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First crane fly from the Upper Jurassic of Australia (Diptera: Limoniidae)

STEFANIE K. OBERPRIELER¹, WIESŁAW KRZEMIŃSKI², JACK HINDE³ & DAVID K. YEATES⁴

¹CSIRO Land & Water, Tropical Ecosystems Research Centre, PMB 44 Winnellie, Darwin, N.T. 0822, Australia.

E-mail: stef_oberprieler@hotmail.com

²Pedagogical University of Cracow, 30-084 Krakow, Poland. E-mail: wieslawk4@gmail.com

³Bomaderry High School Science Faculty, PO Box 2146, Bomaderry, N.S.W. 2541. E-mail: jack.hinde@det.nsw.edu.au

⁴CSIRO National Research Collections Australia, GPO Box 1700, Canberra, A.C.T. 2601, Australia.

E-mail: david.yeates@csiro.com.au

Abstract

The first crane fly (Diptera: Tipuloidea) fossil discovered in the Upper Jurassic Talbragar Fish Bed in Australia is described and illustrated. *Eotipula grangeri* sp. nov., described from a single specimen, is assigned to the family Limoniidae based primarily on the conformation of wing veins. It is the second and oldest record of Limoniidae from Australia, and the first of Jurassic age from the southern hemisphere.

Key words: Lower Diptera, Talbragar Fish Bed, new genus, new species, Eotipulinae, *Eotipula*, fossil insects

Introduction

The Talbragar Fish Bed near Gulgong, New South Wales, was first discovered by Arthur Lowe in 1889 and, while best known for its fish fossils (Woodward 1895; Wade 1941; Bean 2006) and conifers (Walkom 1921; White 1981), it has in recent years also yielded a considerable number of invertebrate fossils (Beattie 2007; Beattie & Avery 2012). Being of Upper Jurassic age (Kimmeridgian–Tithonian, 151.55 ± 4.27 Ma; Bean 2006), the Talbragar Fish Bed is one of only two insectiferous Jurassic sites in Australia, the other being the older Lower Jurassic (Sinemurian–Toarcian, 199.3–174.1 Ma) Mintaja (Hill River) locality in Western Australia (Martin 2008). The Talbragar Fish Bed, correlated with part of the Purlawaugh Formation of the adjacent Surat Basin, lies at the junction of a terrestrial and an aquatic ecosystem of southern Gondwana. It appears to have formed as a lake infilling a depression in underlying Hawkesbury Sandstone (Selden & Beattie 2013). Its stratigraphy, like that of the Mintaja lagerstätte, indicates a shallow freshwater environment (Dulhunty & Eadie 1969; Percival 1979; White 1981; Beattie & Avery 2012). In contrast to Mintaja, however, most insect specimens are fully articulated and often well preserved.

Over 500 insect specimens have been collected from the Talbragar Fish Bed to date. The first was found more than a century ago, a homopteran named *Griphologus lowei* (Etheridge & Olliff, 1890). It was originally interpreted as a cicada but is currently treated as Auchenorrhyncha *incertae sedis* (Handlirsch 1906). Further exploration of the site between 2006 and 2015 has yielded numerous additional insect specimens and enabled a palaeo-environmental reconstruction of the area (Beattie & Avery 2012). The entomofauna is dominated by Hemiptera (largely Protopsyllidiidae, undescribed), followed by Coleoptera (Oberprieler & Oberprieler 2012; Cai *et al.* 2013; Fikacek *et al.* 2014; Ashman *et al.* 2015). Other orders found are Odonata (Beattie & Nel 2012), Neuroptera, Plecoptera, Mecoptera, Orthoptera, Diptera (Oberprieler & Yeates 2012, 2014), Raphidioptera and Hymenoptera (Oberprieler *et al.* 2012). Other invertebrates recovered are gastropods, bivalves and arachnids (Selden & Beattie 2013). The fly described here represents the third dipteran specimen from the site but the first of the Lower Diptera.

The fossil record of Lower Diptera in Australia is not extensive. Three species of Late Triassic age have been described from Queensland (Evans 1971; Kovalev 1983; Blagoderov 1999; Lukashevich & Shcherbakov 1999),