

New structurally preserved seed cones of *Pityostrobus* from the Lower Cretaceous of Northwestern China and its evolutionary significance

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A new structurally preserved conifer seed cone is investigated from the Lower Cretaceous of Jiuquan Basin in Northwestern China, and could be systematically assigned to *Pityostrobus yumenensis* sp. nov., belonging to Pinaceae. The cones are large (>12 cm), cylindrical, with well-developed helically arranged bracts and ovuliferous scales, which are both thinning distally. Cone axis has a prominent parenchyma surrounded by numerous small cauline bundles and traces. The cortex is constructed by thin-walled parenchyma which is differentiated into an inner zone of light-colored cells and an outer zone of dark cells. Numerous resin canals occur throughout the cortex. Vascular traces to the ovuliferous scales and bracts diverge separately from the vascular cylinder and accompanied by a single resin canal from the pith that is pointed between the arms of the horse-shaped ovuliferous scale trace. The bract trace is diverging as a terete bundle, subtending two small traces to ovuliferous scale. Bracts and scales separate from each other. Two inverted seeds, about 5 mm long and 3 mm wide, are adaxially attached to each ovuliferous scale. A phylogenetic analysis using morphological data from the ovulate cones of extant and fossil taxa of Pinaceae was undertaken to assess the phylogenetic position of the present new species within Pinaceae. *P. yumenensis* appears to be most closely related to the Jurassic pinaceous *Eathiestrobus mackenziei* from the Scotland, *P. hokodzensis* from the Lower Cretaceous of Russia, and *P. californiensis* from the Lower Cretaceous of North America. These seed cones provide further evidence that the pinaceous conifer were undergoing a rapid Cretaceous radiation.