

New leptoceratopsids from the Upper Cretaceous of Alberta, Canada

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ABSTRACT

Two new leptoceratopsid neoceratopsians are described based on partial dentaries collected from the Dinosaur Park (Campanian) and Milk River (Santonian) formations of Alberta. The new Campanian taxon has a unique dentary tooth shape not shared by other leptoceratopsid taxa, which has implications for the evolution of the Leptoceratopsidae. The Santonian specimen represents the oldest known leptoceratopsid (~83 Ma), and probably represents the smallest adult-sized ceratopsian known from North America.

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1. Introduction

In 1998, Ryan and Currie reported on the first recorded non-ceratopsid neoceratopsian elements from the middle Campanian Dinosaur Park Formation of Alberta, including a partial right dentary and an almost complete left dentary. These remains were originally referred to *Leptoceratops* sp. At that time, the basal neoceratopsian record (excluding isolated teeth) from Late Cretaceous deposits in North America was limited to the Maastrichtian occurrences of *Montanoceratops cerorhynchus* Sternberg, 1951 from the St. Mary's River Formation of Montana, and *Leptoceratops gracilis* Brown, 1914 from the Scollard Formation of Alberta (Brown, 1914; Sternberg, 1951). Recent work has added to the number of basal neoceratopsian taxa known from the Upper Cretaceous of North America and has clarified both the referral of some problematic specimens, and their host formations. Chinnery (2004) and Chinnery and Horner (2007) described *Prenoceratops pieganensis* and *Cerasinops hogkissi*, respectively, from the Campanian portion of the Two Medicine Formation of Montana. Miyashita et al. (2010) referred a frontal from the Devil's Coulee locality of the Oldman Formation of southern Alberta to *Prenoceratops* sp. Makovicky (2001) identified a braincase (AMNH 5244) of *Montanoceratops*

from the Maastrichtian beds of the upper Horseshoe Canyon Formation of Alberta; however, the exact locality for the quarry of this specimen is unknown and it may have been collected from the Scollard Formation, which also has extensive exposure in the area. A review of *Montanoceratops* by Makovicky (2010), building on work by Chinnery and Weishampel (1998), highlighted important information about the skeleton of *Montanoceratops* including the fact that the nasal is unknown for the taxon. Miyashita et al. (2010) clarified that the provenance of TMP 82.11.1, a partial neoceratopsian skeleton referred to *Montanoceratops*, is derived from the Willow Creek Formation (Maastrichtian), rather than the Campanian Belly River Group of Alberta as suggested by Ryan and Currie (1998). Makovicky (2010) suggested that TMP 82.11.1 represents an indeterminate leptoceratopsid that cannot be referred to *Cerasinops*, *Montanoceratops* or *Leptoceratops*, but which may have affinities with *Prenoceratops*. Most recently, *Leptoceratops* has been identified from the Hell Creek Formation of Montana (Ott, 2006).

This new information on the diversity and biostratigraphy of Late Cretaceous basal neoceratopsians from North America allows reassessment of the original referral of TMP 95.12.6 to the genus *Leptoceratops*. As previously noted by Chinnery (2004), TMP 95.12.6 cannot be referred to *Leptoceratops* or *Prenoceratops*. Makovicky (2010) concurred, and further suggested that the specimen is also not referable to *Cerasinops* or *Montanoceratops*. Key anatomical characters of TMP 95.12.6 are reappraised here and incorporated into a numerical phylogenetic analysis for the first time. Results

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indicate that TMP 95.12.6 is distinct from all other leptoceratopsids, and is erected as a new taxon based on the originally described material. A partial right dentary from the Santonian Milk River Formation represents the oldest known leptoceratopsid, and is also referred to a new taxon.

Institutional abbreviations. ANMH, American Museum of Natural History; MNHCM, Mokpo Natural History and Culture Museum, Korea; MOR, Museum of The Rockies; PIN, Paleontological Institute, Russian Academy of Sciences; ROM, Royal Ontario Museum; TMP, Royal Tyrrell Museum of Palaeontology; USMN, United States National Museum; ZCDM, Zhucheng Dinosaur Museum, China.

2. Systematic paleontology

Dinosauria Owen, 1842
 Ornithischia Seeley, 1887
 Ceratopsia Marsh, 1888
 Neoceratopsia Sereno, 1986
 Leptoceratopsidae Makovicky, 2001
Unescoceratops gen. nov.

Type species. *Unescoceratops koppelhusae* gen. et. sp. nov.

Derivation of generic name. UNESCO refers to the World Heritage Site designation conferred upon the holotype locality (Dinosaur Provincial Park, Alberta) by the United Nations Educational, Scientific and Cultural Organization, and “ceratops”, from the Greek meaning “horned face”.

