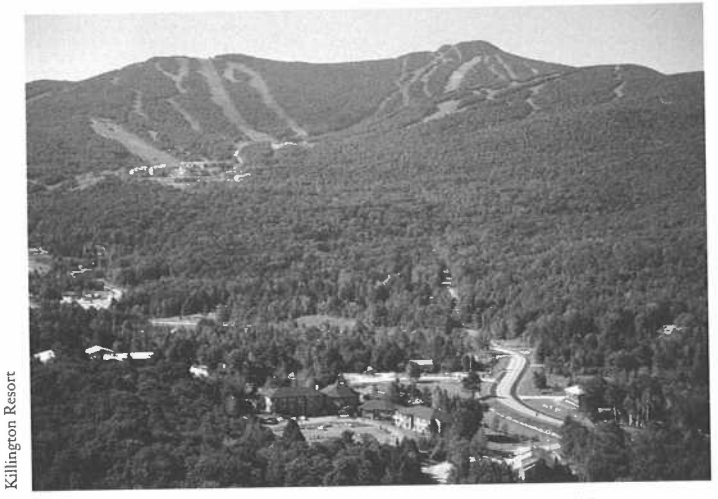
Publication of *Historic Roots* is made possible in part by grants from the A.D. Henderson Foundation, the Vermont Council on the Humanities, the Vermont Historical Society, and Vermont—NEA.

HISTORIC ROOTS

A Magazine of Vermont History

Vol. 2 December 1997 No. 3



Killington Resort

On Killington Mountain, and at Pico and Mt. Holly, you can see rocks that are more than 550 million years old.

BENEATH THE SURFACE

By BARRY DOOLAN
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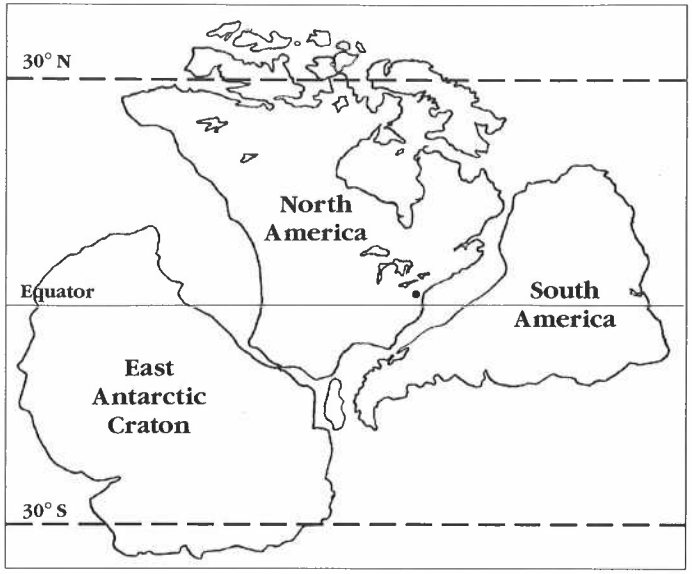
The study of the earth is called geology. Geologists study rocks and fossils, mountains and canyons, continents and oceans to try to learn how the earth was formed and how it has changed.

The geological past is much longer than human history. While no one knows its exact age, we do know that the earth is more than 4.5 billion years old. Periods of time as long as 100,000 years ago are called "recent" in geological terms. With the exception of earthquakes, floods, landslides, and erupting volcanoes, changes to the earth come about very slowly over very long periods of time.

We know, for instance, that most mountain ranges in the world contain rocks that were formed beneath the ocean. None of these ancient oceans exists today. They disappeared as continents moved together and finally collided. This did not happen quickly. At the rate of just inches a year, it may have taken 100 million.



Rodinia at the beginning of its breakup, 550 million years ago. Vermont is the black dot on the eastern shore of North America.

The face of the earth itself has changed several times. The world we know now has six continents, surrounded and separated by large bodies of water. But at least twice in geological history, all the continents were together in one huge land mass. The first time we know this happened was about a billion years ago. We call that supercontinent Rodinia.

