How Manitou Island Got This Way

--Helen M. Martin

A heavy, wet, gray mist quivered over a churning, writhing, surging mass of a huge molten globule--the beginning Earth. Slowly atom joined like-atom as the mass cooled and metal was formed only to be attacked by and attached to different atoms, and minerals were born. Metal and mineral started going to pieces almost as soon as they were formed, giving energy to other atoms, elements, to unite and form many minerals. Long before, in the birth of the great star that became the Earth, hydrogen united with oxygen and made that mineral, water, which almost from the beginning has been the Earth's most important mineral--the most important actor, producer, scene shifter, in the drama Manitoulin. Slowly the molten mass cooled, mineral interlocked with mineral, the heavy metals and minerals sank, the lighter, frothy minerals came to and near the surface and when the mists cleared away the granitic surface crust of the Earth was unclosed with the marble-iron core hundreds of miles below. Thus, in the past gone for four billion years, were made the foundations of Manitoulin Island as of all the continental block--an age-old base of granitic rocks.

Only winds, water, freezing, thawing, heating and cooling were there to change the surface, a surface which was not smooth but had solidified with mountains and plains, hills and valleys all sloping southward from the highlands of the Canadian Shield.

As the earth mass cooled, water was squeezed from the cooling rocks and added to the condensing mists, so the rains fell, the depressions filled, and the oceans spilled over on the continents. A long shallow am of the sea stretched across northern Minnesota, Wisconsin, Michigan, into Canada along the shore of the north Channel. In the States, great swamps received the sediments washed from the granitic rocks and there chemical and bacterial reactions removed iron from the waters and started the iron formations. In the north-of-Manitoulin Island area a shore was laid down, a shore with coarse rocks and pebbles of white and red jasper--and white quartz sand. Farther from the strand line in the shallow waters the washed out sands became finer and finer with here and there a tiny pebble of jasper carried by some freakish current. In billions of years the pebbles were compacted to jasper conglomerate rock (pudding stones) and the sands became a milk-white glassy rock, quartzite. Some of this rock was also weathered away, leaving a few hills. Later earth movements lifted some of it upward into other hills. If you wish to see one of the hills of this ancient rock, visit the old quarry at Sheguiandah. There from Sheguiandah Bay to Manitou Lake is a remnant of the old shore that was lifted as a quartzite ridge during the time of the last Earth disturbance in the Great Lakes region--the Killarney Revolution. This last revolt of the Earth to settling down to quiet old age in the Great Lakes region (the hollow in the granitic floor now known as the Michigan Basin) baked the iron rusts into iron formations, lifted the copper bearing lavas and tilted and baked the pebbles and sands of the old shores as the Killarney granites tried to escape. No use. Dame Nature just set her tools of weathering against the mountains and wore them down and washed the sediments into the slowly sinking, ever-deepening basin. Quiet was restored and has remained ever since for more than 550 million years. But not a nothing-doing quiet. The overflowing oceans spread around the Canadian Shield and over its southern border, where it received the sediments from the mountains being worn down. No wells have been drilled to the granite on Manitoulin Island so we do not know definitely if sediments were deposited there during this time we call the Paleozoic, or early life and an age named Cambrian. But no rocks of Cambrian age are exposed on the north shore and none are around the quartzite ridge--although they are more than 1,500 feet thick on the American side of the St. Marys River. The rocks of Cambrian time are unimportant in Manitoulin history but the life of the time is, because by Cambrian time the primitive plants that had developed earlier had made the sea a fit place for animals to live, animals that were the forerunners of the denizens of the sea that in large part built the island. Also the plants had come out of the sea onto the land and helped the weathering processes and the development of primitive soils that added to the food supply in the sea.

The Cambrian time came to an end, the sea disappeared and with it the plants and animals that had there flourished. Then another flood, another sea, entered the Michigan Basin area, as in other parts of the land, in an age known as Ordovician. It spread over the Manitoulin area as far as Bay of Islands so that the earliest sediments washed into the sea have been compacted into the rocks from Darch to Clapperton, Great Cloche Islands and Maple, Mackay, Long, Bold and other Points, and around the pre-Cambrian rocks of some of the islands of Frazer Bay. The seas of Ordovician time, like all seas, ebbed and flowed. When they were shallow and weathering on the land was rapid, sands and pebbles were deposited on the sea floor with the finer sediments carried farther from shore. When weathering was slow (chemical weathering more important than violent weathering of wind, rain and frost) then fine sediments, silts, were deposited. When the seas were calm and warm plant life and, therefore, food was abundant so animals became abundant, the shelled creatures--snails, clams, and many others, and most important, the corals. So with different sets of conditions, different kinds of sediments were deposited which compacted through millions of years into rocks, sandstones, shales, limestones. You can see the rocks of Ordovician times along the north shore of the island. On the north shore of Great Cloche Island and around the quartzite ridge of Sheguiandah you can see them resting on the pre-Cambrian rocks. At the base the sandstones, shale and limestone beds of the Black River and Trenton groups (rock formations are named as

