

Beicegel Creek sites is represented by seeds and embryos ("clavate structures") referable to the genus *Spirematospermum*, a zingiberalean taxon known from the Paleocene of Greenland, as well as numerous sites in the Late Cretaceous and Tertiary of Europe and eastern North America.

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**A new closed-cone pine from the Miocene of Nevada**

A new closed-cone pine similar to those of section *Pinus*, sub sections *Attenuatae* and *Oocarpae* (sensu Price et al., 1998) is now known from a single ovulate cone recovered from the Miocene of Nevada. The cone is permineralized showing well-preserved internal cellular structure. It is nearly complete, slightly asymmetrical, and measures 13.2 cm long, 8.0 cm at its maximum diameter. Lack of well-developed embryos suggests it is immature. The vascular cylinder is 3.5 mm thick tapering to 0.5 mm near the apex with resin canals present but rare in the secondary xylem. The cortex is 5 mm thick, the inner half composed of thin-walled parenchyma with up to 38 resin canals arranged in a ring, while the outer portion is sclerotic. Resin canals are 0.25 mm in diameter with epithelial cells visible. Ovuliferous scales are 3.5 cm long, 2 mm thick expanding to 5 mm near the scale apex and show a tongue-shaped bract. Apophyses are 15 mm wide and 10 mm high, the umbo forms a rounded projection up to 10 mm long. The seeds are two per scale, winged, and have a thick pad of parenchyma tissue at the wing base. The seed body is 6-7 mm long and 2.5 to 3.0 mm in diameter with a wing up to 18 mm long. Features of the cone that indicate affinity with pines of Subsections *Attenuatae* and *Oocarpae* include: asymmetrical shape, broad outer cortex constructed of sclerenchyma, a pronounced pad of parenchyma tissue at the base of the seed wing, and a tooth-like prolongation of the umbo. This new cone adds to our knowledge of closed cone pines in the Tertiary of western North America.

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**Fungi from the Permian of Antarctica**

Fossil fungi from silicified peat of Late Permian age from Skaar Ridge in the central Transantarctic Mountains in Antarctica are described. Chytridiomycetes include several stages of the life cycle of morphologically diverse and widespread holocarpic, monocentric, and inoperculate endoparasites occurring in various hosts from the Permian ecosystem. Based on thallus morphology and development similarities with Synchytriaceae (Chytridiales), particularly *Synchytrium*, are suggested. Zygomycetes are represented by clusters of variously shaped terminal and intercalary chlamydospores with an ornamented complex wall structure and with hyphae associated in diverse patterns. These characteristics together with the chlamydospores occurring in clusters within silicified plant remains, possibly *Vertebraria* roots, suggest affinities with endomycorrhizal fungi (Glomales), particularly *Glomus*. The fragile nature and the simple morphology of fungal structures have limited the study and documentation of fungi in the fossil record. Notwithstanding, as increasing amounts of data on the biology, distribution, and identity of fossil fungi becomes accessible, a better understanding of the history of the complex biological interactions and processes of fungi with other biological entities in ancient environments is possible.

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**If a Forest Falls, Do the Trees Hear It? Eco-morphological Dynamics of the Cretaceous-Tertiary Boundary Event**

The extinctions that took place at the Cretaceous-Tertiary boundary restructured animal populations to such an extent that we base major chronostratigraphic subdivisions on the faunas that dominated them. The plant fossil record, however, does not always show the same dynamics as the faunal record. In particular, our eco-morphological analysis of fossil leaf occurrences through the Mesozoic and Cenozoic eras, when binned by geological epoch, shows no morphological perturbation of plant ecosystems at the Cretaceous-Tertiary boundary comparable to the changes associated with the rise of angiosperms, 50 million years earlier. This substantiates some of our standing assumptions about the selectivity of extinctions at the end of the Cretaceous, which may have eliminated taxa but do not seem to have restructured plant ecosystems significantly. It provides an example of ecosystem stability under environmental perturbation and highlights the influence of evolutionary innovation on evolutionary history.

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**Fruits and foliage of *Cercis* from the Late Eocene of Oregon**

The fossil history of Cercideae is of particular interest because this tribe is monophyletic and sister to all other legumes. However, Cercideae are poorly represented in the fossil record as compared to many other groups of woody legumes. As a step in tracing the fossil record of this group, we introduce a new Eocene record for the genus *Cercis*. The fruits and leaves are preserved as impressions in shale of a late Eocene (ca 36-38 ma) pond deposit known as the Teater Road site in the John Day Formation of eastern Oregon. The legume fruits and leaves exhibit several morphological characters that, in combination, are only found in the genus *Cercis*. The fruits are membranous with a narrow non-vascularized wing along the placental suture. The leaves are unifoliate and possess two pulvini—one at the junction of the petiole with the base of the cordate lamina and the other at the base of the petiolule. This fossil taxon represents the oldest verified representative of the genus *Cercis*. These fossils occur in a diverse warm temperate assemblage that also includes *Salvinia*, *Acer*, *Allanthus*, *Alnus*, *Craigia*, *Dipteronia*, *Engelhardia*, *Eucommia*, *Koelreuteria*, *Hydrangia*, *Mahonia*, *Paliurus*, *Quercus*, *Ulmus* and the extinct genera *Cedrelospermum*, *Chaneya*, and *Florissantia*. *Cercis* is the only temperate member of the tribe Cercideae; the other genera are tropical and subtropical. Because several other lineages of legumes are known already from the late Paleocene, we conclude that the Cercideae must have been present, but its early fossil record remains undiscovered or unrecognized.