

## "THE ROCK PILE," CYPRESS HILLS, SASKATCHEWAN

RUDY W. KLASSEN, Geological Survey of Canada, 3303 - 33 St. N.W.,  
Calgary, AB. T2L 2A7

The origin of an unusual arrangement of sandstone blocks near Fort Walsh National Historic Park in the Cypress Hills of southwestern Saskatchewan (Figure 1) has long been a topic of speculation by visitors to the site (Anderson, 1989). Known locally as "The Rock Pile," this feature is on the crest of a ridge along the west side of Battle Creek Valley (Figures 2, 3) which separates two heights of land, the upper one referred to as the West Block. Speculation concerning the origin of this feature has its basis in the man-made appearance of closely fitted rectangular and square-shaped blocks of sandstone at the terminus of the ridge crest (Figures 4, 5, 6). Boulders, which elsewhere on the ridge crest appear somewhat scattered, form a platform about 20 by 30 m at the terminus. This arrangement of blocks with flat faces at right angles, contrasts with the wider spacing and scattered nature of generally smaller blocks and semi-rounded boulders elsewhere on the crest of the ridge (Figure 3). A cursory survey of this site leaves one with the impression that intelligent beings arranged the blocks. This aspect gave rise to the suggestions that it may have been "the farthest northern outpost of the Mayan or Aztec civilizations" and that it led aboriginal people to refer to the area as "the dreaded hills" (Anderson, 1989).

Study of the site in a geologic and geomorphic context leaves no doubt that it was formed by natural processes and that the role of man appears to be restricted to inscriptions and graffiti seen on some of the exposed rock faces. A natural origin does not, however, detract from the uniqueness of the site and its setting in this part of the prairies. Unlike the surrounding prairie landscapes that were shaped by the last glaciation and its meltwaters about 15,000 years ago, the upper surfaces of the West Block and the main part of the valley occupied by Battle Creek were never glaciated (Klassen, 1991, 1992). The indirect effects of glaciation are, however, evident along the lowest part of the valley which formed as a glacial meltwater channel (Figure 7).

The geologic succession exposed along the sides of the preglacial valley consists of several rock formations (Figure 7). The lowest formations (Frenchman and Bearpaw) consist mainly of soft, erodible silt and clay, whereas the overlying Ravenscrag Formation consists of loose sand in places cemented by carbonates into a massive sandstone. A cap of bouldery gravel (Cypress Hills Formation) forms a resistant surface over the highest parts of the West Block.

The positions of the sandstone blocks and the patterns they form along the terminus of the ridge crest (Figures 4, 6) reflect their origin within the Ravenscrag Formation and the effects of natural phenomena known as joint systems. The sandstone bodies seen in exposures of the Ravenscrag Formation range in size from elongate, bed-like forms tens of metres long to ovoid pods several metres long enclosed in loose sand. Joints are fractures or breaks formed in rock bodies as a result of the nature of the rock properties and the effects of other natural processes. Where vertical joint systems occur in large rock masses, they may form various surface patterns such as the hexagonal ones on some lava beds or rectangular to square patterns as seen at "The Rock Pile." The closely spaced blocks along the ridge crest result from vertical joint systems in a large body of sandstone that remains in its original position. Sets of continuous joints are oriented in a north-south trend and sets of shorter, offset joints along an east-west trend (Figures 4, 6). The upper surfaces of the blocks reflect the former contact of the sandstone body with the enclosing sand, whereas the bottoms remain imbedded in soft sediments protected from erosion by the blocks (Figure 5). Blocks and boulders elsewhere on the ridge (Figures 2, 3) originated from smaller sandstone bodies. They have been separated and scattered to a greater degree than the blocks along the terminus of the crest as a result of the erosion of the enclosing sand and further separation by slope processes such as rock creep, whereby individual blocks move slowly downslope.

Boulders resting on the surface of the blocks along the terminus of the ridge crest (Figure 6) were likely lowered on to the surfaces when the support of loose sand was removed by erosion. Various degrees of roundness of sandstone boulders (Figure 3) and bowl-shaped weathering pits on the upper surfaces of the closely spaced blocks (Figure 8) reflect prolonged weathering. These exposures may date back to the time when valley excavation began some five million years ago. The cap of sandstone blocks along the terminus of the crest will in time be removed as a result of erosion and rock creep. Exposed rock surfaces will undergo more intensive weathering and resemble the scattered rocks seen on parts of the ridge and elsewhere along the valley sides.

"The Rock Pile" will likely continue to fuel speculation concerning its origin because it is an unusual and intriguing display of the results of natural phenomena.

