

A Second Specimen of *Permocoleus* (Coleoptera) from the Lower Permian Wellington Formation of Noble County, Oklahoma

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ABSTRACT: Specimens of Paleozoic Coleoptera are quite rare, particularly so in North America where they have been hitherto represented by a single specimen. The first Permian beetle from North America was only recently described from a single specimen of a complete elytron (no counterpart). A second specimen from another locality in those same beds, comprised of the part and counterpart of a fragment of an elytron, is figured and discussed here. While representing a somewhat larger individual than the original specimen, the present material appears to represent the same species, *Permocoleus wellingtonensis* Lubkin and Engel.

KEY WORDS: fossil beetle, Oklahoma, *Permocoleus*

Beetles (order Coleoptera) today comprise the most diverse and speciose group of extant animals (e.g., Ponomarenko, 1969; Liebherr and McHugh, 2003; Grimaldi and Engel, 2005; but see Sandvik, 2006) and are virtually ubiquitous throughout the world. This diversity is mirrored in the fossil record during the Tertiary and Mesozoic, but beetles are extremely rare in the Paleozoic record (Ponomarenko, 1969; Carpenter, 1992). Consequently, the earliest stages of coleopteran evolution remain elusive. While Paleozoic beetles have been known for some time from the Lower Permian deposits of the Czech Republic and Tshekarda, Russia, and to a lesser extent from the Upper Permian of South America, southern Africa, Australia, and eastern Europe (see Lubkin and Engel, 2005 for primary references), in North America they have been conspicuously absent. In 2002 Engel discovered a moderately complete beetle elytron in the Museum of Comparative Zoology (Harvard University) among material that had been originally collected by the late Paul Tasch in the 1950's from the Midco Fossil Beds in northern Oklahoma (Wellington Formation, Lower Permian, Artinskian, 269-260 mya). This specimen was subsequently described as the first Permian beetle from North America by Lubkin and Engel (2005) and dubbed *Permocoleus wellingtonensis* Lubkin and Engel.

The senior author recently found a second *Permocoleus* specimen among another batch of Midco fossil insect material that had also been collected by Tasch in the 1950's. The Kansas and Oklahoma Wellington Formation fossil beds are famous for the quality and quantity of insect fossils they have produced (Rasnitsyn and Quicke, 2002; Grimaldi and Engel, 2005). More than 200 species of insects representing approximately 20 orders, 50 families, and 100 genera have been described from these beds (Beckemeyer and Hall, 2007). Many of these species, including *Permocoleus*, are rare; a quarter of Wellington Formation species are known from the type specimen

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alone. Thus, the discovery of a second specimen of this unusual and rare taxon is noteworthy, particularly given the significance of Coleoptera in terrestrial faunas today and throughout the Mesozoic and Tertiary. It is greatly hoped that bringing this material to the attention of entomologists and paleontologists will aid their searches for additional Paleozoic beetles in North America.

Systematic Paleontology

Order COLEOPTERA Linnaeus

Family *incertae sedis*

Genus *Permocoleus* Lubkin and Engel

Permocoleus wellingtonensis Lubkin and Engel

Description: Part and counterpart of an elytral fragment markedly contoured and sculptured with 10 parallel rows of punctures in the form of semi quadrate cells. Part (Fig. 1a), representing the dorsal surface, 1.6 mm wide by 4.9 mm long; counterpart (Fig. 1b) impression smaller, 1.3 mm by 4.3 mm. Elytron definitely convex. Longitudinal veins poorly preserved and only partially visible; identifications assigned based on curvature of surface and on convergence of cell rows between presumed branches of Rs. The presumed identities of the veins are noted on Fig. 1c. The ten rows of cells correlate with those of the type of *P. wellingtonensis*, which had two cell rows between longitudinal veins, but the width of the holotype elytron was 1.15 mm. The current specimen is about 40% greater in maximum width than the holotype, indicating that the elytron of this specimen may have been about 6.3 mm in total length (versus 4.5 mm for the holotype). We consider this to be within the size range variation likely to have occurred in *P. wellingtonensis* (such ranges are common among modern beetle species and other, more well represented, fossil species), and choose to assign this specimen to that species.

Material: Specimen KU-Tasch N-IIB-001a, b. Part and counterpart collected by Paul Tasch in the late 1950's. Part: Fragment of dorsal surface of elytron (1.6 mm wide, 4.9 mm long). Counterpart: Concave impression of elytron (1.3 mm by 4.3 mm). Also preserved on both the part and counterpart is a small fragment of a membranous wing (probably a polyneopterous wing) and a conchostracan valve. Material deposited in the University of Kansas Natural History Museum, Division of Entomology fossil insect collection.

Locality: Lower Permian Wellington Formation (Artinskian): United States: Oklahoma: Noble County: Tasch Locality Noble II-B: NW¼, NW¼, Section 4, Township 23N, Range 1W.

