

STATE OF OHIO
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF GEOLOGICAL SURVEY
Horace R. Collins, Chief

Geological Note No. 6

**EXTENT OF TILL SHEETS AND ICE MARGINS
IN NORTHEASTERN OHIO**

by

George W. White



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EXPLANATION

- Pleistocene and post-Pleistocene lake deposits (only larger tracts shown). Two levels of Grand River Lake in Ashtabula and Trumbull Counties; higher lake in Ashtabula County has shore deposits only
- Ashtabula Till
- Hiram Till, may be very thin. Lavery Till may be at or near surface
- Lavery Till (4a) in Grand River lobe, Hayesville Till (4b) in Killbuck lobe; fairly continuous except in marginal belt, denoted by boundary line within unit. Lavery-Hayesville Till in marginal belt very discontinuous, and surface material over 90 percent earlier till
- Kent Till (5a) in Grand River lobe, Navarre Till (5b) in Killbuck lobe (including correlative Knox Lake Till (5c) in Scioto lobe in northern Knox County). Underlying earlier till close to surface at many places
- Titusville Till (6a) in Grand River lobe (including Mogadore Till (6b) in Summit County), Millbrook Till (6c) in Killbuck lobe (including correlative Jelloway Till (6d) in Scioto lobe in northern Knox County)
- Butler Till, much weathered and eroded till in southern Richland County
- Till boundary
- Boundary between correlative tills of different lobes
- Boundary of continuous Lavery-Hayesville Till; outer 10 to 15 miles very discontinuous till; dashed where approximate

TILL SHEETS OF NORTHEASTERN OHIO

The ice of the continental glaciers advanced into Ohio at several different times, the earliest possibly two million years ago. Deposits of the earliest advances have so far not been positively identified in northeastern Ohio. The deposits of the later glacial advances are listed in table 1, and their extent at the surface is shown in figure 1.

The ice advanced out of the Erie basin into lower land in a series of lobes between higher areas. From east to west in northeastern Ohio these are the Grand River lobe, the small Cuyahoga lobe, and the Killbuck lobe. The Scioto lobe advanced into central Ohio.

Each ice advance deposited an unsorted mixture of clay, silt, sand, pebbles, cobbles, and boulders, called till or boulder clay. The composition of each till sheet is different; the older tills are coarser and the younger ones are finer, with a high clay content. These differences make it possible to identify the different tills. In general, the earlier ice advances extended farther than the later ones.

The oldest till, the Butler Till, is present at the surface in a small area of southwestern Richland County, but it is present beneath younger tills at some places. (The margin of this ice sheet is not exactly known and no separate figure is presented for it.)

The Titusville Till (Mogadore Till in the Cuyahoga lobe and Millbrook Till in the Killbuck lobe) is the most extensive till in northeastern Ohio (fig. 2). It is also by far the thickest and coarsest, and at many places is very close to the surface beneath thin till(s) of later age.

The Kent Till of the Grand River lobe and the Navarre Till of the Killbuck lobe are coarse tills and are almost as extensive as the Titusville Till, but are much thinner and more discontinuous (fig. 3).

The Lavery Till of the Grand River lobe and correlative Hayesville Till of the Killbuck lobe (fig. 4) are silty tills. An outer belt from 5 to 10 miles wide is exceedingly thin and discontinuous. The contrast between the silty brown Lavery-Hayesville Till and the underlying coarse yellow-brown or olive-brown Kent-Navarre Till is marked.

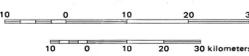
The Hiram Till is a clay till which covers about the northern half of the area (fig. 5). Its brown color resembles Lavery Till, but its higher clay content and slightly different chocolate-brown color distinguish it from the older Lavery Till. The Hiram Till is generally very thin, and the Lavery-Hayesville Till may be almost at or the surface.

The Ashtabula Till extends out of the Erie basin only a short distance and is present only in Ashtabula and Lake Counties and a very tiny area in Cuyahoga County (fig. 6). It is a silty till with many shale fragments.

The different compositions of the various tills have many important effects. Soils range from coarse silt loams on sandy tills to much finer silty clay loams on the later tills. The engineering properties of the various tills differ widely, both on the surface and below the surface; more than one till is almost surely present in any deeper excavation. The slope stability of the tills also differs; the younger tills are much more unstable.

