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A new libelluloid family from the Eocene Green River Formation (Colorado, USA) (Odonata, Anisoptera)

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Abstract

The new family Urolibellulidae is proposed for the new genus and species *Urolibellula eocenica*, based on a fossil dragonfly from the Eocene Green River Formation (USA). This new taxon is considered as the sister group of the extant Libellulidae. As the oldest libellulid dragonfly is dated from the Turonian, the Urolibellulidae should also be at least Late Cretaceous.

Key words: Odonata, Cavilabiata, **gen. et sp. n.**, Cenozoic

Introduction

The Green River Formation in the USA is well-known as a very rich Konservat-Lagerstätte with vertebrates, plants, and insects (Grande 1984). Many of these fossils are in exquisite state of preservation with some soft structures and traces of coloration preserved. The fine-grained lacustrine and fluvial-lacustrine sediments were deposited in the Eocene Lake Uinta. This formation represents one of the largest documented accumulations of lacustrine sedimentary rocks in the world. It extends over an area of more than 65,000 square kilometers (portions of the three states Wyoming, Colorado and Utah), and averages about 600 meters in thickness (Grande 1984). Most of the paleontological work in the Green River Formation has been done in Wyoming. Not only is the formation widespread, but at many localities there is an intricate record of both flora and fauna of the locality at the time of deposition. Several complex Eocene lake communities, containing organisms from the size of microscopic algae to five-meter crocodiles, have been 'frozen' in time for 40 to 50 million years to be reconstructed by paleoecologists today. Only a few Odonata have been described from this formation, viz. the eight Zygoptera *Dysagrion fredericii* Scudder, 1878, *Dysagrion lakesii* Scudder, 1890, *Dysagrion packardii* Scudder, 1885, *Petrolestes hendersoni* Cockerell, 1927, *Zacallites balli* Cockerell, 1928, *Eolestes synthetica* Cockerell, 1940, *Labandeiraia americaborealis* Petrulevičius *et al.*, 2007, and *Litheuphaea coloradensis* Petrulevičius *et al.*, 2007, plus an alleged libelluloid abdomen (*Stenogomphus scudderi* Cockerell, 1921) (Cockerell 1921, 1928, 1940; Petrulevičius *et al.* 2007). Grande (1984: fig. IV.18) also figured a nearly complete Odonata as a Libellulidae from the Green River Formation, but this fossil is clearly a Calopterygoidea. Here we describe a new Cavilabiata (so-called 'libelluloid' dragonflies) from the Green River Formation on the basis of a relatively well-preserved specimen. Except for the Late Cretaceous *Palaeolibellula* Fleck *et al.*, 1999, and the Lowermost Eocene libellulid wing found in the Oise amber (Fleck *et al.* 1999, 2000), this new fossil is the third oldest record of the stem group of the clade Libellulidae.

Material and methods

The specimen is deposited in the Department of Paleobiology of National Museum of Natural History

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