Geology of the Cuyahoga Valley: A FIELD GUIDE

Compiled, edited, and written by Susan Richards, MS Geology, Kent State (retired consulting geologist)

Sunrise at Brandywine Falls

Memorial Bench at overlook at Fort Hill in the Rocky River Reservation, Cleveland Metroparks.

Dedicated to the late Dr. Tom Lewis (Cleveland State), who inspired me to have the confidence to become a real geologist when I was too shy to know my own destiny and for showing me there is no substitute for getting out there and seeing the rocks.

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AUTHOR'S NOTE (February 2025)

Hi, thanks for reading/using my geology field guide. It was a labor of love.

I moved to the Cuyahoga Valley in 1983, when my first daughter was only seven months old. In the next three years, the stork delivered three little boys to our house on the edge of the valley. Living on the edge of the valley turned out to be a wonderful place for my kids and me to explore. While raising the kids, I was attending graduate school in Geology at Kent State University. I started leading interpretive geologic field trips to the Valley then and continue to do so almost 40 years later.

I am a retired environmental geologist, with a specialty in Human Health Risk Assessment. Most of my work was in Northern Ohio, and it was necessary to understand the geology of the sites at which I worked, so I never stopped learning and interacting with the geology of the region. I worked in Toledo, Ohio for 15 years, moving back to Akron after retirement just a few years ago.

When I lived in Toledo, the Valley drew me back at least a couple of times per year to lead field trips and to hike. In 2023 I was overjoyed to be able to share the Valley with my 4 kids and six grandkids (You guys inspire me). I had 21 relatives staying in Stanford House for my 70th Birthday. It was the perfect place for a family gathering and right in the heart of the place I love so much. I love hiking in the winter months. If you see someone on the trails in a long green coat, be sure to say hi!

Geologists tend to interact with their environment visually. Friends who hike with me will attest that I stop often taking pictures (great excuse to take a rest). The photographs in this document are mine, unless otherwise noted.

I want to give thanks to the Western Reserve Racing Group for their yearly hiking/running challenges. The challenges took me to trails I had not explored before, providing me the opportunity to really understand the geology of the Cuyahoga Valley National Park (CVNP). Each hike was a different piece of the puzzle. I also need to shout out to the WhyNots hiking group, Adventurous Souls, and the Akron Bicycle Club who have kept me hiking and riding my bicycle. A special thanks To Heidi Emeroff Sumser for technical assistance with this document.

The wonderful trails in the CVNP and surrounding area would not be possible without many entities, including the National Park Service (NPS), the Conservancy for the Cuyahoga Valley National Park (Conservancy), the Summit Metroparks (SMP), the Cleveland Metroparks (CMP), the Buckeye Trail Association (BTA), and the Cuyahoga Valley Trails Council (CVTC). These entities own land and/or maintain trails within the park. Please consider supporting them. Most of all, get out there and enjoy, and let your sense of wonder wander through the hills, streams, and rocks.

About – Conservancy for Cuyahoga Valley National Park (conservancyforcvnp.org)

Parks and Recreation in Summit County | Summit Metro Parks

Home | Cleveland Metroparks

Buckeye Trail Association

Cuyahoga Valley Trails Council (cvtrailscouncil.org)

This guide is not meant to be read cover to cover. I have provided links so you can jump from one trail to another, and to some of the introductory material. The document is structured with a general description of the geology of the Cuyahoga Valley, followed by geological descriptions of each trail in the order given in the "**Trail :Guide: Cuyahoga Valley National Park, 4th edition**, © 2007-2024 Cuyahoga Trails Council, published by Gray & Co., written by Peg and Bob Bobel" (TG). Therefore, some of the information is repeated. In addition, some of the trails overlap or coincide with each other, so links are provided to the first description given for that area. Each section describing the geology of the trails refers to the page in the 4th Edition of the Trail Guide (TG). There are rather lengthy descriptions of the Geology of Ritchie Ledges at Virginia Kendall and of Brandywine Falls.

1) THE CUYAHOGA VALLEY

The Cuyahoga Valley National Park (CVNP) is named for the river that runs through it. The CVNP was created as the Cuyahoga Valley National Recreation Area (CVNRA) in 1974. It was redesignated as a National Park in 2000. The name change occurred quietly by a change of one sentence in an appropriations bill. This change was the work of Representative Ralph Regula, and was made to elevate the status of the park (1).