## References

- ANDERSON, F.W. 1989. Fort Walsh and the Cypress Hills Gopher Book No. 8, Privately published by F.W. Anderson, Regina Saskatchewan.
- KLASSEN, R.W. 1991. Surficial geology and drift thickness, Cypress Lake, Saskatchewan Geological Survey of Canada, Map 1766A, scale 1:250,000
- . 1992. Nature, origin and age relationships of landscape complexes in southwestern Saskatchewan. *Geographie physique et Quaternaire* 46: 361-388.
- WHITAKER, S.H., 1967. Geology and groundwater resources of the Cypress Lake (72F) area, Saskatchewan Research Council Geology Division, Map No. 22.



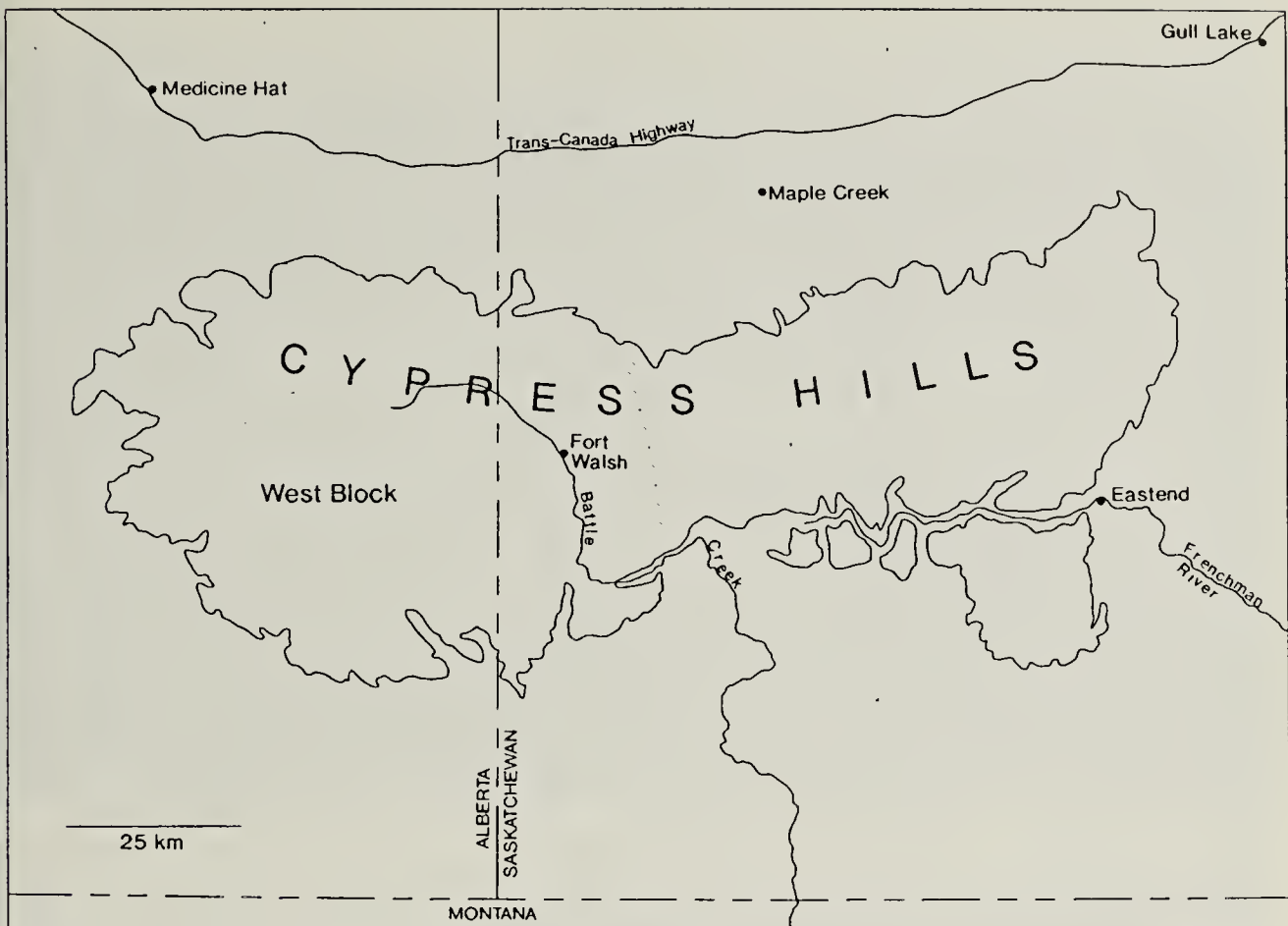


Figure 1. Map showing the location of Fort Walsh National Historic Park in the Cypress Hills of southwestern Saskatchewan.



Figure 2. Ridge capped by sandstone blocks referred to locally as "The Rock Pile" (SE 1/4 sec. 8, tp. 7, rge. 29, W3) along the west side of the preglacial Battle Creek Valley. Sandstone and sand of the Ravenscrag Formation forms the highest part of the ridge to the left and a residual of sandstone boulders covers the lower part of the ridge to the right. View is north towards the upland surface on the horizon. ISPG photo 4173-8.





