

Grandoculidae: a new fossil spider family from the Upper Cretaceous of Canada

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Summary

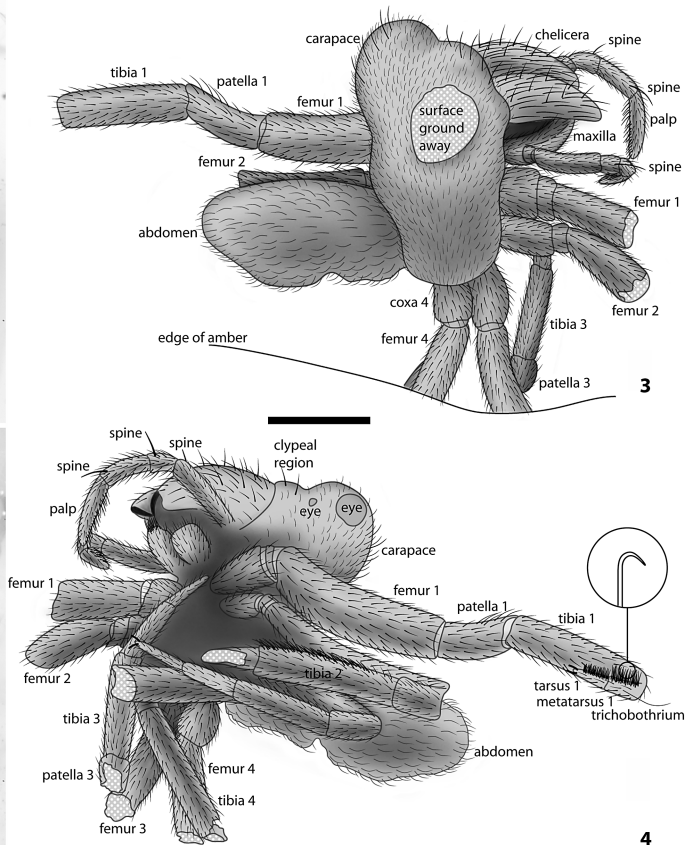
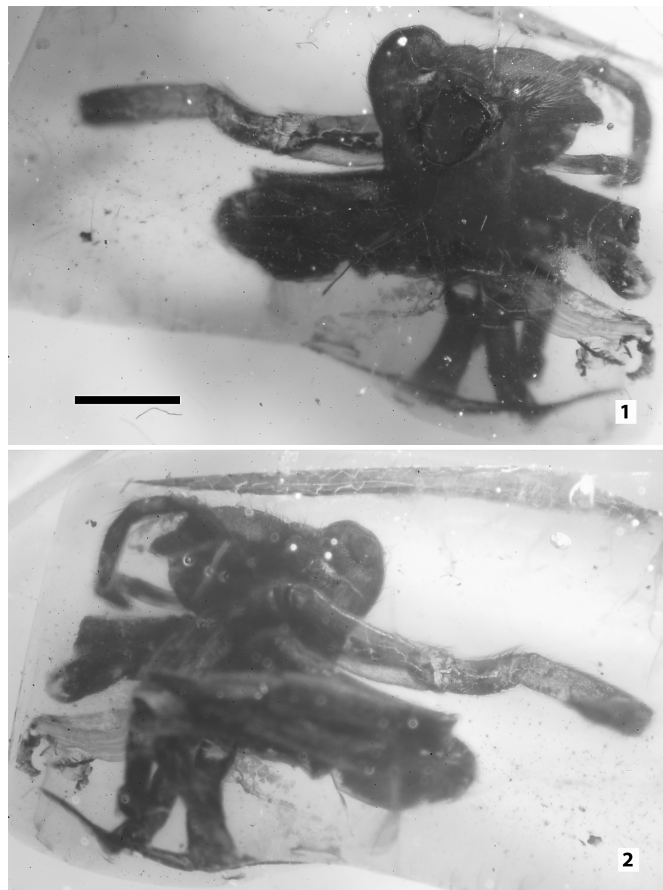
The new fossil family Grandoculidae fam. n. is erected for a Cretaceous (Campanian) Canadian amber spider *Grandoculus chemahawinensis* formerly placed tentatively in the extinct family Lagonomegopidae. Following the descriptions of several new lagonomegopid genera from widespread fossil deposits, it is now clear that their overall somatic morphology is rather homogeneous and different from that of *Grandoculus*, which now sits uncomfortably alongside them. The enlarged first leg with a dense scopular brush of hook-tipped setae on metatarsus I represents a distinct autapomorphy for Grandoculidae. These may indicate possible relationships to non-lagonomegopid taxa such as Palpimanidae (although their scopulae consist of spatulate setae), but additional better preserved fossils (preferably mature males) will be required to confirm this.