animals, [plants,] people are, for identification purposes). Above are dark shales of the Collingwood and Sheguiandah formations and above that are shales and limestones of the Wekwemikongsing, Weaford, Kagawong formations. And in all the rocks you can find the petrified remains, fossils, of the animals that lived in the Ordovician seas, the great rock cemeteries of the Ordovician life.

Long after the Ordovician sediments had started to compact to rock they became the floor of the next flooding sea--the warm sea of Silurian time that covered the land and built the greater part of Manitoulin Island. Weathering of the older land rocks had brought dissolved lime beloved of corals into the Silurian seas. Myriads of corals, billions of the little animals, lived and flourished, took lime from the water, built their reefs, died and sank into the lime muds they had helped to deposit. With the ebbs and flows of the Silurian seas, with changes of weathering on the land, different types of sediments were carried to the sea and different types of plants and animals were developed, so that when the drill penetrates Manitoulin's Silurian rocks it pierces dolomites and shales and different fossil zones. Overlying the Ordovician rocks are first the Cabot Head shales, then upwards the Dyer Bay dolomite, Wingfield shale, Manitoulin dolomite, Lockport dolomite and at the very southern edge of Fitzwilliam Island is the youngest rock of Manitoulin Island--the Guelph dolomite.

If you trace these Silurian formations through the Bruce Peninsula and on southeastward, you come to Niagara Falls. Trace them west and southward you cross Michigan to the Dorr Peninsula of Wisconsin through eastern Wisconsin into Illinois. Everywhere you will follow an escarpment with its steep slope to the east, north, west, and its long gentle slope dipping at a low angle toward central Michigan. Because, although Dame Mature finished building Manitoulin Island when the Guelph dolomites were laid down more than 350,000,000 years ago, she didn't leave the region. slowly sediments were carried into the Michigan Basin, slowly it became overweighted and slowly sank at the center so that the rims of the basin were lifted higher and higher only to be attacked by nature's tools of the weather, only to be cut by rivers, to be worn down and carried back to the sea from whence they came. But the soft shales and soluble limestones could be weathered faster and for nearly 350 million years the hard dolomites have been undercut as the Collingwood, Cabot Head and other shales were eroded so that if you could walk on the bare rock from Bay of Islands south, southwest to Lake Huron you would start on the old pre-Cambrian rock climb a limestone cliff (Black River-Trenton) and then walk down its gentle southern slope to the flat lands underlain by the easily eroded Collingwood shale south of Little Current, then climb up the edge of the last of the Ordovician rocks and know that they also slope gently into the Michigan Basin. In the path we follow we reach the oldest of the Silurian rocks, climbing their cliffed northern edge to reach them, and find they rise again capping High Hill. If we could drill down High Hill we'd find the same pre-Cambrian quartzite that is near Sheguiandah Bay. This hill with the quartzite under it is the last evidence of the Killarney Revolution on the island. We'll walk on south to Timber Bay, climbing northward-facing cliffs and walking southward down long gentle slopes. In the walk we've traversed rocks that took more than a billion years in the making. No animals lived on the land and the plants were primitive. In our walk we started on the oldest Ordovician sandstone and shale. That rock, at the surface on Bay of Islands is 1,200 to 1,500 feet below the end of our walk at Timber Bay, and slopes thousands of feet deeper in central Michigan.

Not yet was nature through with Manitoulin Island. She had another powerful tool, ice, to change the surface of the island--a great continental glacier crept slowly from the Laurentian Highlands, gathered loose soil, ground it up for polishing material; plucked off and carried huge granitic boulders and hard quartzite and used them for plows, bulldozers, scrapers, rasps. As it moved over the island from the northeast it cut the soft rocks deeper, plucked the hard dolomites and made the cliffs steeper, gouged the old river valleys and depressions, deepened the valley that is now the North Channel and made depressions, now the hundreds of bays around the island. As the glacier moved southward to the Ohio River because of the heavy snows of a million years in the Laurentians the glacier became so heavy its weight pressed the southern edge of the Canadian Shield and its overlying rocks downward.

Slowly the Ice Age came to a close, slowly the glacier retreated, dumping its rock load in the moraines and glacial drift of Ohio, Indiana, Illinois, Michigan, Ontario, until the ice front reached northwestern Ohio, southeastern Michigan, then the water of the melting ice could not escape across the morainic hills but ponded between them and the glacier--and the Great Lakes began.