The Cuyahoga River flows south from its headwaters in Geauga County, then turns north in Cuyahoga Falls emptying into Lake Erie. This strange change in direction occurred as the glaciers were melting during the last glacial retreat. Meltwater flowed south, hit a continental divide in the Akron area (Cuyahoga Falls), and then found its way north cutting into an existing preglacial valley and finding a path to discharge to Lake Erie. This change in direction is thought to be the reason for the name Cuyahoga. The name is believed to mean "crooked river", but the exact origin of the name is unclear. The Mohawk name *Cayagaga* means "crooked river"; the Seneca word for "jawbone" is *Cayóhágeh* meaning "on your chin" – the river's course does resemble a jawbone. However, neither the Mohawk nor the Seneca were in the valley alongside Europeans, rather the Wyandot were, and their name for the river does not resemble the word Cuyahoga at all (2). Conventional thinking, however, holds that the name means "crooked river".

The geology of the Cuyahoga Valley impacted the lives of the various people who have occupied the valley over time, providing the resources needed for hunting, farming, transportation, and mining. The National Park Service Visitor's Center has information on the cultural history of the Cuyahoga Valley. The Visitor's Center is always a good place to begin a visit to the valley.

2) GLACIAL GEOLOGY OF THE CUYAHOGA VALLEY

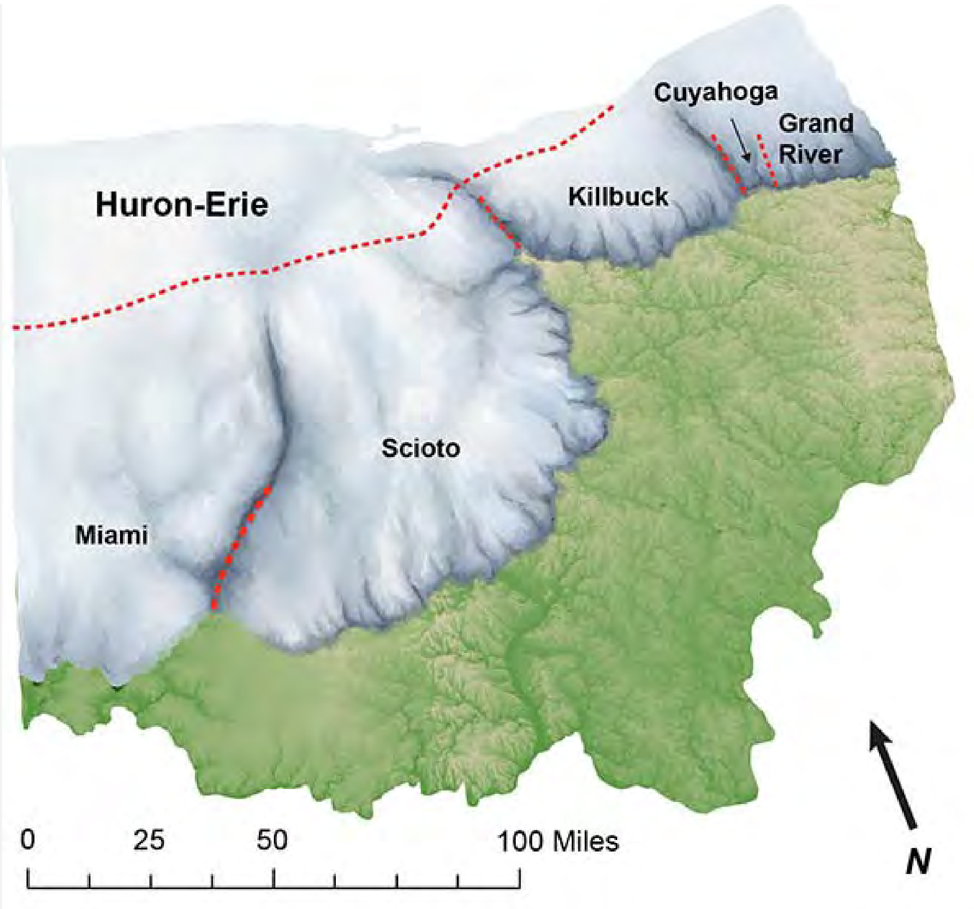
The Pleistocene Epoch, commonly referred to as the Ice Age, represents a period starting approximately 2 million years ago ending about 11,600 years ago. There were at least three identifiable advances of glaciers in Northeast Ohio. The advance of continental glaciers led to great thicknesses of ice partially covering Ohio and large loads of sediment being deposited, altering the landscape.

