

# Walking Through Time

Exploring Niagara Escarpment Geology  
*in the* Beaver Valley Bruce Trail Section

Beth Gilhespy, M.Sc.

# Beth Gilhespy's Walks Through Time

**B**eth Gilhespy is known for leading Bruce Trail hikes that share her knowledge of the unique and puzzling geology of the Niagara Escarpment. Now she has written a book that, while it gives an overview of the entire Escarpment, concentrates on the dramatic Beaver Valley section. Here are excerpts from her book *Walking Through Time*.

**M**y love affair with the Niagara Escarpment is life-long and enduring. I fell for the Escarpment as a child while vacationing at the Blue Mountains, exploring crevices at Rattlesnake Point and on school geography trips to Forks of the Credit. As I grew older I discovered the Bruce Trail, that string of white blazes that seemed, delightfully, to pass through and bind together all the places I loved. I explored farther, backpacking in the Beaver Valley and camping at Cyprus Lake on the Bruce Peninsula. It was the Niagara Escarpment that inspired





my university studies in geography and geology.

In my late 20s I joined the Bruce Trail Association (renamed the Bruce Trail Conservancy in 2007), volunteering on various committees and eventually on the Board of Directors. I was – and still am – passionate about the mission of the organization in preserving land along the Niagara

Escarpment, land that I love. I was fortunate to be able to apply that passion to a career as Chief Executive of the Bruce Trail Conservancy from 2004 to 2018. It was a magical time and I worked with a stellar team of staff and volunteers to preserve thousands of acres of Escarpment land.

I love exploring the Niagara Escarpment. To me, every walk on the Escarpment is a walk through time, starting 450 million years ago and continuing through the

millennia to the still-changing landscape of today. I have found profound delight in sharing my love of Escarpment geology with thousands of others on geology hikes I lead as a volunteer between 2003 and 2018. This book is a culmination of many years of exploration and encouragement from those geology hikers, and from the volunteers with whom I connected and who remain my friends.

The story of the Niagara

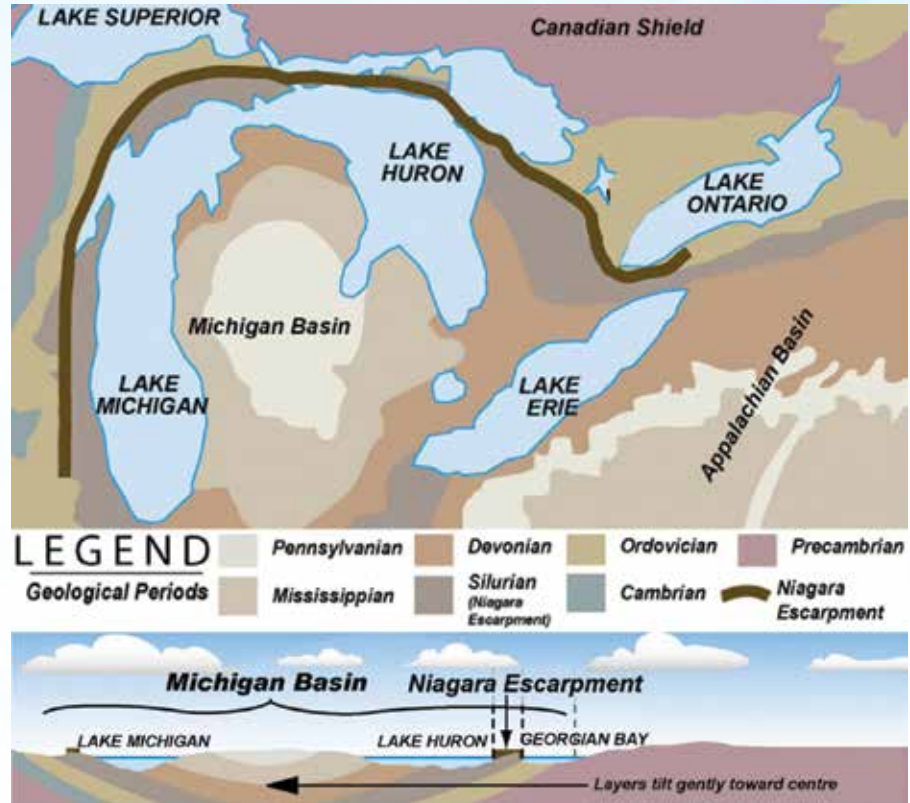
Escarpment stretches back 450 million years to a time when the earth was vastly different to what it is today. The land that we now call southern Ontario was covered by a tropical sea, and the whole continent that would become North America was laying on its side straddling the equator, with southern Ontario located at about 10 degrees south latitude. The planet spun faster so the days were only 21 hours long. Oxygen levels were at a reasonable, and even slightly