TABLE 1.—Correlation of tills in northeastern Ohio

| QUATERNARY | Erie lobe: Ashtabula Till | Killbuck lobe | Cuyahoga lobe | Grand River lobe |
|------------------|--|--|--|---|
| WISCONSINAN | Scioto lobe | Killbuck lobe | Cuyahoga lobe | Grand River lobe |
| WOODFORDIAN | Centerburg Till Hiram Till Lavery Till Knox Lake Till Navarre Till | Hiram Till Lavery Till (concealed) | Hiram Till Lavery Till (concealed) | Hiram Till Lavery Till (concealed) |
| FARMDALIAN | Palaeosol | | | |
| ALTONIAN | Jelloway Till | Millbrook Till | Mogadore Till | Titusville Till |
| SANGAMONIAN | Palaeosol | | | |
| KANSAN/ILLINOIAN | Butler Till | unnamed till | unnamed till | Mapledele Till (subsurface only) Slippery Rock Till? (subsurface only) |



LOCATION MAP

Till boundaries taken from published and manuscript reports of George W. White, George W. White and Stanley M. Totten, Stanley M. Totten, and Jack Baker.

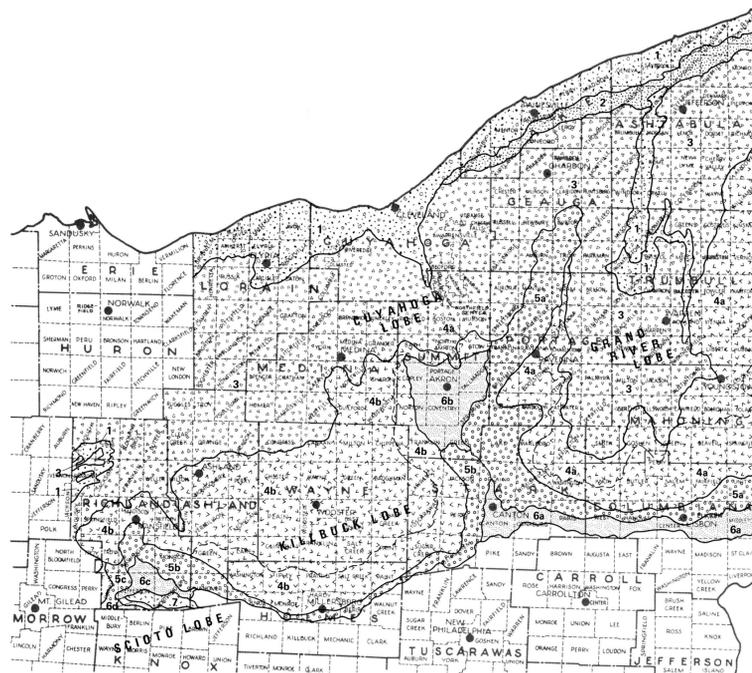


FIGURE 1.—Extent of till sheets in northeastern Ohio.