Introduction

The purpose of this short taxonomic note is to erect a new fossil family for a Cretaceous (Campanian) Canadian amber spider formerly placed in the extinct

family Lagonomegopidae. Eskov & Wunderlich (1995) described Lagonomegopidae from a juvenile spider in Cretaceous (Santonian) amber from Siberia. The family was rediagnosed by Wunderlich (2008). Lagonomegopids appear to have been widespread in the Mesozoic, with subsequent descriptions from numerous other Cretaceous amber deposits (New Jersey, Myanmar [a common component of the fossil spider assemblage], Spain and Jordan) (Dunlop *et al.*, 2010), but are still known only from juveniles and one questionable female (Wunderlich, 2008).

Penney (2004) described *Grandoculus chemahawinensis* Penney, 2004 (Figs. 1–4) from Campanian Canadian amber and tentatively referred it to this family in a conservative approach (Penney, 2004; Penney & Selden, 2006), on the grounds that so few lagonomegopid specimens had been identified that it was impossible to assess the intra-familial variation. It is now clear that the overall somatic morphology of Lagonomegopidae is rather homogeneous (Eskov & Wunderlich, 1995; Penney, 2002, 2005, 2006; Kaddumi, 2007; Wunderlich, 2008). They possess four to six eyes with the posterior medians large, widely spaced and directed antero-laterally in flank positions; anterior legs of similar thickness to the rest and lacking spatulate hairs or scopulae. Thus, their morphology is quite different from that of *Grandoculus* Penney, 2004, which now sits uncomfortably alongside the other described taxa. Furthermore, *Grandoculus* possesses its own unique characters



Figs. 1–4: *Grandoculus chemahawinensis* Penney, 2004, holotype (MCZ A 5000) in mid-Campanian amber from Cedar Lake, Manitoba, Canada. **1** Dorsal view; **2** Ventrolateral view; **3** Illustration of Fig. 1; **4** Illustration of Fig. 2 (all after Penney, 2004). Scale lines=1.0 mm.

that preclude its placement in Lagonomegopidae or any other previously described spider family, especially the enlarged, powerful first legs with dense scopular brushes of non-spatulate setae and the presence of scopulae along the length of metatarsus II, but not on legs III and IV. Although it is generally considered bad practice to erect new taxa for juvenile specimens (see discussion in Penney & Selden, 2011), in some cases, where only juveniles are available and the spiders show highly distinctive features that cannot be related to any existing taxon, a new taxon warrants description following due diligence and careful consideration.

Taxonomy

Order Araneae Clerck, 1757

Suborder Araneomorphae Smith, 1902

Family Grandoculidae fam. n.

Type species: Grandoculus chemahawinensis Penney, 2004 by monotypy.

Diagnosis: Araneomorph spider with raised cephalic region with a bulge on each side antero-laterally bearing a large eye, with a much smaller eye located below it; chelicerae elongate and procurved. Leg I distinctly longer and more robust than the others, with very closely packed, long, hook-tipped scopular hairs on the prolateral surface of the metatarsus, and long, straight, pointed scopular hairs on the prolateral surface of the tarsus (both these scopulae forming dense brushes); tibia of leg II with short scopulae along most of its length; legs without spines and palpal tarsus lacking a claw (emended from the genus diagnosis of Penney, 2004).

Distribution: Fossil in amber from Cedar Lake, Manitoba, Canada; mid-Campanian (76.5–79.5 Ma), Upper Cretaceous (McKellar & Wolfe, 2010). The holotype juvenile (or female), held in the Museum of Comparative Zoology, Harvard; coll. Carpenter (A5000, juvenile), is the only known specimen.

Remarks: The type species was originally tentatively placed in Lagonomegopidae based on the unusual eye arrangement, the spineless legs and a single metatarsal trichobothrium. Lagonomegopidae now consists of five species in three genera. The only apparent similarity between these spiders and *Grandoculus* relates to the arrangement of the eyes, but even these differ in being more numerous (six versus four) in two of the lagonomegopid genera, including the type genus *Lagonomegops* Eskov & Wunderlich, 1995, so it is doubtful that this represents a synapomorphy uniting the two families as

sister taxa. There are also differences in the mouth parts. In lagonomegopids, the maxillae are convergent across a triangular labium, whereas in *Grandoculus* the labium is not triangular and the maxillae do not converge. Furthermore the unmodified anterior legs and the absence of dense scopulae in lagonomegopids suggest that these families are not closely related. The dense scopular brush of hook-tipped setae on metatarsus I represents a distinct autapomorphy for Grandoculidae. The enlarged anterior legs and scopular brushes of *Grandoculus* indicate possible relationships to non-lagonomegopid taxa such as Palpimanidae (although their scopulae consist of spatulate setae), but additional better preserved fossils (preferably mature males) will be required to confirm that this is not just a case of parallel evolution. The supra-familial placement of the family is currently unclear. It bears some similarities with Palpimanoidea (an ill-defined and much debated taxon; see discussion in Selden & Penney, 2010), but lacks the spatulate leg setae often cited as diagnostic for this group.

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