Plant Fossils Discovered in Badlands National Park



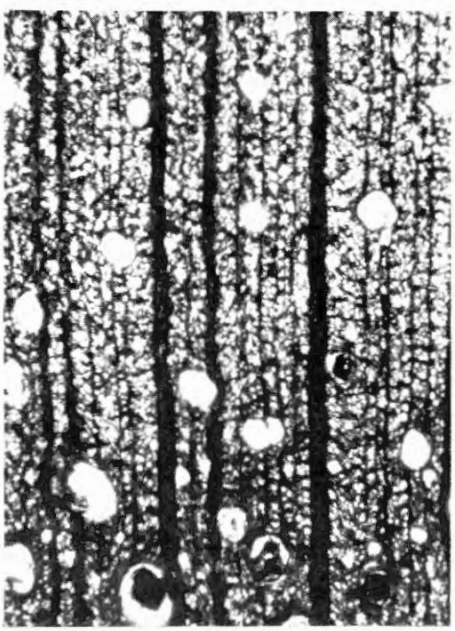
From near the contact *between the Scenic and Poleside members of the Brule Formation, an in situ fossil root with exceptionally well-preserved surface detail. This specimen has been left in place in the field.*

By Jay Shuler and Vincent Santucci

A uniquely rich Oligocene fauna was cited by Congress in the 1929 Act authorizing creation of a National Park unit in the White River Badlands of South Dakota. In taxonomy, the fossils range from snails to primates; in size, they vary from minute lizards to elephantine titanotheres; and in population and number of species, they may outrank the present day herds of the Serengeti.

Paradoxically, except for widespread endocarps of hackberry, so few plant fossils have been reported from the White River formations that they have been little considered in constructing a view of the Oligocene environment here. Cleophas C. O'Harra in his classic *The White River Badlands* (1920) makes no mention of fossil plants, and John Clark, who to date has done field work in the Badlands for half a century, wrote in 1967 of "the absence of paleobotanical materials," and questioned the existence of fossil soils in these formations.

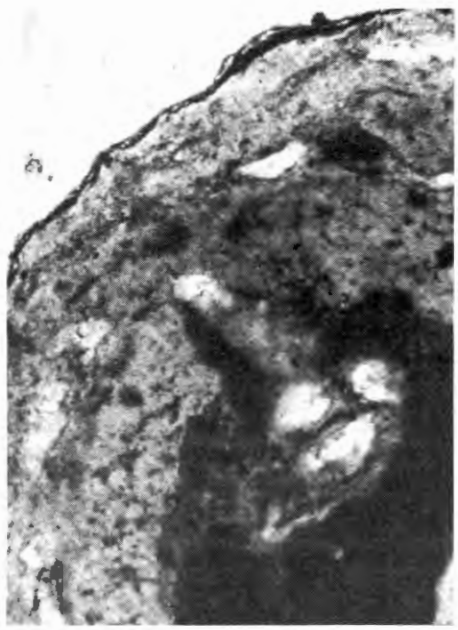
In a series of papers published between 1982 and 1985, Greg Retallack recognized root traces throughout these formations, and discerned 87 fossil soils. However, Retallack ventured no taxonomic conclusions about the traces, saying "vegetation has a very poor record in the Badlands."



Cross section of fossil wood *of a tropical tree resembling Diptocarpaceae. Members of this family are important timber trees in the Indo-Malayan region. This specimen came from the lowest level of the Chadron Formation.*



Closeup of the same specimen *showing tyloses (calluses or knobs). Roots and part of the stump were present when about 30 pieces were collected in the South Unit of Badlands NP in 1971 by Jim Legg of the Bureau of Indian Affairs and John Stockert of the park staff.*



At this point *in the study of these specimens, this appears to be a palm root. It is less well preserved than the wood of the tropical tree. Preservation varies by site and specimen.*

The perception that the Badlands has a poor plant fossil record, compounded by the focus on vertebrate fossils, may have discouraged scientific search for plant fossils. Actually, it turns out that plant fossils are abundant in the Badlands Oligocene. In 1985 park personnel found fossil roots in situ (the first by seasonal interpreter Alan Scott), and petrified wood, at numerous sites in the field and also in the park museum collection. In thin section some specimens show cellular structure and original organic material.

Several of the thin sections look like fern, one like palm, and another like a tropical tree of the *Diptocarpaceae* (see photographs and captions for additional information). Collection continues. The study of these specimens by Dr. Wm. D. Tidwell of Brigham Young University will be published on its completion.

Discovery of these fossils suggests that additional research projects will be fruitful and that flora of the White River Formations will become better known.

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***These structures** appear to be the vascular bundles of a fern. Another thin section, not illustrated here, shows what seems to be a leaf trace arising from a fern rhizome. Both the "palm" and the "ferns" were collected from the middle of the Scenic Member of the Brule Formation.*