

Glacial Features of Maryhill by Peter Russell



On our tour of Maryhill we will talk about an unusual set of glacial features. Maryhill is located in the west end of the Guelph drumlin field. This is a large drumlin field which extends into Guelph, as well as to near Orangeville. The Guelph drumlin field consists of a set of elongated, oval-shaped hills which have their long axis parallel to the direction of ice flow. In other words, the drumlins are streamlined hills that were formed by the moving ice.



A particularly striking example of one of these hills is in downtown Guelph, where the prominent Catholic Church of our Lady sits on top of a drumlin. The hill is called Catholic Hill. (Picture to the left, courtesy Doors Open Guelph).



The Guelph drumlin field is formed of Port Stanley Till. It is a deposit which was laid down by the ice in its flow from the Lake Ontario Basin towards Elmira. Ultimately this material forms a deposit of till a few metres thick over the area from Guelph to the Grand Valley.

In contrast, the material in the Breslau Moraine (a ridge which extends more or less North-South through the area around Maryhill) is very clay rich. The till itself is called the Maryhill Till, named after the town Maryhill. It is believed that the Maryhill Till is so clay-rich because the ice flowed over glacial lake deposits of high clay content and mixed all the sediments together to create a clay-rich till.

The image at the top of the next page is taken from Maryhill Heritage Park, which is on St. Charles Street

East, which is just past the junction with Maryhill Road. Your tour should start at this spot.

The Breslau Moraine was formed during the ice retreat that laid down the Maryhill Till. This ridge was left behind when the edge of the ice was in an equilibrium position and the rate of melting was in balance with the rate of flow. The ice didn't stop flowing; the rate of melting became equal to the rate of flow and caused an accumulation of material at the edge of the glacier.

The Church:



The Maryhill Church also sits on a drumlin, formed by the last advance of the ice that deposited the Port Stanley Till on top of the Maryhill Till. This happened about 14,000 years ago. It's fascinating to realize that the last local advance of the ice covered this area. During that deposition, the ice moved westward, almost to Elmira, and then its time was up and it retreated to the east, leaving this landscape.

Glacial Erratics – Ice Transported Rocks.

Crinoid fossils

Amongst the many kinds of rock in the wall of the church, there is a particularly interesting specimen, which is full of fossils. These fossils, which make up almost the entire rock, are known as crinoids. Crinoids are sometimes called sea-lilies but they are in fact animals. They are still living in the ocean off of India. Crinoids grow in warm tropical waters where they have a root system in the sea floor as well as a long stem, which extends up towards the water's surface. The stem is mainly what we see in the fossils and it appears very stick-like. The stem can grow up to several metres long! At the top of the stem there is a structure where the animal actually lives. A crinoid is like a starfish mounted on a long stem. They collect food from the water with their long arms.





Church Front:

The front of the church is composed of rectangular blocks of stone. Some of these rocks appear to be calcium magnesium carbonate (dolostone), which probably comes from the local bedrock. The bedrock here is similar in composition, all the way to the city of Guelph. It is called the Guelph Formation, and it's of Silurian age. The rock often has fossils in it but the fossils don't appear very obvious in the rock here.



Fieldstone:

The walls of the church are made of what is known as fieldstone. Fieldstone is simply a random assortment of rocks from farmer's fields around the area. These are referred to as glacial erratics, which were carried here by the glacier and are not native to this area. They are foreign rocks different from the local bedrock. A stone mason used to work on the stones to make them suitable to be used for walls like in the photograph to the right. Most of the fieldstones come from Eastern Ontario, from the Grenville province, where the rocks are about 1 billion years old.



Some of the darker rocks are found in what we call dikes (large rock veins which allowed molten material to intrude into the rock along lines of weakness). A typical rock type which is derived from the dikes is diabase. Diabase is a dark rock which is almost black in colour. It was slightly younger than the country rock around it when it intruded to form the dikes.

If you look at a broad scale geological map of the Precambrian Shield part of Ontario you will see patterns of dikes, formed along sets of cracks in pre-existing rock.



Stromatolites:

In one of the pieces of the Guelph formation, near the front door of the church we can find some fossils. These fossils may look like a cross section of a cabbage with little layers going round to the middle. These fossils are stromatolites, which are a type of an algal structure. Stromatolites are found in the sea, even today, and form these characteristic cabbage-like structures.



Other Rock Types:

A lot of the rocks in the wall of the church are granite or gneiss. These rocks likely came from the Peterborough - Bancroft and near the Ottawa area. As the glaciers came down along Lake Ontario, and up in this direction, they transported a variety of rocks.