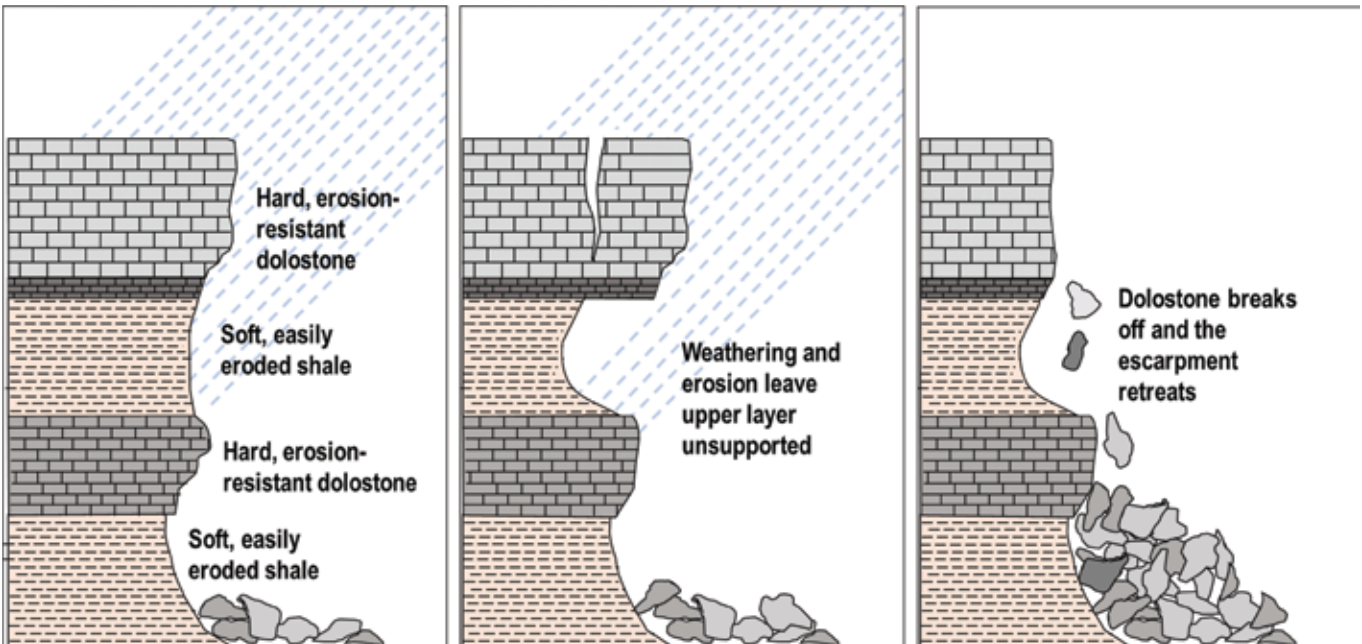


◀ All of the Niagara Escarpment rock layers are stacked up one atop the other at old Baldy in the Beaver Valley, from the Queenston Shale laid down 450 million years ago in a shallow tropical sea up to the Amabel Dolostone caprock so iconic of the Niagara Escarpment. PHOTO BY LILLA FODOR.

SOURCE: [HTTPS://WWW.CGENARCHIVE.ORG/TORONTO-NIAGARA-ESCARPMENT.HTML](https://www.cgenarchive.org/toronto-niagara-escarpment.html)



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▲ Through freeze-thaw activity, the fractured dolostone rock is wedged apart creating cracks and eventually widening into crevices. PHOTOS BY BETH GILHESPY.

invigorating, 24 percent, but with the exception of primitive algae, all life on earth was confined to the seas.

