

K-T Boundary

View looking eastward at Zahursky Point

Age and lithology of strata at Zahursky Point and the environments/ecosystems in which they were deposited		
	Lithology	Environment/Ecosystem
65.5 Ma	Tertiary sandstone, siltstone, mudrock and coal	coal swamps, swamp margins, floodplain lakes; mammals and mostly wind-pollinated plants
	Cretaceous olive-grey mudstone and sandstone, and yellow-grey sandstone	well-drained floodplains; dinosaurs, prominence of animal-pollinated plants

Location and directions:

Contact park staff and obtain an East Block map from the park website, or its Visitor Centre in Val Marie. Park at the Rock Creek Camping and Picnic Site¹. Make your way up to the eastern edge of the rim overlooking Rock Creek and follow a mowed prairie trail south, aiming for a prominent knob known as Zahursky Point²(~11 km round trip). Descend to the valley floor for the best view of this GeoVista. You can also approach Zahursky Point²from the south. Travel to the Poverty Ridge Operations Station, continue west through the yard along a bladed trail to the park boundary³and park your vehicle. Hike north along the rim towards Zahursky Point²(~5 km round trip).

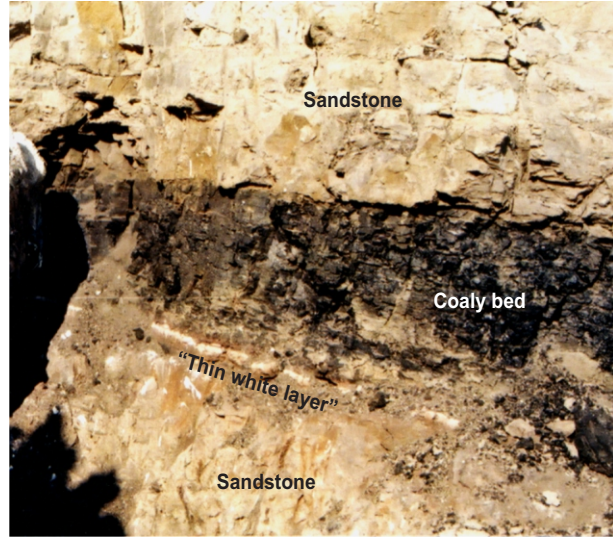
1 GPS coordinates: N49° 04.2720', W106° 31.7820'
 2 GPS coordinates: N49° 02.1755', W106° 32.1403'
 3 GPS coordinates: N49°01.2720', W106° 31.8240'

Introduction

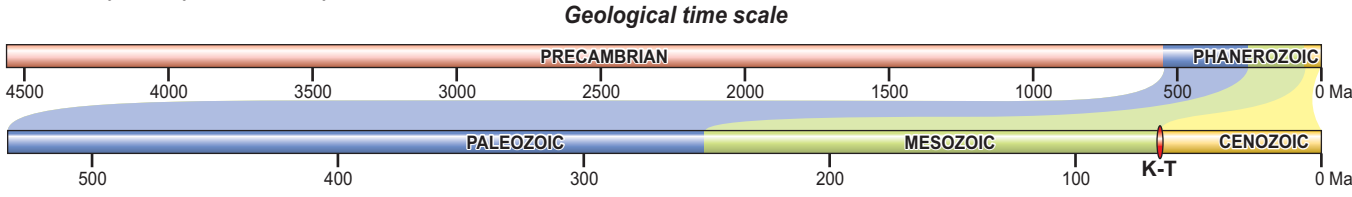
Zahursky Point, located on the east side of the Rock Creek badlands, is named after the Zahursky family who homesteaded here in 1912. The spectacular dissected badland topography is a result of severe erosion of alternating layers of hard and soft rocks. Limited, but often torrential, rainfall in summer and snowmelt in spring preferentially erode the softer rocks creating steep slopes and abundant gullies on valley walls. Buttes and plateaus form where softer rock layers are capped by more resistant strata that offer protection from erosion. Plants in the badlands need to adapt to intense erosion. From hill crests populated by moss phlox and rubber weed, to slopes interspersed with junegrass, blue grama grass, broomweed, umbrella plant and pasture sage, to a slope base of juniper and rabbitbrush, there's a lot here. Shrubs such as sagebrush and greasewood are present but rare. A vibrant lichen community is found anywhere you look closely!

Cretaceous - Tertiary (K-T) boundary beds

Zahursky Point is one of the best locations in North America to observe the Cretaceous-Tertiary boundary. Geologists look at the layered rocks exposed here and see 2 million years of time sporadically recorded by accumulations of sediment deposited in a succession of lakes, river channels, floodplains and swamps. A keen eye might spot a 1-2 cm-thick pinkish-white layer near the top of this butte. This is the lowest of a succession of layers recording, on the more human time scale of hours, days, years and decades, the physical events generated by a 10-km diameter asteroid striking Earth in the Yucatan Peninsula, Mexico some 65.5 million years ago to end the Cretaceous Period. These remarkable layers mark the time in the Earth's history when dinosaurs died out forever and, directly or indirectly, so did about 50% of the fossilizable plants and animals living moments before the impact. Given the usually imprecise nature of the geological record it is incredible to realize that this same succession of centimetre to millimetre thick layers can be found from New Mexico to Saskatchewan and into Alberta.