Discussion

Recently, A. G. Ponomarenko and A. G. Kirejtshuk, in an unpublished draft version of a catalog of fossil beetles, placed *Permocoleus wellingtonensis* in the family Tshekarocoleidae Rhohdendorf, 1944. (See: Sistematiceskij spisok iskopaemykh zhukov podotryadov Cupedina, Carabina i Scarabaeina (1-ys Chasty) [Taxonomic list of fossil beetles of suborders Cupedina, Carabina and Scarabaeina (Part 1)], an internet web page at the URL: <<http://www.zin.ru/Animalia/Coleoptera/rus/paleosy0.htm>> dated June, 2007, and last accessed 24 October, 2007.) As noted by Lubkin and Engel (2005), *Permocoleus* and Tshekarocoleidae share vein Rs,

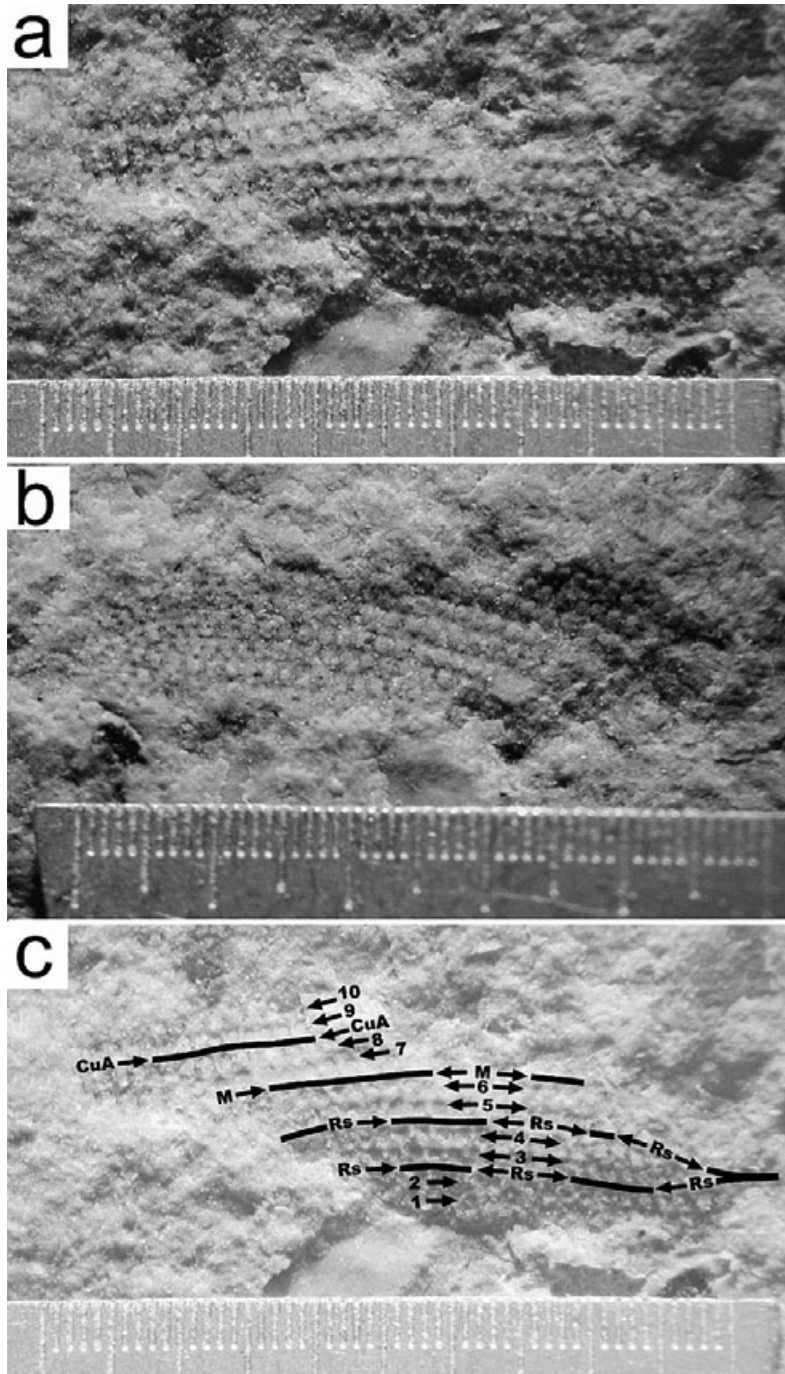


Fig. 1. Fragment of beetle (Coleoptera) elytron: *Permocoelus wellingtonensis* Lubkin and Engel, 2005. Specimen KU-Tasch N-IIB-001a, b. Scale: 0.1 mm per division. a) Part – dorsal aspect of elytron illustrating the convex shape. b) Counterpart – impression of elytron. c) Part annotated with cell row and vein identifications: The ten rows of semi quadrate cells are indicated by numbers 1 through 10. Presumed identification of longitudinal veins indicated by letters: Rs – anterior and posterior branches of radial sector; M – medial vein; CuA – Anterior cubital vein. Black lines show the course of the veins.

however the Tshekardocoleidae possess veins CuP and a series of anal veins, while *Permocoleus* lacks CuP and has only A1. While the Permocupedidae Martynov, 1933 lack the branched Rs of *Permocoleus*, in other respects *Permocoleus* most resembles the Permocupedidae, and might be considered to represent a basal subfamily of permocupedids. Pending the discovery of more detailed specimens and the completion of a phylogeny of basal Coleoptera including fossil groups, we feel it best to leave *Permocoleus* unplaced within the Coleoptera at this time.

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