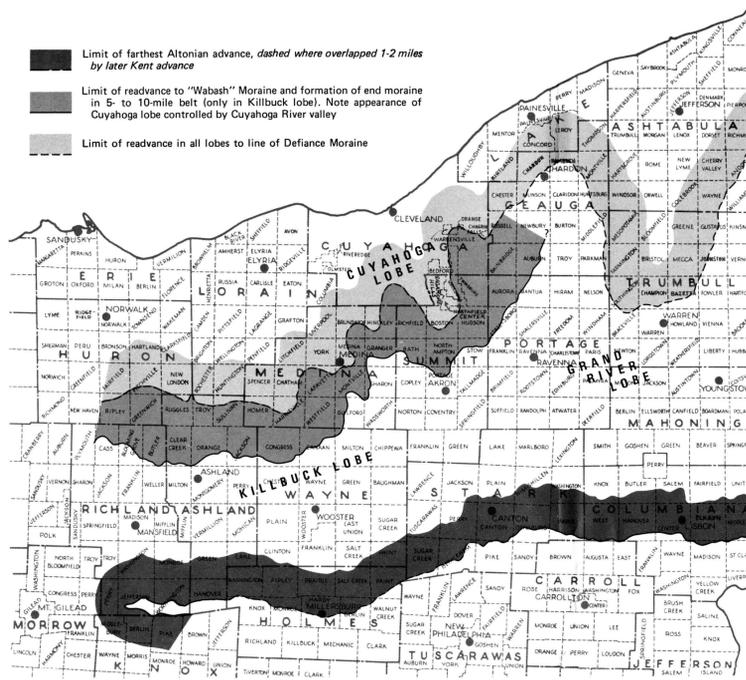


FIGURE 2.—Altonian (Titusville, Mogadore, and Millbrook) ice margins in northeastern Ohio. Altonian drift is covered by later tills except in narrow outer belt on east and west. End moraines are covered by later tills, but moraine ridges are clearly prominent.

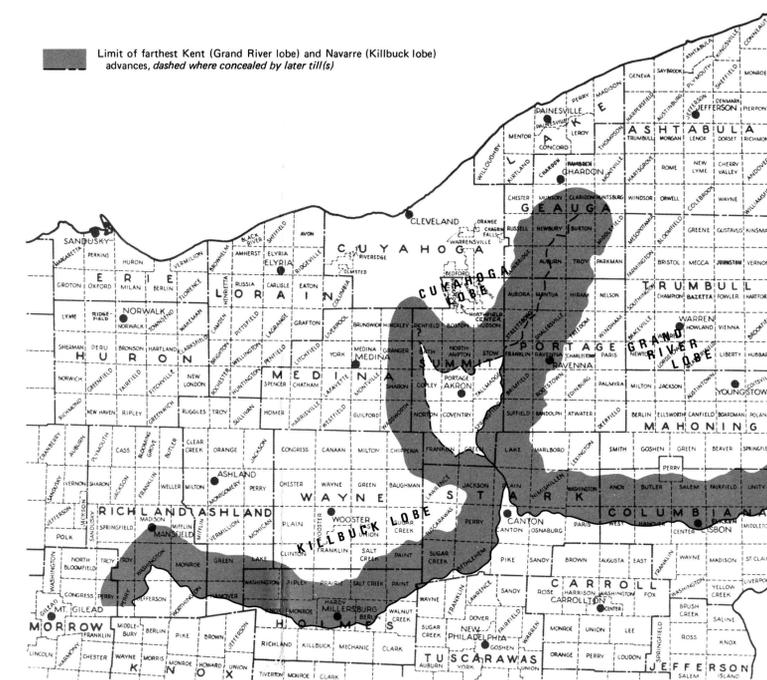


FIGURE 3.—Early Woodfordian (Kent and Navarre) ice margins in northeastern Ohio. Note ice-free area in southern Summit County at this time and position of the Cuyahoga lobe.

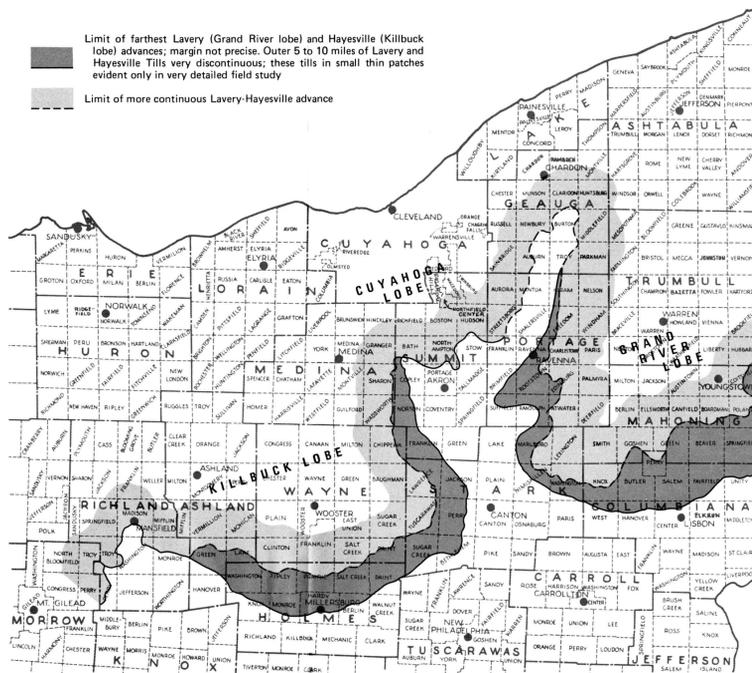


FIGURE 4.—Middle Woodfordian (Lavery and Hayesville) ice margin in northeastern Ohio.