Changes in climate during the Pleistocene also affected the plants and animals that lived in Ohio, many of which are no longer found in Ohio today. The wood preserved in glacial sediment shows that spruce, fir, cedar and hemlock — now found in more northern environments, like Canada — were common in Ohio during the Pleistocene. During the post-glacial period, warming temperatures brought more deciduous trees, like the oak and elm (3) One tree that was around in the Pleistocene, the Hemlock, is still growing in the Valley today and is an important geological marker in the valley. In the Cuyahoga Valley, it will ONLY be found growing on sandstone. Often, the underlying bedrock cannot be seen because of the dense vegetation, but when Hemlock trees are present, sandstone is underfoot. Geologists often use vegetation for clues to understand the underlying rock and soil.

Pre-glacial Ohio was a hilly area; the landscape, was formed as the Appalachian Mountains were formed beginning about 480 million years ago. Pre-glacial drainage was different than in evidence today, but the glaciers blocked the original channels, in some cases changing flow direction upon melting. In the eastern half of the state, the glaciers only made it a little south of Akron while in the west, the glaciers extended to Cincinnati. (3). In Northeastern Ohio we only see clear evidence of two glacial periods, the Illinoian (190,000–130,000 years ago) and Wisconsin (35,000 to 12,000 years ago). Any pre-Illinoian glacial landforms were either destroyed or buried by subsequent glaciations. Because the Wisconsin

Glaciation was the last glaciation to occur and happened relatively recently, glacial sediments are still well-preserved.

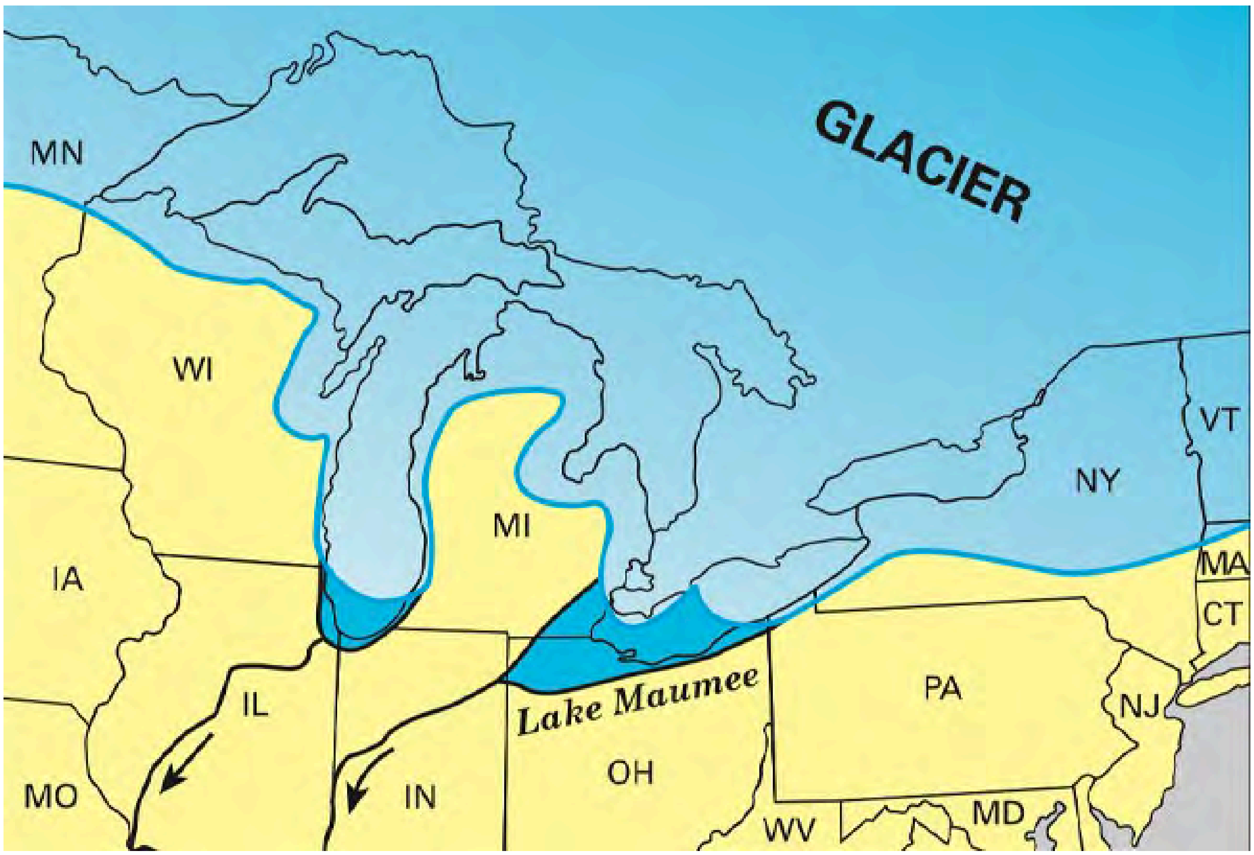
During the Wisconsin Glaciation, the Laurentide Ice Sheet extended across Ohio. The glacial lobe split into five parts, or sublobes (4), because of topographic features that impeded the ice.



