Glacial and Marine Sediments in Augusta, Maine:
The Cony Street Exposure

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Introduction

In 2008 construction was underway to build a Hannaford supermarket at the site of the old Cony High School in Augusta, on the east side of the Kennebec River. This project included a large excavation south of Cony Street, resulting in a temporary but spectacular exposure of glacial and marine sediments dating back to the close of the Ice Age.

Figure 1. The Cony Street exposure on July 31, 2008. This panorama is a composite of photos starting with a northward view toward Cony Street on the left (marked by white houses), then progressing around to the east wall along the treeline, and finally toward the south wall next to the solitary house.
Cony Street Exposure

Figure 1 shows where the excavation cut into the valley side. It had three nearly vertical walls at right angles, providing a continuous sediment exposure hundreds of feet long. Two principal sedimentary units can be seen here. The stony sediment with an undulating surface is till that was deposited from glacial ice (Figure 2).

Figure 2. Till overlapped by marine clay in east wall of exposure.
Cony Street Exposure
The prominently stratified material overlying the till consists of marine clay, silt, and sand that accumulated on the ocean floor as the glacier margin was retreating from the Augusta area (Figure 3). This marine sediment is part of the Presumpscot Formation, which is very widespread across southern Maine. There are many places where seashells occur in the Presumpscot Formation, confirming its marine origin.

Figure 3. Marine clay (Presumpscot Formation) in south wall.
Glacial Sea

The Kennebec Valley and other lowland areas were flooded by the sea in late-glacial time because of lingering depression of the earth's crust caused by the weight of the ice sheet. We know where sea level stood at this time because the Augusta airport is located on top of a glacial delta that was built up to the ocean surface by sand and gravel washing out of the glacier. Studies of the airport delta indicated a former sea-level 344 feet higher than today (Thompson and others, 1989). The bottom of the marine clay at the Cony site ranges in elevation from about 100 to 150 feet, so the ocean was approximately 200-250 feet deep at this locality. Glacier margins usually do not float in water this shallow, so it is inferred that the edge of the glacier was "grounded" on the sea floor as it retreated from the Kennebec Valley.

The excavation walls show what appear to be several mounds formed by the till. The shape of the till surface where it continues into the hillside, and its former shape where removed, are uncertain. However, the mounds may actually be cross sections of till ridges called moraines. Hundreds of moraine ridges formed at the active edge of the glacier during brief - perhaps yearly - pauses or minor forward pulses during its overall recession in the marine environment. These moraines have a generally east-west trend, parallel to the ice margin and perpendicular to the dominantly southward flow of the ice in this part of Maine.
Kennebec Valley

In the Kennebec Valley around Augusta and Gardiner, icebergs breaking off the glacier margin caused faster retreat of the ice compared to other areas to the east and west. Consequently the ice flow converged toward the valley axis, as demonstrated by the directions of glacial striations and grooves engraved by the ice on bedrock surfaces (Figure 4; Thompson, 2004, 2005). The latest ice flow on the east side of the valley shifted toward southwest or west, and ice on the west side had an easterly flow.

Figure 4. Two sets of weathered glacial grooves on granite ledge near junction of Mikes Lane and Maloy Avenue in West Gardiner. Blue pen in foreground points in direction of earlier SSE ice flow (163°). Red pencil marks younger set of grooves indicating ESE flow (121°).
That process was similar to the formation of the [marine embayment in the Penobscot Valley](#) ice margin around Bangor.

The convergent ice flow in the Augusta-Gardiner area caused several moraines in this part of the Kennebec Valley to hook upvalley toward the valley axis. For example, moraines on the east side of the valley trend northwest-southeast. We may be seeing an example of this phenomenon in Figure 1. One of the construction foremen recalled that the two apparent till knobs in the north and east walls of the exposure were formerly connected so as to form a continuous till ridge, but the intervening ground has since been removed. If this is true, then we are looking at two cross sections of a single NW-SE trending moraine.
Kennebec Valley

The till section in the north wall supports the moraine theory. Figure 5 shows a lens of the oldest marine sediments extending into the till from the left side. These stratified sediments were draped over the underlying till, and then some more till was deposited on top of them. The younger till could have either slid off nearby glacial ice, or alternatively was laid down by the ice advancing over the lens of marine sediments. In either event, the ice margin would have stood on the right (northeast) side of this possible moraine ridge, with a local flow direction toward the southwest.

Figure 5. North wall of the exposure, adjacent to Cony Street. View looking northeast.
Kennebec Valley

Another likely moraine ridge was intersected in the southeast corner of the construction site (Figure 6). The stony till mound in the right-foreground of Figure 1 may be part of this same moraine, assuming it has a NW-SE trend. Very wet, muddy and slippery conditions limited the author's study of the Cony Street excavation during his visit to the site, but these photos will at least record one of Augusta's most remarkable sections of glacial sediments in recent years.

Figure 6. Cross section of moraine(?) in southeast corner of exposure.
References and Additional Information