Diagnosis. *Unescoceratops*, gen. nov. differs from *Cerasinops*, *Leptoceratops*, *Prenoceratops*, *Udanoceratops*, and *Zhuchengceratops* in having a gentle rather than pronounced curvature of the ventral margin of the dentary, and from *Montanoceratops*, which has a straight ventral margin. *Unescoceratops* shares with *Leptoceratops* and *Prenoceratops* the flange-like anteroventral margin of the pre-dentary-dentary symphyseal surface, but differs from them in having this flange

developed as a small “chin” projecting below the ventral margin. Additionally, in *Prenoceratops*, the flange is separated from the ventral margin by a notch. *Unescoceratops* is similar to *Leptoceratops*, *Montanoceratops*, and *Zhuchengceratops* in having a dentary that is deeper anteriorly than it is posteriorly (Chinnery and Weishampel, 1998), but the presence of the chin gives its dentary a distinct hatchet-shape when viewed laterally. *Unescoceratops* shares with *Cerasinops* a distinctly recumbent coronoid process, but it can be differentiated from this taxon in having the contacts for the surangular and articular being positioned more posteriorly below the coronoid process. It differs from all other leptoceratopsids for which the teeth are known in that the teeth from the middle region of the dentary are as wide as high and have a rounded lingual profile with marginal denticles that extend almost to the root. The dentary teeth of other leptoceratopsids are much taller than wide, have vertical mesial edges, with the denticles on the mesial edge restricted to the top of the tooth.

Unescoceratops koppelhusae sp. nov.

Fig. 1

Holotype. TMP 95.12.6, a partial left dentary (Fig. 1).

Derivation of specific name. The species epithet honors Eva B. Koppelhus, in order to recognize her contributions to vertebrate paleontology and palynology.

Diagnosis. As for the genus.

Referred specimen. TMP 74.10.31 (Fig. 4), a partial right dentary fragment. This is also from Dinosaur Provincial Park, and probably from the Dinosaur Park Formation, although the exact locality and stratigraphic position is unknown.

Horizon and locality. Bonebed 55 (Fig. 2) in the Steepleville region of Dinosaur Provincial Park, in middle of the Dinosaur Park Formation (Fig. 3), approximately 40 m above the contact with the Oldman Formation. Exact locality information is on record with the Royal Tyrrell Museum of Palaeontology.

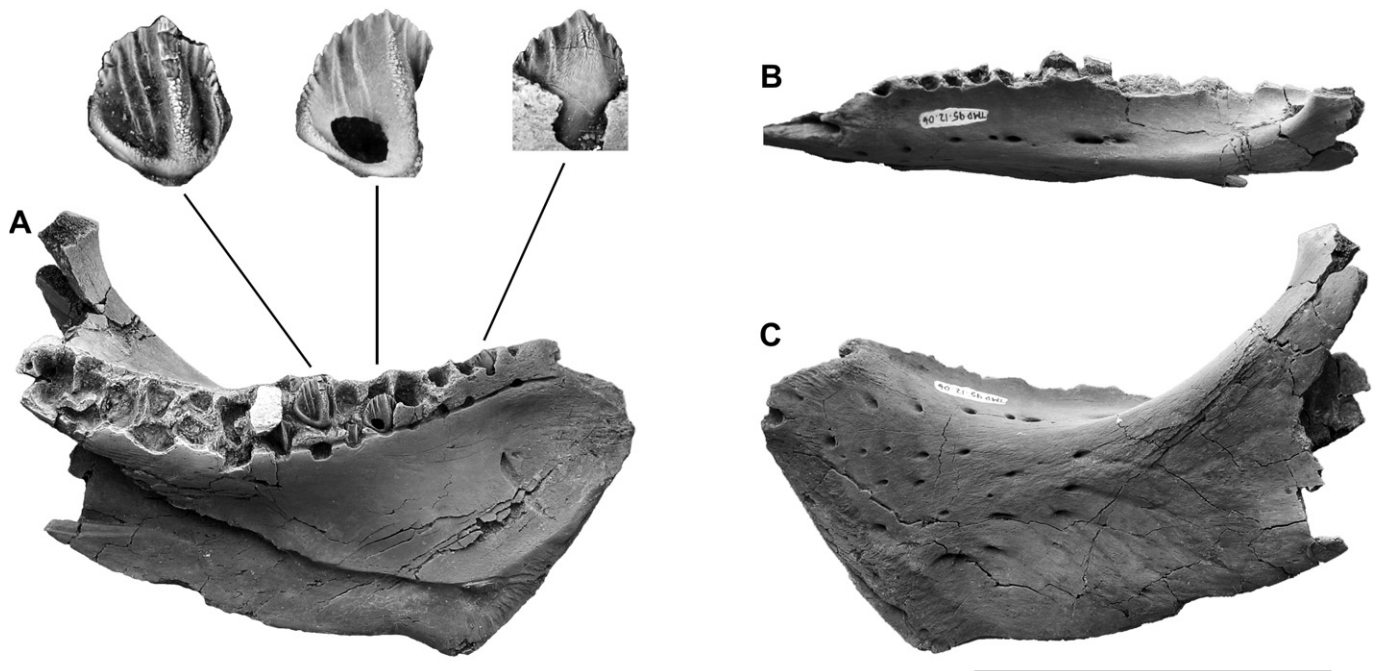


Fig. 1. TMP 95.12.6, a partial left dentary, holotype of *Unescoceratops koppelhusae*, in A, medial, B, dorsal, and C, lateral views. Scale bar represents 10 cm.

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