

GLACIAL GEOLOGY OF THE ROCHESTERQUADRANGLEINTRODUCTION

Location This quadrangle lies in the south-central part of Vermont, about mid-way across the state.

Topography It is in the heart of the Green Mountains which comprise its central core. Here peaks of these mountains rise to 3800 feet in altitude. The terrain is well-dissected by deep steep dendritic valleys tributary to the White River. The crest of the Green Mountains, which is followed by the famous Green Mountain Club section of the Appalachian Trail, lies north-south along the western edge of the Quadrangle, whereas a range known as Braintree Mountain follows the eastern edge, with the valley of the White River between.

Access The area is fairly well severed by roads. State highways cross the mountains at Middlebury Gap (2149 ft. altitude) and Brandon Gap (2184 ft. altitude) and farther east at ^{Rochester Gap 2144 ft. alt. The village of} Granville, Hancock, Rochester, Stockbridge, and Pittsfield lie in the valleys as centers of habitation.

Bedrock The underlying bedrock of the region is the characteristic meta-sediments of early Paleozoic age flanking pre-cambrian gneisses in the core of the Green Mountains. As stream erosion through geologic time has eroded these rocks it has dissected and lowered the metasediments but left standing higher the stronger gneisses to stand now as the summits of the mountains. Rocks of about equal resistance to erosion now stand at about equal elevations. Resistance to erosion depends on the susceptibility of the mineral content of the rocks as well as their structure and attitude of layers. The topography was mostly produced by fluvial erosion prior to glaciation. With coming of the ice age glaciers overran the area, rounded off the higher places and left glacial drifts scattered over the area.

GLACIATION

As just said, during the Pleistocene epoch glaciers overrode the area, rounded and subdued the pre-glacial topography and left behind a discontinuous blanket of till on the uplands and deposits of glacio-fluvial gravel in the valleys.

TWO EPISODES OF GLACIATION

1) The Burlington glaciation-

Seven well-scattered till fabrics have been made of exposures in the northern part of the area. (see the map and Fig. 00) These fabrics all show ice movement from north-west toward south-east showing their till to be of Burlington age; along the southern edge of the map, on the other hand, two till fabrics show ice movement from the north-east toward the south-west, indicating it to be *Shelburne* till. It therefore appears that this quadrangle was completely overrun first by *Shelburne* ice and later largely by Burlington ice. Near Warren, 5 miles north of this quadrangle, a big highway cut exposes Burlington drift on top of *Shelburne* drift, and this same relation is seen at West Rutland, 15 miles to the south-west.

The southern margin of the Burlington drift lies across the quadrangle from the large morainal ice-contact deposit at the juncture of Furnace Brook and North Brook, 3 and 1/2 miles south of Goshen Four Corners, to Stockbridge at the southeastern edge of the quadrangle. Along this east-west margin of the Burlington

drift there is no moraine to be seen, even after careful exploration. This condition signifies that the edge of the Burlington ice here must have feathered out to a thin stagnant margin without enough debris to accumulate as a moraine when the ice melted.

Beside the thin discontinuous blanket of till on the uplands there are several patches of thicker till in the valleys. Such a patch is seen 1 and 1/2 miles southwest of Rochester where it constricts the valley of West Branch White River which has undercut it to form a bluff of dense basal till 100 ft. high and 500-600 ft. long. The till fabric with weighted means direction of N.29°W shows it to be Burlington till.

Gravel

1) The patch of drift, just mentioned, in Furnace Brook valley, in the southwestern corner of the quadrangle, is a considerable deposit of ice-contact kame gravel with kame-and-kettle topography. The summit is composed of a sharp steep-sided little asker about 100ft. high and 1/2 mile long trending north-south. In fact it is steep enough so that the local people have built a little ski run and jump on its eastern slope.

- 2) In the northwestern part of the quadrangle at, and north of Breadloaf, lies an extensive kame terrace perched high on the west flank of the Green Mountain range. Its total north-south length is almost four miles; its width is $1/4$ to $1/2$ mile. It rises toward the north from about 1400 ft. at Breadloaf to about 2000 ft. at northern edge of the quadrangle.
- 3) At Goshen Four Corners, along the western edge of the quadrangle, lies a kame terrace and a mile-long north-south kame ridge, with ice-contact structure and material displayed in large road cut a mile below Brandon Gap.
- 4) The main rivers of the area are flanked by low kame terraces. They are commonly discontinuous and stand 40 to 50 ft. above the river flood plains.

Lake Sediment

1905

About a dozen patches of low terraces, composed of lake sediment (fine sand, silt and clay) are strewn along valley bottoms. They now stand about 25 feet above flood plains. Highway cuts and road ditches show these lake sediments to be varied and to have sub-aqueous slumping structures in places. The best display was seen a mile southwest of Stockbridge, (Fig. 00). The lake terrace

at Hancock stands at 900 ft. altitude, whereas that at Stockbridge 9 miles farther south in the White River valley has an altitude of only 800 ft. These occurrences *show* that a post-glacial lake must have been present in White River valley and its tributaries and stood up as high as 900 ft. present altitude.

Ablation Till

- 1) A mile-long patch of Ablation till is seen along the highway just northeast of the "Snow Bowl" in the Middletown Gap.
- 2) A second patch lies a mile south of Breadloaf at 1800 ft. altitude. Till fabric in this material shows the weighted mean of pebble orientation to be N.20°W., giving evidence of its being Burlington till.

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