Landscape formed by Glaciers

The ice sheets associated with the last ice age were, in places, three miles thick. This extremely heavy layer of ice carved out valleys and scraped the bedrock in Canada, eroding the gouged-out debris to the south as the ice sheet advanced. As the glaciers approached the limits of their southward movement, the debris was scattered over the surface of the bedrock in the Midwest, including Indiana. The term applied to any sediment or debris deposited by a glacier is **glacial drift**.

**Glacial drift** comes in two major varieties. **Stratified drift** is composed of sediment that is sorted according to the size of its particles. This occurs if the drift was deposited by the melt water of the glacier rather than directly by the ice. **Glacial till** is unsorted sediment that was deposited by the ice itself as it melted.

A glacier can deposit its load of sediment directly from the ice. This type of debris, ranging in size from large boulders to sand and clay, is unsorted. It is called **glacial till**. The central third of Indiana is a gently rolling till plain averaging 40 feet thick. The thickness of the till layer across the northern two-thirds of the state varies in thickness from only a few inches on the southern shore of Lake Michigan to 265 feet. The thickest till deposit in the Midwest is 1,189 feet near Cadillac, Michigan. The extreme southeast corner of Indiana, which was covered by the Illinoian glacial but untouched by the later Wisconsin ice is covered by a thin, nearly non-existent layer of till that is more than 100,000 years old.

If an ice sheet remains still for a prolonged period of time, a ridge of till called an **end moraine** accumulates at the glacier’s edge. The largest of the many moraines in Indiana is the Valparaiso Moraine, arching around the southern end of Lake Michigan through Lake, Porter, and LaPorte counties in Northwest Indiana. The elevation of the Valparaiso Moraine varies from about 750 feet to 900 feet. The steepness of the grade traveling from the Kankakee Moraines form because, although the ice sheet itself remains still, the ice within the glacier continues to advance southward. The melting at the leading edge of the glacier...
is balanced with the advance of new ice, so the ice sheet neither advances nor retreats. But the ice making up the glacier, and all its cargo scraped loose from the bedrock to the north, continues inching southward toward the melting edge. When the ice reaches the front edge, it drops all its debris, forming an end moraine.

Indiana’s bedrock is all sedimentary rock. There are no outcrops of granite or other igneous rock anywhere in the state. However, a stroll along a hiking path in Potato Creek State Park in northern Indiana will reveal a large granite boulder measuring about four feet in diameter. Although landscapers will often truck in granite boulders as decorative stones to be placed in lawns or around commercial buildings, this large boulder was obviously not trucked in. So where did it come from?

Boulders are sometimes embedded within glaciers and are then dropped by the ice when the glacier melts. The ice sheets encroaching from the north during the Ice Age also contained many such boulders, which they scattered across the northern United States. These boulders do not resemble the bedrock of the area where they occur, so the obvious conclusion is that they were broke loose from the bedrock of the Canadian Shield and were carried southward. In many places in Canada and on some outcrops in Indiana, the bedrock has been scratched by the rocks embedded within the ice. The scratch marks, called striae, run parallel to the direction of the ice flow and can be used to deduce the direction from which the glacier advanced.

Southern Indiana’s landscape greatly differs from the rest of the state. As mentioned before, the glaciers of the last ice age did not extend past central Indiana. Instead, floods from the melted ice carved rivers and the hills that this part of the state is known. The melted glacier water also created the karst topography by eroding and shaping the limestone bedrock that was left behinds thousands of years ago. That is why our caves, sinkholes and disappearing streams are found only in the southern parts of the state.

Questions (answer in your science notebook):
1. What is glacial drift? What is the difference between glacial till and stratified drift?
2. Indiana used to have hills and valleys. How do you think the glacial till affected the landscape?
3. What is a moraine? How does it affect the landscape of Indiana?
4. If Indiana’s bedrock is all sedimentary, how are we able to find so many igneous rocks lying above and under ground?
5. How is southern Indiana different than the northern two-thirds of Indiana?

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