extents are interbedded in the section. Over many of the slate quarries near Barnor the till is from three to thirty feet thick, these limits being seen in the same quarry. Along the roads the till is frequently seen to exceed six feet in thickness, but not uncommonly, particularly in southeastern Upper Mount Bethel township, rock is reached at depths of three, four or five feet. Perhaps seven or eight feet would be a fair average for the depth of till in the southeastern part, and a somewhat greater depth nearer the mountain.

**Character.** The till of this area is not markedly different from the till of the moraine. It is slightly less bouldery and more clayey, but the difference is not conspicuous. Although less bouldery than the moraine, stomes of all sizes are extremely abundant. The common constituents are those already mentioned as occurring in the moraine. Shawangunk quartzites and conglomerates are everywhere the most abundant, but there are large numbers of gray sandstones and slates, probably from several horizons; Martinsburg, Caudal Galli, Hamilton and others. Red sandstones from the Shawangunks and probably from the Pocono are common. Heiderberg and Onondaga limestones and Oriskany sandstones also occur, but sparingly. Several bowlers of the Onondaga ten and eighteen feet in diameter occur about three-quarters of a mile west of Slateford.

Streis are common on the softer slates and sandstones, and more rare on the hard Shawangunk quartzites. Plantation surfaces are much more abundant and chatter marks are not rare. In general the till is weathered to a depth of less than five or six feet, but the lime content is small even in unoxidized till. Most of the boulders have been but slightly affected by the weather in their present positions, but not a few were found unequally weathered on different sides and give evidence in themselves of being freshened rock cores.

A few small localities occur within the moraine, in which all the boulders have taken on a dark yellowish-brown approaching in cases a chocolate-brown color. This deep coloration gives them an appearance of great age, and it has been one of the reasons for asserting the great age of the extra-morainic drift whose boulders are so uniformly of this color. The areas within the moraine in which these dark brown boulders occur are always areas of poor drainage, where the boulders have lain on soggy ground. Such conditions seem to favor somewhat rapid discoloration.

In the case of the extra-morainic drift, no such distinction prevailed. The brown-colored boulders occur on high and well-drained areas as well as in wet places, and the inference is that long exposure brings about the same changes.

**Relationship of the till to underlying rock.** In by far the greater number of quarries the till is seen to rest upon the broken and disintegrated shale and slate. In some instances the till grades into broken shale in a manner which indicates that the ice knifed the upper part of the residuary material, incorporated a small amount of foreign material, and then covered the whole with a layer of tough clayey till composed largely of foreign material. In a few instances the till was found to rest upon the worn and polished rock. It cannot be assumed that the shale had disintegrated after the drift covered it, for several reasons. First. Only the upper three or four feet of the drift have been oxidized and that overlying the broken shale is fresh. Second. The fact that streis on many ledges which have been but slightly protected are still fresh and clear cut shows that the weather has had but small effect upon the slate in post-glacial time.

The inference which would most naturally be drawn from the relationship of the till to the disintegrated shale in these quarries is that the ice possessed but little erosive power. Certainly it did but very little eroding over quite wide areas in this region.

**Kittatinny Mountain.** On Kittatinny Mountain the till is in general rather thin. The steep southeastern escarpment is bare of drift and at its foot lies a steep rocky talus. On the top and back of the mountain