*Figure 3. Rocks on the ridge crest in the foreground are weakly aligned residuals of closely spaced blocks similar to the ones capping the ridge terminus shown in Figure 4. The east wall of a meltwater channel occupied by Battle Creek can be seen just beyond the main belt of trees. View is to the east across the preglacial Battle Creek Valley. ISPG photo 4173-5.*



*Figure 4. Surface of closely spaced sandstone blocks about 2 to 5 m long and 1 to 2 m wide along the terminus of the ridge in Figure 2. Note the surface pits and rounded edges of blocks. View is to the east across the valley. ISPG photo 4173-2.*





*Figure 5. Vertical faces of blocks that form the outermost part of "The Rock Pile." Note the boulder resting on the upper surface of a block. View is west towards the valley wall. Scale is in feet. ISPG photo 4173-6.*



*Figure 6. Surface of the platform of sandstone blocks that form part of "The Rock Pile" along the terminus of a ridge crest. The rectangular and square blocks resulted from the intersection of sets of vertical joints trending north-south and east-west. ISPG photo 4173-1.*



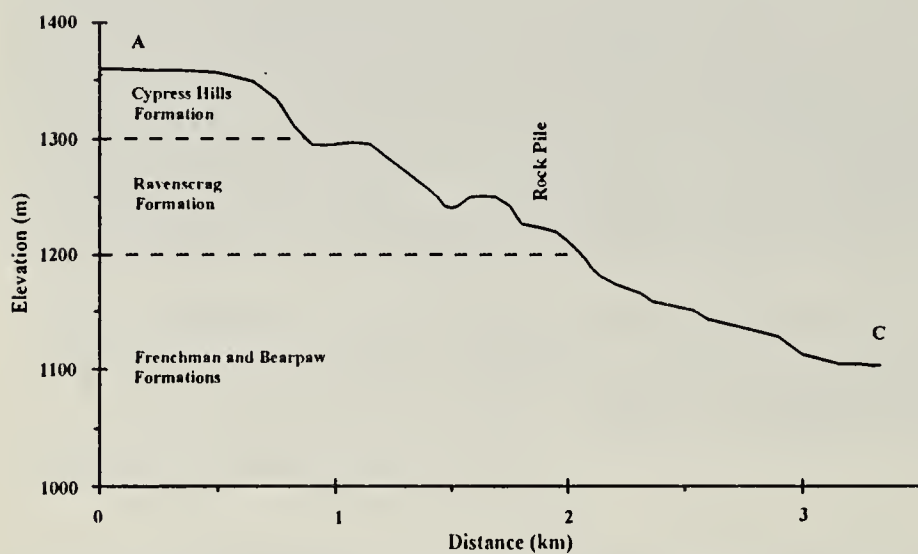
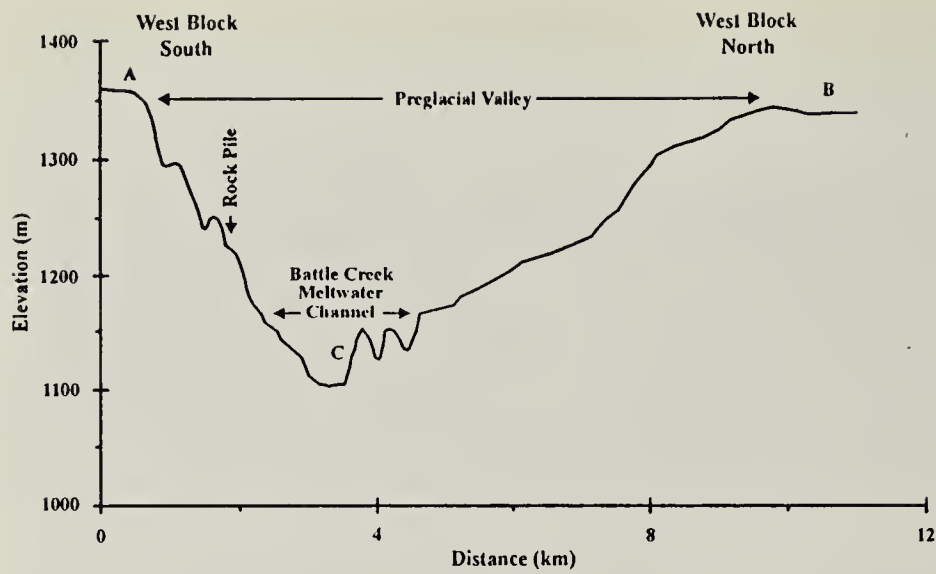


Figure 7. Topographic profile ACB taken north-south across preglacial Battle Creek Valley near Fort Walsh (upper figure) and geologic cross section AC of the south side of the Valley (lower figure).



Figure 8. Bowl-shaped weathering pit about 30 cm in diameter and 10 cm deep on the surface of a sandstone block (see figure 4). Scale is in feet. ISPG photo 4173.