Pegmatite (right) Pegmatites are light coloured igneous intrusive rocks with large crystals of feldspar, quartz and various dark minerals such as biotite and hornblende.



Syenite: This rock is an igneous rock like granite, is made of feldspar with mica and no quartz.





Gneiss: Most of the rock in the walls of the church came from the East (where the ice came from). The rocks were deposited locally when the Lake Ontario ice lobe flowed along the axis of the basin and over-topped the Niagara escarpment. The ice that reached this area came from further east in the Grenville Province, part of the Precambrian shield. A dominant rock type in the Precambrian shield and the Grenville area is gneiss. If you trace that area to the north, up near North Bay, it

becomes more and more straight granite. But in the southern parts, where this ice would have come from, say north of Kingston, the characteristic rock is a gneiss.



There are a great variety of these rocks, depending on the variability of its mineral content. Layers in the rock have been warped and pressed and squeezed by crustal forces. When the rock was softened by heat and plastic it could be moved, squeezed, and bent in various shapes. The bands in the rock are different mineral concentrations: light

bands could include feldspar or quartz; dark bands may include hornblende or various kinds of mica. In general, a mix of various minerals form a rock called gneiss.

Gneiss with Garnet, (photo above):



On the north side of the entrance ramp there are several good specimens of gneiss with different colours and combinations of minerals. One of them has a concentration of garnet, which are reddish colour; they can be a semi precious stone that is used in jewellery.

You may see examples of various combinations of mineral colours in gneiss here. Reddish and white feldspars as well as other light and dark coloured minerals too!



Houses:

Walking around town you may notice houses made of yellow brick. These bricks are formed from clays found in the area. The bricks are yellow because the clay that they are formed from contains lime (calcium carbonate). If you want to make a red brick you have to add a colouring material of some kind to make it red.



Ice Flow:

Standing at the back of the church, facing to the east, you can see artificial ground forms. There was once a drumlin with a crest here, but that was flattened off to make a parking lot. The slope which you can see down below, facing east, is not the normal slope face. It has been modified and steepened in the process of creating a building site.



As you look out over the field you may be able to get a hint of the long axis of the drumlin trending off to the northwest, parallel to the direction of ice flow that created the drumlin.

The direction of the long axis of the church is not exactly parallel to the direction of ice flow as its direction is controlled by the direction of the street.



Stone Wall:

The wall along the street in front of the church provides many more samples of fieldstone. The wall includes boulders of Paleozoic age as well as of Precambrian age. We can see some fine examples of



quartzite. This rock began as a sand deposit. Over time, this sandy deposit was turned into sandstone. Then, through heat and pressure, the sandstone was metamorphosed to form quartzite, one of the toughest kinds of rock. Interestingly, quartzite has been used by First Nation people to create projectile points from quartzite deposits up on Manitoulin Island. Chert is used instead in southern Ontario too, but is commonly referred to by archaeologists as flint.



Cemetery, on the west side of the road across from the stone wall:

The entrance gateway to the cemetery is built recently of field stone.



From the cemetery on the west side of the road it is easy to get the impression of the long axis of the crest of the drumlin. The trend is north-westerly parallel to the direction of the ice flow when this was deposited.



If you look to the west you can also see the crest of the Breslau Moraine. Similarly, this slope was created when the drumlin formed here in the last advance of the glacier.

Hill on the West side of Maryhill:

We are now located on a hill, set back from the village of Maryhill, on the west side. We are on a relatively isolated hill with a road cut in it along the edge of the road. Unfortunately the road cut is now mostly overgrown, but the cut formerly exposed some very clay-rich till, which forms the core of the Breslau Moraine. This exposed till also forms the surface material in the fields along the crest of the



moraine. It's not difficult to imagine the ice riding up over this ridge and not really depositing, but rather eroding and modifying it. We have had the moraine overrun by the glacier, and somewhat smoothed off. If you could see the till you could notice that it is very different than that which forms the drumlins in Maryhill. It is much more clay-rich.



Closing Remarks:

The drumlin at Maryhill on which the church was constructed is just one of many drumlins which form the Guelph drumlin field. The drumlin's North-West to South-East trend represents the direction of ice flow out of the Lake Ontario Basin from the South-East. All of the drumlins in this field are elliptical shaped with their long-axis parallel to the direction of ice flow.

The Maryhill drumlin is one of the outermost drumlins in the Guelph drumlin field. The Maryhill drumlin is the one nearest to the Kitchener/ Waterloo area. The largest drumlin field in Southern Ontario is near Peterborough. The Peterborough drumlin field was formed by the same Lake Ontario ice lobe as the Maryhill drumlin. There are many other drumlin fields in Southern Ontario, such as near Woodstock and Teeswater.