Depiction of the Laurentide Ice Sheet over Ohio during the Late Wisconsinan Glaciation.

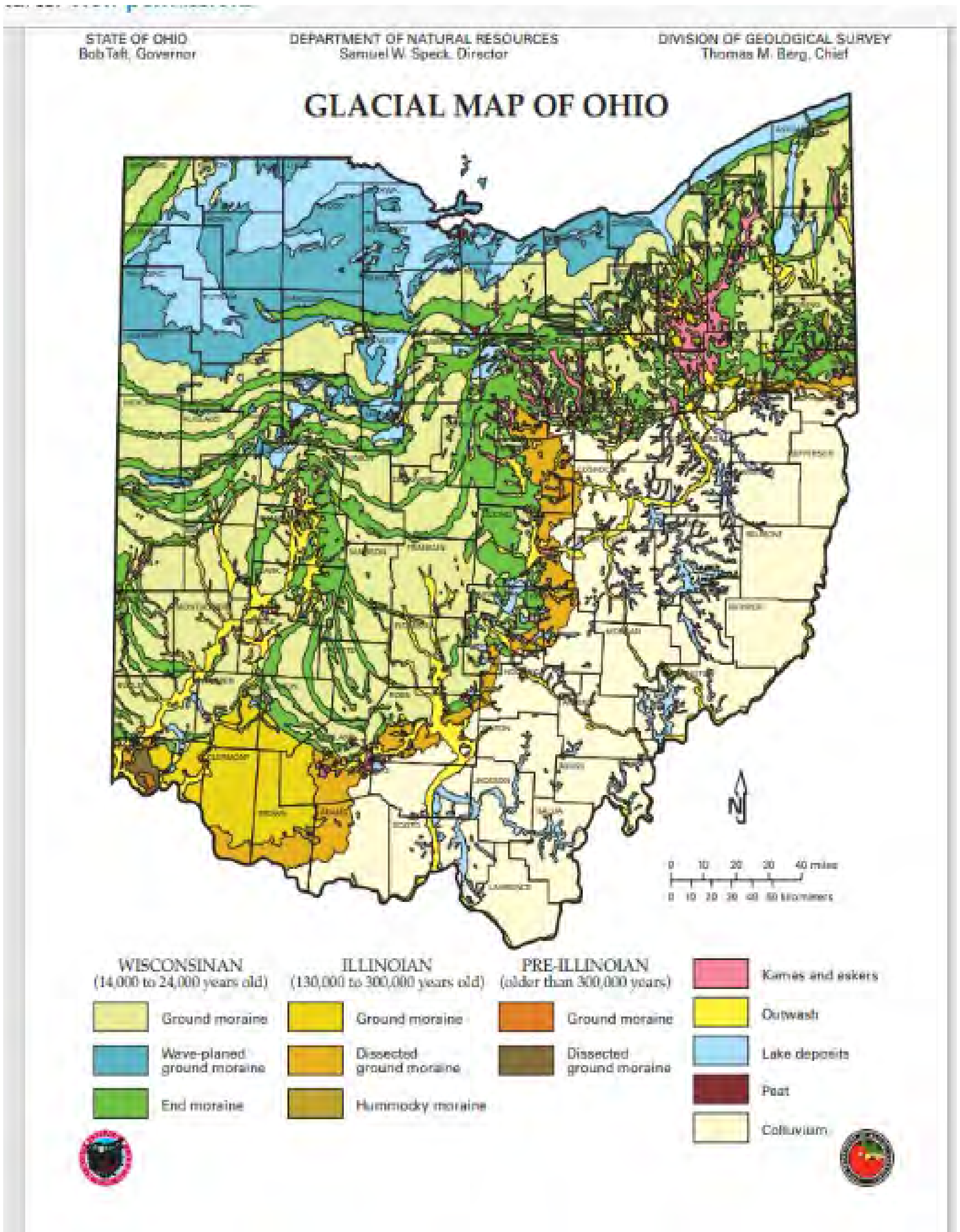
In the area surrounding the Cuyahoga Valley, the ice was as thick as a mile deep. The weight of this ice depressed the underlying crust. When the ice melted, the crust started to rebound (isostatic rebound). Once de-glaciation was complete this isostatic rebound was about 2.5 cm per year. This uplift continues today, but current rates are on the order of 1 cm per year or less. It is estimated that this rebound will continue for another 10,000 years (5).

