

# Geology of the Cypress Hills

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The most casual visitor to the Cypress Hills of Saskatchewan must sometimes wonder what these highlands are made of, and how they came to be. I shall attempt briefly to present the findings of geologists in this intriguing area.

Let us first look at a simple geologic column of the formations (rock layers) out of which the Hills are carved.

<i>Formation</i>	<i>Thickness, in feet</i>	<i>Composition</i>	<i>Geologic Period</i>	<i>Time, years ago</i>
Glacial Drift	0-200(?) Generally scanty	Mixture of clay, sand and boulders	Pleistocene	25,000-1,000,000
Cypress Hills	300-550	Mostly hard conglomerate-quartzite cobbles mixed with sand and cemented	Oligocene	About 30,000,000
Ravenscrag	0-230, generally about 200	Mostly yellowish silt, some grey clay, and coal	Paleocene	60,000,000-70,000,000
Frenchman	10-200 generally 60-80	Some yellow sandstone, much grey clay, no coal	Upper Cretaceous	70,000,000-100,000,000
Battle	0-40, usually 15-25	Black clay	Upper Cretaceous	70,000,000 100,000,000
Whitemud	50-75	Chalky white clay	Upper Cretaceous	70,000,000 100,000,000
Eastend	About 70	Grey sand; much grey clay	Upper Cretaceous	70,000,000 100,000,000
Bearpaw	900-1000	Sterile grey clay	Upper Cretaceous	70,000,000 100,000,000

These formations are poorly exposed in the Park and elsewhere along the north side of the hills, owing to a heavy coating of glacial drift. For good exposures, one must go to the southern slopes, especially the valley of the Frenchman river around Eastend. Ravenscrag Butte, on the north side of the river between Eastend and Ravenscrag, exhibits these strata in most impressive cliffs.

The geologic history begins, for the purposes of this discussion, with a great Upper Cretaceous sea depositing the Bearpaw shale. This sea withdrew eastward; more exactly, the land rose, starting at the west. The sands of the Eastend formation mark the changes from shallow sea to low

land built up at river mouths. The Whitemud, Battle, Frenchman, and Ravenscrag formations are all non-marine, laid down on land by rivers draining down from the rising Rocky Mountains. The Whitemud (which is mined for ceramic clay at Eastend) carries fossil leaves of hardwood trees. Fossils of horned dinosaurs, among the last of their race, have been collected from the Frenchman along Conglomerate Creek northwest of Eastend. The coal of the Ravenscrag indicates moist flats thickly covered with mixed forest; apparently that much uplift was going on just then. Later on renewed uplift caused the rivers to cut down and erode sediment, rather than deposit it; and on

almost all of Southern Saskatchewan uplift and erosion have continued, interrupted by the Ice Age, until the present day.

In the Cypress Hills region matters took a somewhat different turn. About Oligocene time there must have been a fairly sudden uplift in the Rocky Mountains; one or more rivers were able to carry pretty fair sized cobbles (up to eight inches across) of hard quartzite down from the mountains and deposit them upon the plains. This is the origin of the Cypress Hills conglomerate, that hard layer which now caps the hills. This ever-laid conglomerate most likely once extended much further north and south than it does now. It has been eroded away by rivers except atop the Cypress Hills; they stand because this is where the divide between north and south flowing river system happened to be before the Ice Age. The height and steepness of the slopes comes about because the hard layer overlies a great thickness of soft rocks. If a river cuts through such a hard layer, the soft layer all waste speedily away; but the soft layers cannot be attacked until the hard layer is cut through. We emphasize that the Cypress Hills are not uplifted folded mountains like the Bearpaw Mountains 60 miles to the south; geological reports disagree about the position and even the existence of faint folds in the hills.

The last major event in the geologic history of the Cypress Hills was the Ice Age. The great ice sheets coming from the northeast had lost a lot of pep by the time they arrived here. There are no glacial deposits above 4500 feet (that is, in that part of the West Block west of Battle Creek); and on most of the rest of the plateau, or Main Bench, the odd erratic (limestone or granite boulder)

here and there make up the evidence for the presence of continental ice. During most of the Ice Age the edge of the ice sheet lay up against the north face of the plateau, depositing morainic debris there. The south side was only rarely iced over, and what ice was present was present seems largely to have flowed around the east end, by way of Dollard. The chief result of the Ice Age in the Cypress Hills was that, since the ice lay to north, the south-flowing rivers were able to cut their valleys headward right up to the ice front, almost across the hills—Belanger Creek in the Park is a fine example.

For those who wish to pursue the subject further the following reports (from which much of this has been cribbed) may be of interest.

### COLOURED PRINTS OF MUSEUM HABITAT CASES

The Regina Natural History Society has for sale coloured prints of Museum habitat cases. These are the reproductions that have been used for covers for the Saskatchewan Teachers' Federation *Bulletin*. Size 6"x10", with short descriptive text. Price: 15c per print, or \$1.25 per set of seven in special envelope. Subjects: Whooping Crane, Pelican and Cormorant, Great Blue Heron, Beaver, Wolf, White-tailed Deer, "Bambi".

Write:

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CYPRESS LAKE MAP-AREA, by G. M. Furnival. Geol. Surv. Canada Memoir 242. Queen's Printer, Ottawa, 1946.

GEOLOGY OF EASTERN CYPRESS HILLS, by W. O. Kupsch. Sask. Geol. Survey Report No. 20. Queen's Printer, Regina, 1956.

GEOLOGY OF SOUTHERN SASKATCHEWAN, by Fraser, McLearn, Russell, Warren, and Wickenden. Geol. Surv. Canada Memoir 176. Queen's Printer, Ottawa, 1935.

GEOLOGY OF THE SOUTHERN PART OF THE CYPRESS HILLS, by L. S. Russell. Sask. Geol. Survey Report No. 8. Queen's Printer, Regina, 1948.