

GEOLOGY FIELD TRIP
ACADIA NATIONAL PARK

LED BY TOM LOWELL, UNIVERSITY OF MAINE
Notes by Lois Winter, September 1984

Stop #1: Road cut at north end of Tarn on Rt. 3

About 10 years ago, Route 3 was widened. The soil protecting much of the bedrock was shorn off, exposing the rock surface.

Special features to note:

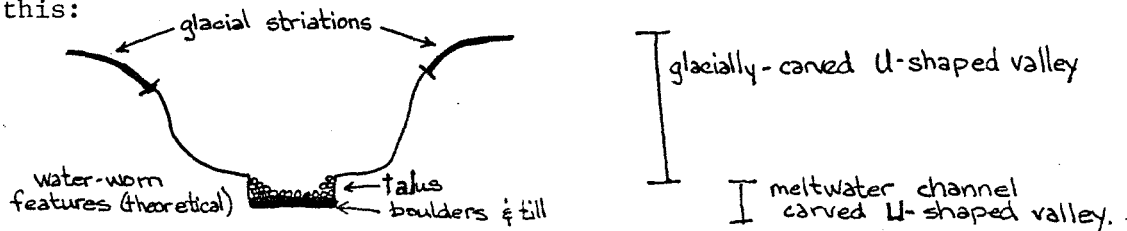
1. Compare appearance of freshly exposed rock (10 years old) to nearby weathered rock (presumably 13,000 years old) high up the slope.
2. Distinctive vertical and horizontal joint system creates a blocky appearance to the bedrock.
3. Stoss and lee topography, caused by glacial plucking. (Compare general appearance of bedrock looking north and looking south. Looking north, the rocks are jagged; south, the rocks are rounded.
4. Friction cracks, created by glacial boulders pounding into bedrock.
5. Inclusions in the granite. (Here, near the meeting of the molten rock with country rock, inclusions of country rock are typical.)
6. Glacial striations. (The general trend of striations is 30° off from the direction of plucking. Plucking occurred when the ice was thick and topography had little affect on the direction of ice movement. Striations were created when ice was thin and the movement of glacial ice funnelled through the valleys.)

Random tidbits:

1. Observation: We can detect evidence of plucking only partway up the highest mountains (ie Dorr Mt.), but we can find plucking up to the summit of the lower mountains (ie Huguenot Head)
Conclusion: Glacial plucking, the "workhorse" of glacial carving, predominated in valleys, not high mt. peaks. With approximately 20-30 subsequent glaciations, perhaps a total of 200 m. has been carved off summits while perhaps 400 m. has been carved out of valleys. (Note: 200 m. & 400 m. are not based on scientific study; rather they are ballpark figures to illustrate an idea.)
2. Observation: The spacing pattern between valleys on MDI is regular. Stream valleys can often be cut across a mountain ridge in an irregular pattern. However, glacial action generally creates a regular pattern. A certain width of glacial ice will concentrate in a certain area, creating an even spacing of valleys.
Conclusion: The even spacing of Acadia's valleys supports the theory that valleys were carved first by glaciers, NOT streams.

Stop #2: Otter Creek, looking towards Gorge

3. Observation: Valleys high in the mountains typically have cross-sections like this:



examples: a) Gorge between Dorr and Cadillac and b) valley between Huguenot Head and Champlain.

Conclusion: The glacier carved the large U-shaped valley. At the base

of the glacial ice, a subglacial meltwater channel carved a smaller valley. This channel probably formed in the middle of a period of general glacial recession. (Early in glacial recession, there wouldn't have been enough meltwater available to create a subglacial channel. Late in glacial recession, when ice became thin, the subglacial meltwater channel would have been diverted to lower elevations.) The source of the subglacial dendritic meltwater channel was probably located several kilometers north of the notch. The meltwater flowed south and perhaps bumped into one of the mountains, which diverted the meltwater flow through the notch. This meltwater channel formed a U-shaped valley. (Normally streams form V-shaped valleys, but the blocky nature of the bedrock meant that stream action on MDI eroded large blocks out of the bedrock, creating the atypical cross-section.) The bottom of the U-shaped valley is littered with glacial debris (ie till and boulders) deposited by ice which dropped it's load after the meltwater channel vanished. Later, talus fell into the valley, creating a superficially U-shaped cross section in the small valley. Evidence of water-worn erosion features is restricted to the notch area in the small meltwater channel. As the glacier retreated, and the meltwater channel disappeared, evidence of water erosion north and south of the Gorge was erased by glacial action.

Stop #3: Hunter's Brook, near it's intersection with Park Loop Road and Rt. 3.

Observation: Marine clays have been deposited in at least 3 prominent locations:

1. Near shoreline down the slope from the Fabbri Memorial.
2. Bank of Hunter's Brook near it's intersection with the Park Loop Road.
3. Jordan Stream

Shells dated from these clay deposits were alive approximately 12,200 B.P.