It's a long story, the history of the Great Lakes, the episodes of retreat, advance, retreat, of the glacier, with melting of the ice and ponding the meltwater into lakes that lasted long enough and were powerful enough to cut and build shore lines and beaches that wrote the story. Finally not so many thousands of years ago the glacier melted off Manitoulin Island and it was covered by the waters of the last of the glacial lakes--Lake Algonquin. Probably the very top of High Hill was an island in Lake Algonquin. During Algonquin time the thin cover, glacial drift, that had been deposited during the advance of the glacier was worked over, modified, and in many places removed. When the glacier retreated so far it was no longer an ice dam to hold Lake Algonquin, the lake found a low outlet to the east first through the Kirkfield-Trent River outlet to Lake Iroquois (the ancestral Lake Ontario) thence through the Mohawk-Hudson River valley to the Atlantic Ocean. Perhaps* the last and lowest outlet of Lake Algonquin was through the Mattawa-Ottawa outlet to the St. Lawrence. Then came the "Lost Interval" in which the water was so low in the

Great Lakes Basin that only small bodies ox water were in the basins of Lake Michigan and Lake Huron and the "gorge" of the Straits of Mackinac connected them. Then Manitoulin was larger--perhaps not an island but a part of the northern mainland. Perhaps the outlet of this low level lake (known as Lake Chippewa in the Lake Michigan Basin and Lake Stanley in the Huron Basin) was through the Mattawa (French)-Ottawa outlet to the St. Lawrence Basin.

Then the waters rose and powerful Lake Nipissing came into existence, a warm lake immediate ancestor of the Great Lakes. It was a rapidly rising lake that could cut the cliffs along its shores, carve the skerries, flowerpots, cliffs in the Silurian limestones, and build strong beaches along the lowlands and across valleys. It also disappeared. Relieved of the depressing load of the glacier, the northern part of the continent warped upward and spilled the waters of Lake Nipissing, just about 3,000 years ago when the Queen of Sheba and King Solomon were making history in Palestine, through the modern outlet at Port Huron--the St. Clair-Detroit River outlet to Lake Erie, Ontario, the St. Lawrence and to the sea.

This is the open book, Manitoulin. The rocks record the story of how the island was built, the fossils tell the slow change of living forms. But the glacier swept off all evidence of the soils that had been formed by vegetation evolving though the centuries from the lowly plants to the forests; soils that produced food for the mammals that finally came on the land. The glacier wrote its chapter in the grooved and highly polished rock. A line of the story is shown you as you enter South Baymouth Harbor--there to the west you can see parallel grooves from two to six feet deep carved by ice tools that gouged from the northeast to the southwest. All over the island such grooves can be found. They give a rollercoaster effect to unimproved roads and trails. The bare rock shows the work of finer tools. The clays in the ice polished the dolomite but an occasional sharp pebble scratched through the polish just to show the direction of ice movement. Such scratches are called, striae and, like the grooves, are oriented northeast-southwest. In a few places these striae cross another set that are oriented northwest-southeast, proving that an earlier brief ice movement (perhaps a spur from the main glacier) was from the northwest.

When ice melts rapidly at the front of a glacier but forward movement of the glacier is equal, the front remains stationary and the rock debris, or glacial drift (mixed rock, clay, pebbles), is piled into a hilly mass known as moraine. Like the gravelly deposits on the Duck Islands. If the glacier is stagnant, it disappears by evaporation and slow melting and the glacial debris is left where the glacier stood. Such a deposit is a ground moraine or till plain. Readvance of the ice in some places carves the ground morane leaving long narrow hills shaped like an inverted canoe. Such hills are called drumlins. In some places the ice carved the bare rock into drumlins. Scattered over Manitoulin are many of these hills, perhaps not true drumlins, but drumlin-like or drumlinoid hills. In many places granitic boulders from far north rest on the limestone. They show where moraines had been but the waters of Lake Algonquin removed the finer material of the drift.

The cliffs of the shores and the sandy bars are the work of Lake Nipissing, Lake Huron has not had much time to work on the shores. Likewise plants have not had much time to make soil of the weathered limestone since the removal of the forests that moved in and rapidly covered the island after Lake Algonquin time. Few places have the glacial drift thick enough to be made into soil.

This is the story of how, on a granitic base, Manitoulin has been built and of the roll of water in the building and change of 1,073 square miles of the largest freshwater island in the world.

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*Recent interpretations of the evidence have made the last stages of Lake Algonquin a matter of controversy.

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