It was into this unfamiliar environment that the rocks that would become the Niagara Escarpment were deposited – layer upon layer of sand, mud and coral reef, building up over roughly 22 million years in a shallow depression called the Michigan Basin. There are older rocks in Southern Ontario, stretching from the Escarpment edge east to the Canadian Shield and underlying the homes of more than 10 million people in the GTA. There are younger rocks, too, which lie on top of the Escarpment and extend west into Michigan. But the rocks we’re most interested in – our beautiful Niagara Escarpment – is the 22 million year sequence of layers that formed between about 450

and 428 million years ago.

The formation of these rocks is the “building up” stage of the Niagara Escarpment. Old, old rocks lain down in a shallow tropical sea, on a planet that was – at least from our present day perspective – both inhospitable and unfamiliar.

That we have an Escarpment at all is thanks to a perfect combination of conditions: just the right degree of dip of the rock layers, the sequence of hard rock overlying soft rock, and the slow, steady passage of time over the past 250 million years after the shallow sea dried up and exposed the layers to erosion.

The rocks of the Michigan Basin sag towards the centre of the basin due to the pressure of overlying layers and a slow tectonic drawdown at the centre of the basin as the

rock was being deposited.

Water more easily penetrates the exposed, slightly tilted, edge of the rock, exploiting the cracks, breaking the rock apart, and eating away at the soft layers underlying hard layers, causing the hard layers to fall. This process of undercutting and erosion of the Escarpment is easy to see at its many waterfalls, but even where there are no waterfalls, the passage of time has been sufficiently vast to wear the Escarpment face back 100 to 200 km over the past 250 million years to its present location today.

At its southeast reaches the Niagara Escarpment follows the edge of another basin, the Appalachian Basin, to the Hamilton, Ontario area, then picks up the edge of the Michigan Basin north along the Bruce Peninsula and Manitoulin Island,







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▲ Extinct coral fossils found along the Niagara Escarpment, like this Favosites (“honeycomb coral”) fossil, are evidence of the ancient tropical sea that once inhabited the area more than 400 million years ago. PHOTO BY BETH GILHESPY.



► The Amabel Dolostone, which is magnesium-rich limestone, seen here at Old Baldy, is the caprock of the Niagara Escarpment and iconic along the Bruce Trail. PHOTO BY LILLA FODOR.



then curves west and south through Mackinaw Island and the western edge of Lake Michigan in Wisconsin. The bedrock continues the circle into Illinois and Ohio, where it is covered by a layer of glacial sand and gravel so thick that it completely disappears from the landscape. The portion of the Niagara Escarpment followed by the Bruce Trail extends from the

Niagara River west to the Hamilton area and then north to Tobermory at the tip of the Bruce Peninsula. Along its length the Bruce Trail is divided into 9 sections, and in this book we will focus on the geology of one of those sections, the magnificent Beaver Valley Section.

*Books are available from the Bruce Trail Conservancy*

*store at [brucetrail.org/store](http://brucetrail.org/store) or 1.800.665.4453 or from the author directly, at [walkingthroughtime.ca](mailto:walkingthroughtime.ca) or [wttnegeology@gmail.com](mailto:wttnegeology@gmail.com). The price is \$25 for BTC members and \$27 for non-members.*

*Beth Gilhespy has worked in the field of environmental conservation for more than 30 years and was CEO of the Bruce Trail Conservancy*

*between 2004 and 2018. She is an avid explorer and frequently hikes in the Canadian Rockies, on long distance paths in the UK and locally on Ontario's Bruce Trail. She holds Bachelor of Science and Master of Science degrees in physical geography and geology from the University of Guelph. Beth is executive director of the Toronto Zoo Wildlife Conservancy. **NEV***





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▲ Erratics are rocks that are transported to a new area within glacial ice and left behind as the ice melts. Many old fields on the Escarpment are dotted with these rock piles, created as settlers cleared the land. Larger erratic boulders were often moved by oxen and cart to line the field edges. PHOTOS BY BETH GILHESPY.

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