When the thick, slow-moving plates that form the earth's surface collided to form Rodinia, the surface of the earth was raised and mountains were formed. The pressure of the overlapping plates created so much heat that some rocks melted into a liquid called magma.

There is clear evidence of this magma in the Adirondack Mountains, in Canada, and on every continent on earth.

Vermont is a land of mountains and valleys. Its winters are cold and long. But when Rodinia broke up, about 550 million years ago, Vermont was on the shore of a tropical sea. Corals, snails, and worms that are found only in warm oceans show up as fossils in rocks in the Champlain Valley of Vermont and New York.

After about 250 million years, the large plates of the earth collided again and again formed a supercontinent. This one we call Pangea. (Pangea is a Greek word meaning "the whole earth.") Vermont was near the center of

The supercontinent of Pangea, about 250 million years ago.

this collision zone and was pushed inland. The Appalachian mountains were lifted up. Rocks from ancient Rodinia were brought to the surface and formed the core of the Green Mountains. You can see this kind of rock today at Mt. Holly, Pico, and Killington.

Large areas of land moved when the plates came together. The Taconic Mountains, for example, were set in motion. They moved a few inches a year. After millions of years, the entire mountain range had traveled dozens of miles, from east of the Green Mountains to the southern Champlain Valley, where they are now.

Geologists can see in rocks of the Champlain Valley evidence of the breakup of Pangea, about 200 million years ago. Large cracks in the earth filled with magma throughout the Champlain Valley and most of New England. Over a period of several hundred million years, the continents drifted apart to where they are today. The Atlantic Ocean was formed. Vermont was moved into a colder climate zone. The Green Mountains and other mountain ranges that were lifted up during the collision that formed Pangea still exist. But after two hundred million years of wearing down by wind and weather, they are much lower than they were then.

The last great changes to Vermont happened very recently in terms of geological time. About 1.5 million years ago Vermont, along

with much of the Northern Hemisphere,[1] was covered by flowing sheets of ice called glaciers. The glaciers advanced and retreated at least four times. During the last advance, about 13,000 years ago, all of Vermont was covered by ice almost a mile thick. The glaciers carried boulders and dirt and trees along with them. They dug out valleys and created hills. Each time they moved they changed the landscape of Vermont.

Camel's Hump was shaped by glaciers. The ice, flowing from north to south, scooped rocks off the south face of the mountain.

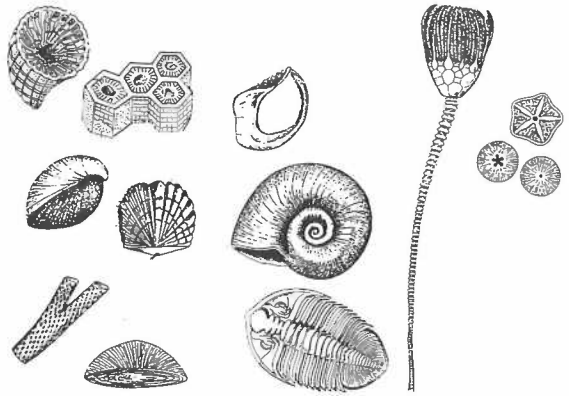
The landscape of today seems unchanging. Vermont's mountains, rivers, and valleys appear to be the same as they were when our grandfathers and great-grandfathers lived. But change is still happening. The continents still move about two inches a year. Wind, water, and ice erode the tops of mountains. Some mountain ranges are rising. The Adirondacks, for instance, are being pushed up from below faster than they are eroding at the top.

[1]The Northern Hemisphere is the part of the world that is north of the equator.

Great geological changes are in store. At some time in the future (less than 50 million years from now), the Atlantic Ocean will again close and Europe and Africa will again be joined to North America. The processes of change are already in motion, even though we hardly notice them.

Rooting Around

Geology books contain maps showing the way the world looked at different periods of geological time. Natural history magazines and encyclopedias often have articles about supercontinents and continental drift. Earthquakes and volcanoes can change the face of the earth in minutes. If you are interested in any or all of these subjects, ask your librarian to help you find more information about them.



Fossils like these have been found in the Lake Champlain Valley. They are proof that more than 400 million years ago Vermont was on the shore of a tropical sea.