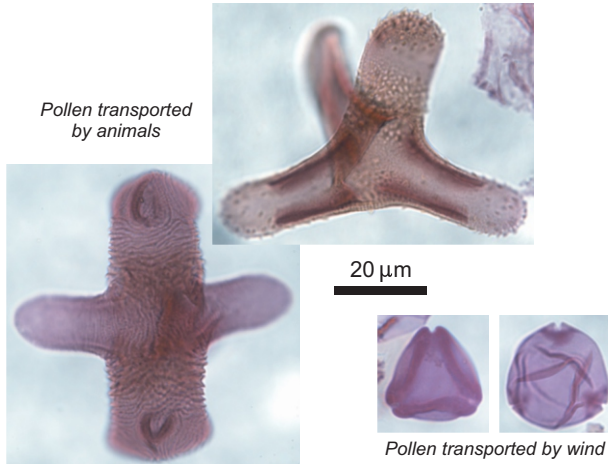


The thin white layer shown in this photo marks the Cretaceous-Tertiary boundary. It originated from glass beads solidified from the molten rock projected over much of North America upon the impact of an asteroid in the Yucatan Peninsula. Glass beads that were deposited in swamps and ponds in southern Saskatchewan were, through time, changed to kaolinite, a white clay. The overlying rusty brown to black impact layers (1 to 1.5 cm in total thickness) are enriched in iridium from volatilized and finely fragmented asteroid debris, and include "shocked" micro-laminated quartz that was formed by the shock of the impact on Earth rocks.



Plants across the K-T boundary

Fossil pollen recovered from the rocks below the K-T boundary at Zahursky Point tell us that the late Cretaceous landscape was dominated by broken canopy forests of gymnosperms (cone-bearing conifers) with an understory of ferns, and open glades covered by a mixture of ferns and angiosperms (flowering shrubs and herbs). Many of these angiosperms produced exotic-looking pollen which, by analogy to modern plants, suggests that their flowers would have been showy, perfumed and nectarous – an adaptation to entice pollination by animals.



Above the K-T boundary, plant fossils suggest a different world – an early Tertiary landscape of swamps, lakes and rivers with coniferous forests, ferns and angiosperms. However, most pollen from Tertiary flowers have simpler shapes and reduced sculpture. In modern plants, this type of pollen is adapted for wind transport and is associated with small inconspicuous flowers such as those seen in poplar or birch. The pollen evidence suggests that the shift across the K-T boundary from beautiful, complex, flowering plants to simpler, wind-pollinated plants may be the result of the extinction of animal pollinators.

Herds of the past

Bison formed the last of the great free living herds of plant eaters to occupy the area around Zahursky Point. Their bones are still found as they wash out from recent sediments. Taking a big step back through time, to rocks the same age as those below the Cretaceous/Tertiary boundary at this GeoVista, this area was home to herds of plant eating dinosaurs such as *Edmontosaurus* and *Triceratops* and their tyrannosaurid predators. The first recorded discovery of dinosaur bones in the Rock Creek badlands was made in 1874 by George Mercer Dawson, a geologist travelling with the North American Boundary Commission. In 1919, a new species of duck-billed dinosaur, *Edmontosaurus saskatchewanensis*, was discovered in these badlands and a nearly-complete skeleton of *Triceratops* was recovered in 1964. New discoveries continue to contribute to our knowledge of these enigmatic animals.



Skull of duck-billed dinosaur, *Edmontosaurus saskatchewanensis*, discovered in Rock Creek badlands in 1919. These animals grew to up to 12 metres in length and each had nearly a thousand teeth that were used to grind plant material before digestion. Photo courtesy of Royal Saskatchewan Museum.

Want to know more?

Consult these publications and websites:

Grasslands National Park:
www.pc.gc.ca/pnnp/sk/grasslands/index_E.asp

Grasslands National Park Field Guide, 2000 (available from Prairie Wind & Silver Sage - Friends of Grasslands: www.pwss.ca)

Geoscape Southern Saskatchewan: www.geosapesask.ca

Royal Saskatchewan Museum:
www.royalsaskmuseum.ca/http://www.royalsaskmuseum.ca

Sweet, A.R. (2001) *Plants, a Yardstick for Measuring the Environmental Consequences of the Cretaceous-Tertiary Boundary Event*; *Geoscience Canada*, Vol.28, No. 3, p. 127-138:
<http://journals.hil.unb.ca/index.php/GC/article/view/4087>

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Grasslands National Park, East Block Zahursky Point

Look at the present - think of the past

Hidden in the rocks before you are many stories of geological processes, including those associated with one instantaneous event that profoundly affected life on Earth. Fossils, big and small, play an important role in interpretation of the history of these rocks

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