches of RP with transversal crossveins, can be assigned to cf. *Tococladus* sp. (Cnemidolestodea: Tococladidae). It represents the second record of Cnemidolestodea from the Avion locality apart from *Aviocladus pectinatus* Prokop et al., 2014. *Bruaylogus magnificus* **gen. et sp. nov.**, based on forewing venation, is attributed to Panorthoptera nec Orthoptera having some distinct characters for the placement either close to Oedischiidae or a more basal position possibly with affinities to genus *Heterologus*. *Aviologus duquesnei* **gen. et sp. nov.**, based on forewing venation, differs from Oedischiidae by the presence of basal fork of M far from point of separation between M and Cu and fusion of MA with first posterior branch of RP. *Aviologus* share a long stem of M and simple CuPaβ with *Heterologus duyiwuer* and *H. langfordorum*, but both differ in well separated median and radial veins. These new fossils demonstrate that the archaeorthopterid insect fauna from the North of France was rather diverse with links to late Carboniferous and early Permian assemblages in Euramerica such as the Mazon Creek, Carbondale Formation or Elmo, Wellington Formation (Illinois, Kansas, USA) entomofaunas.

Key words: Archaeorthoptera, Tococladidae, Pennsylvanian, Bashkirian, Moscovian

Introduction

Insect bearing deposits from the Pennsylvanian strata of the Nord and Pas-de-Calais basins in northern France were first discovered about a century ago (Pruvost 1912, 1914 and others). Due to efforts and sampling activities on slag haps of the fourth author (PR), a number of new significant discoveries such as the oldest holometabolan insect were recently obtained (Nel et al. 2007, 2012a-b, 2013; Prokop et al. 2013, 2014). For historical background see the summary given by Prokop et al. (2014: 155). The present paper extends the diversity of Archaeorthoptera supplementing the two previously described taxa *Aviocladus pectinatus* Prokop, Roques and Nel, 2014 (Cnemidolestodea), and *Aviohapaloptera bethouxi* Prokop, Roques and Nel, 2014.

Materials and methods

The fossils are provisionally stored in the collection of the Laboratory of Entomology in the Muséum National d'Histoire Naturelle, Paris (MNHN), France. The collection will ultimately be deposited in the Musée Géologique Pierre Vetter, Decazeville, France. The fossils were studied in a dry state or under a film of ethyl alcohol using

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