As glaciers continued to retreat late into the Wisconsin Glaciation, large glacial lakes began forming from glacial meltwater in northwestern Ohio. These proglacial lakes were the precursor to the modern Lake Erie. Eventually, ice retreated north of the present-day Niagara River outlet and modern Lake Erie was established with a mean elevation of about 570 feet above mean sea level (msl).



Pro-glaical lakes formed at the leading edges of glaciers as they retreated [(4)]

As a result of the migration northward of the shorelines of these glacial lakes, a series of beach ridges formed. Today, as you travel south from Lake Erie, you will cross a number of these ridges. Because of their higher elevation, these ridges were used as roadways, hence the roads are named things like Ridge Road, Butternut Ridge Road, and etc.



Glacial Map of Ohio [(6)]()

a) Glacial Features of Note in the Cuyahoga Valley

i) Deeply Incised Valleys –

As one travels through and hikes in the valley, very steep slopes and deeply incised valleys are encountered. The steepness is a result of the rapid downcutting resulting from the retreat of the glacial lakes to lower elevations and the isostatic rebound (currently about 1 cm per year) that occurred as the glaciers melted.

ii) Moraine

As glaciers advance over a landscape, they erode and entrain (pick up) the rock and soil they travel over, so when they melt, they leave behind vast amounts of debris. These deposits are called Moraine or Till (used interchangeably in this document).

(1) Glacial Erratic

When we find granitic boulders on the ground (called glacial erratics), we know that these materials did not originate in Ohio but were transported by the glaciers from Canada. There are no granitic outcrops in Ohio. <u>Glacial erratics can be found everywhere in the Cuyahoga Valley.</u> (Granitic rocks are igneous rocks, generally composed of feldspar, quartz, mica and dark iron rich minerals including amphiboles, and biotite. These minerals, which are generally visible with the naked eye, form an interlocking matrix).

(2) Ground Moraine (Till)

Glaciers acted as conveyer belts, bringing materials from the north (eg. Canada and southward) and deposited materials as they receded. These deposits consist of a mixture of sand, silt, clay, and boulders. <u>Ground Moraine is found everywhere in the Cuyahoga Valley.</u>

(3) Terminal (or End) Moraine

When the glaciers started to melt, there were periods of time when the rate of melting was about equal to the rate of glacial advance. When this happened, the glaciers, which acted as conveyor belts, deposited accumulations of material at the terminus of the glacier. These deposits can be quite thick, depending on how long the glacier was stalled. Terminal moraines are characterized by rolling hills and closed depressions (often bogs or ponds form in these depressions). Some terminal moraines include kettle and kame topography. <u>The Virginia Kendall Hills area is an excellent example of terminal moraine.</u>

(4) Kettles and Kames

Kettles form when large ice blocks are deposited within moraine. Eventually these ice blocks melt, leaving closed depressions which may become lakes or bogs. Kames are formed when the melting ice flows into a hole in the ice. This results in a conical hill of well sorted coarse grained deposits (eg. sand and gravel). In Ohio, kames are mined for sand and gravel. <u>Kettles and kames are present at Virginia Kendall Hills, at Oak Hill, and at Indigo Lake.</u>