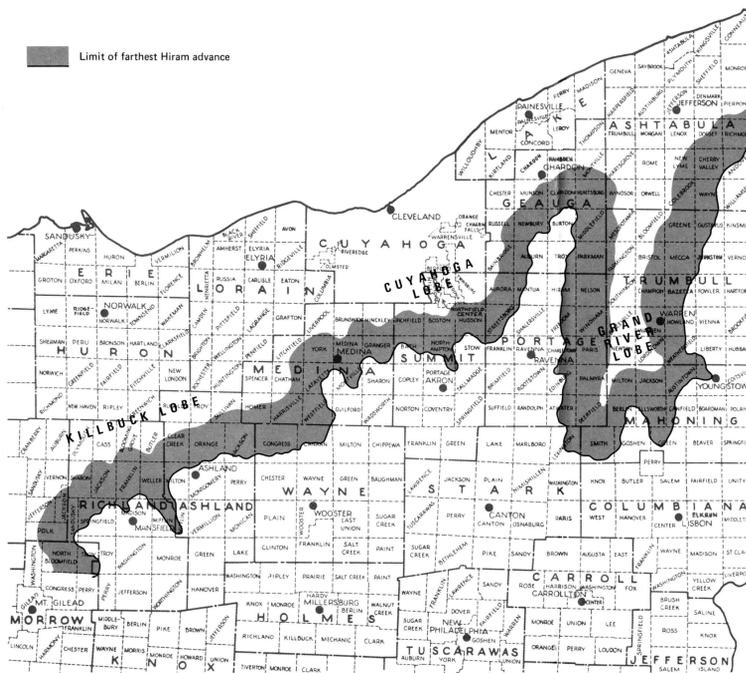


FIGURE 5.—Late Woodfordian (Hiram) ice margin in northeastern Ohio.

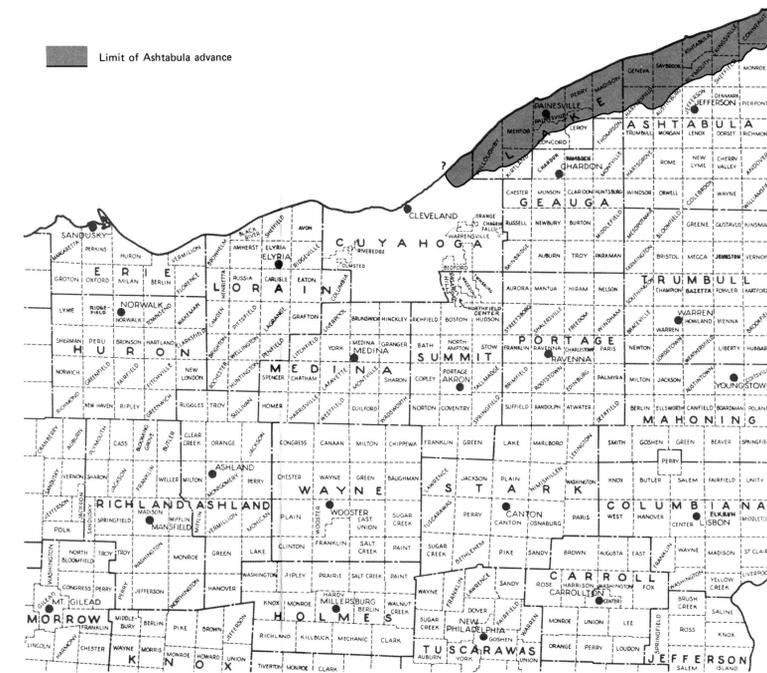


FIGURE 6.—Latest Woodfordian (Ashtabula) ice margin in northeastern Ohio.