Lab 10: Volcanic rocks on Île Sainte Hélène

EPSC 240, Geology in the Field

Nov 7, 2018

Due date: Wednesday Nov 14

Meet: 1:35 pm in FDA 348, or at 2:30 at parking lot P13 on Île Sainte Hélène (Parc Jean Drapeau). If you travel with me by Metro, I will buy your round trip Metro ticket. If you travel on your own, save your receipts and tickets! Do not use a prepaid OPUS card because I can't reimburse you for that.

From the McGill Metro station: Board the Green Line east toward Honoré-Beaugrand. Get off in 3 stops at Berri-UQAM and board the Yellow Line toward Longueuil. Get off at Jean Drapeau. Walk 1.1 km north toward the Jacques Cartier Bridge. The outcrop is in parking lot P13, just west of the ramp from the bridge.

Bring: Notebooks, chalk, hand lens (hammer optional)

Wear: Dress warmly! We will be outside until about sunset. Wear comfortable shoes as we will be walking 1.1 km (about 15 minutes) from the metro station to the outcrop (and back as well), and will be working outside for about 2 hours on the island.

Instructions: We will visit a diatreme breccia on Île Sainte Hélène. This igneous rock is about 125 million years old, associated with the Monteregion volcanics. The diatreme eruption was so explosive that it fragmented the surrounding rock as it raced toward the surface, so it contains large and small clasts of the country rock and can be classified as a volcanic breccia. Similar rocks on Île Bizard (off the west island) contain fragments of mantle rock, indicating that fragmentation began at great depth, so the magma must have been traveling very quickly toward the surface and expanding to increase the pressure. No mantle rocks have been reported from Île Sainte Hélène, but we should look for them. Other fragments are derived from the older rocks in the region: metamorphic and plutonic rocks from the Grenville Province, and sediments from the Saint Lawrence lowland sequence, which unconformably overlies the Grenville.

In the field:

1. Make a DETAILED general description of the igneous rock in the quarry. Include the primary features (matrix, phenocrysts or vesicles or amygdales if any). Clearly separate primary features from secondary features. Document natural secondary features and also describe anthropogenic secondary features which affect the appearance of the rock.
2. Make a detailed study of the population of xenoliths. To be systematic about it, select a 40-cm circle area on the rock (mark it with chalk). Photograph it. For each xenolith in your circle, measure its long and short dimensions, and identify the rock type.

Turn in:

1. Field notebook
2. Short report (2 pages):
    a) Introduction (1 paragraph) location and context
    b) Overall rock description (include photos if you like)
    c) Report all lithologies observed, the typical aspect ratio and shape for clasts of that lithology, and tentative identification of which rock they are derived from (use stratigraphic column provided in Figure 1).

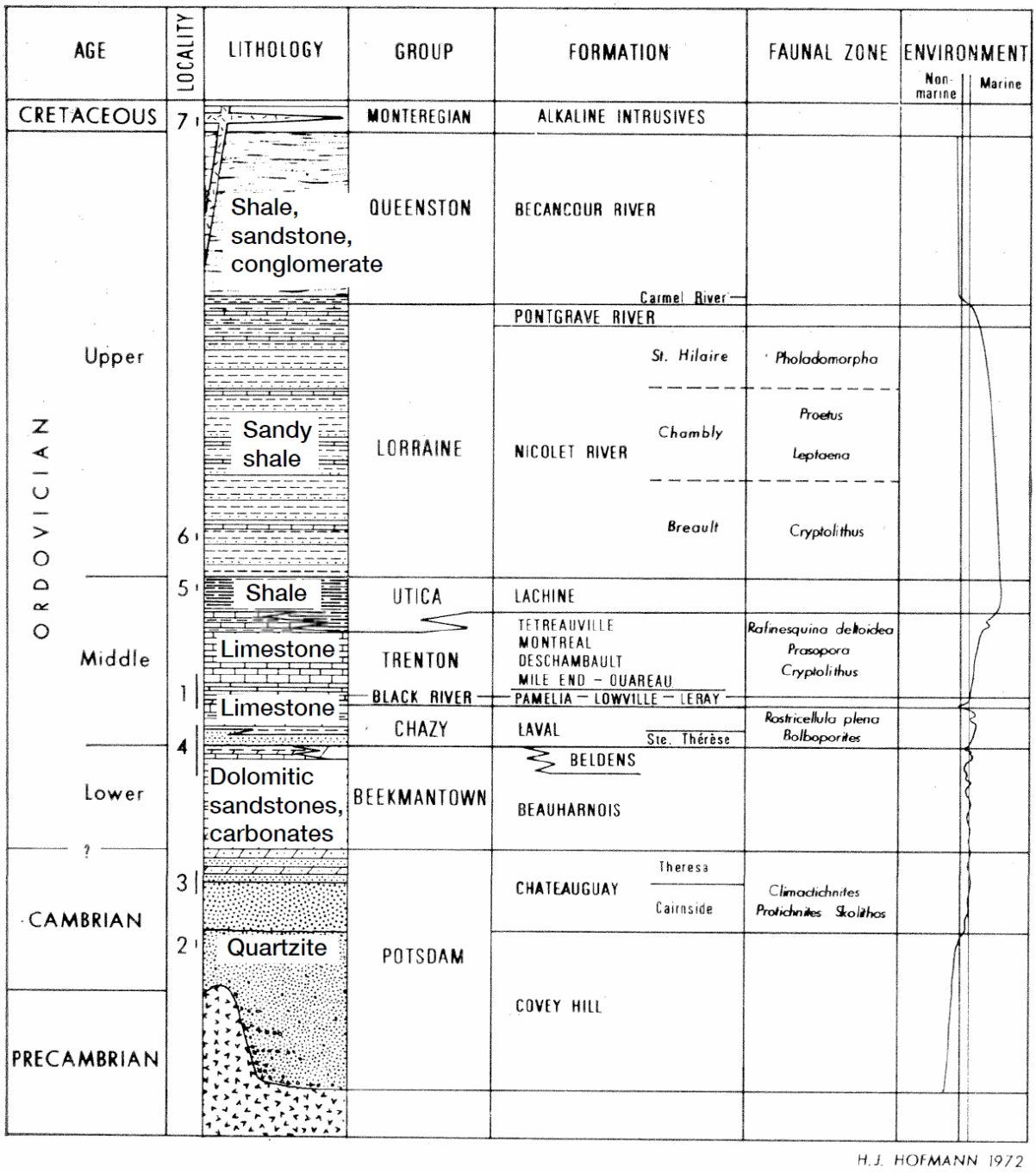

Figure 1: Columnar section for the Montreal area and vicinity, showing the stratigraphic position of selected localities.