iii) Outwash

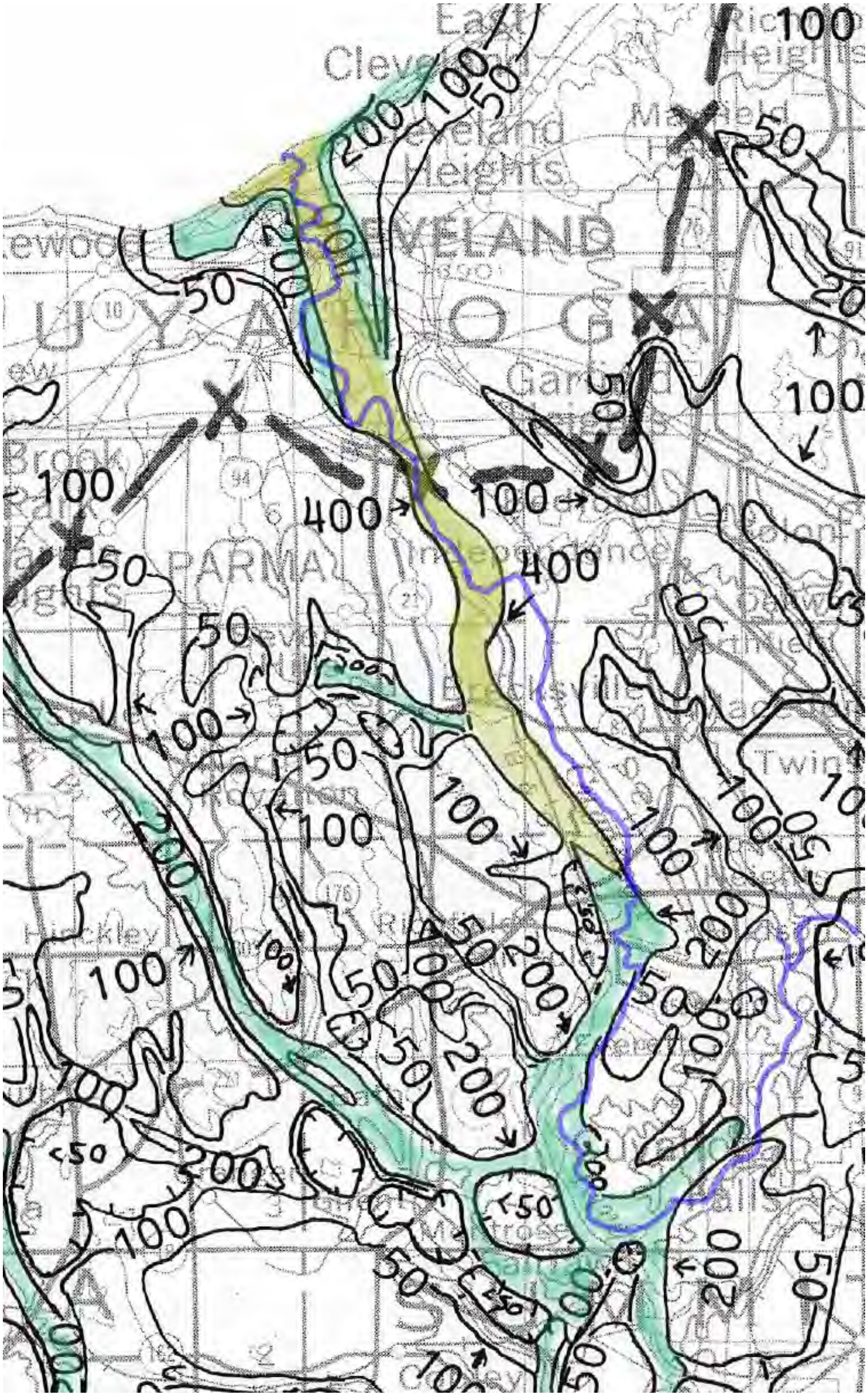
Outwash is deposited in front of the glacier as it melts. Meltwater carries material away from the glacier and the water sorts the sand and gravel as it flows; coarser material is found closer to the glacier's edge, and finer material is found further from the edge of the glacier. <u>Outwash deposits are present south of Virginia Kendall Hills along the Butler Run Trail, in Hampton Hills, and in O'Neil Woods.</u>

iv) Buried Valley

A buried valley forms when a preglacial stream valley is filled with outwash from retreating glaciers. The northern flowing portion of the Cuyahoga River is largely aligned with the ancestral Cuyahoga Valley. The glacial fill within the valley can be 200 to 400 feet deep. These deep deposits are good sources of groundwater and were utilized by the former Jaite Mill where there are flowing artesian wells.

The pre-glacial stream valley flowed southward. We know this by looking at a map of the "drift" thickness. Stream valleys "V" upstream. The figure below, excerpted and colored by the author shows the relationship between the buried valley and the present-day Cuyahoga River (7).

There are areas where the Cuyahoga River makes steep cuts through bedrock rather than following the alignment of the ancestral valley. In these locations, bedrock crops out in the stream bed and along valley walls, and the river valley narrows considerably. <u>You can observe bedrock in the riverbed downstream of the Gorge Dam (e.g., along Babb's Run), between Deep Lock Quarry and through and north of Peninsula, and in Piney Narrows north of Station Road Bridge.</u>

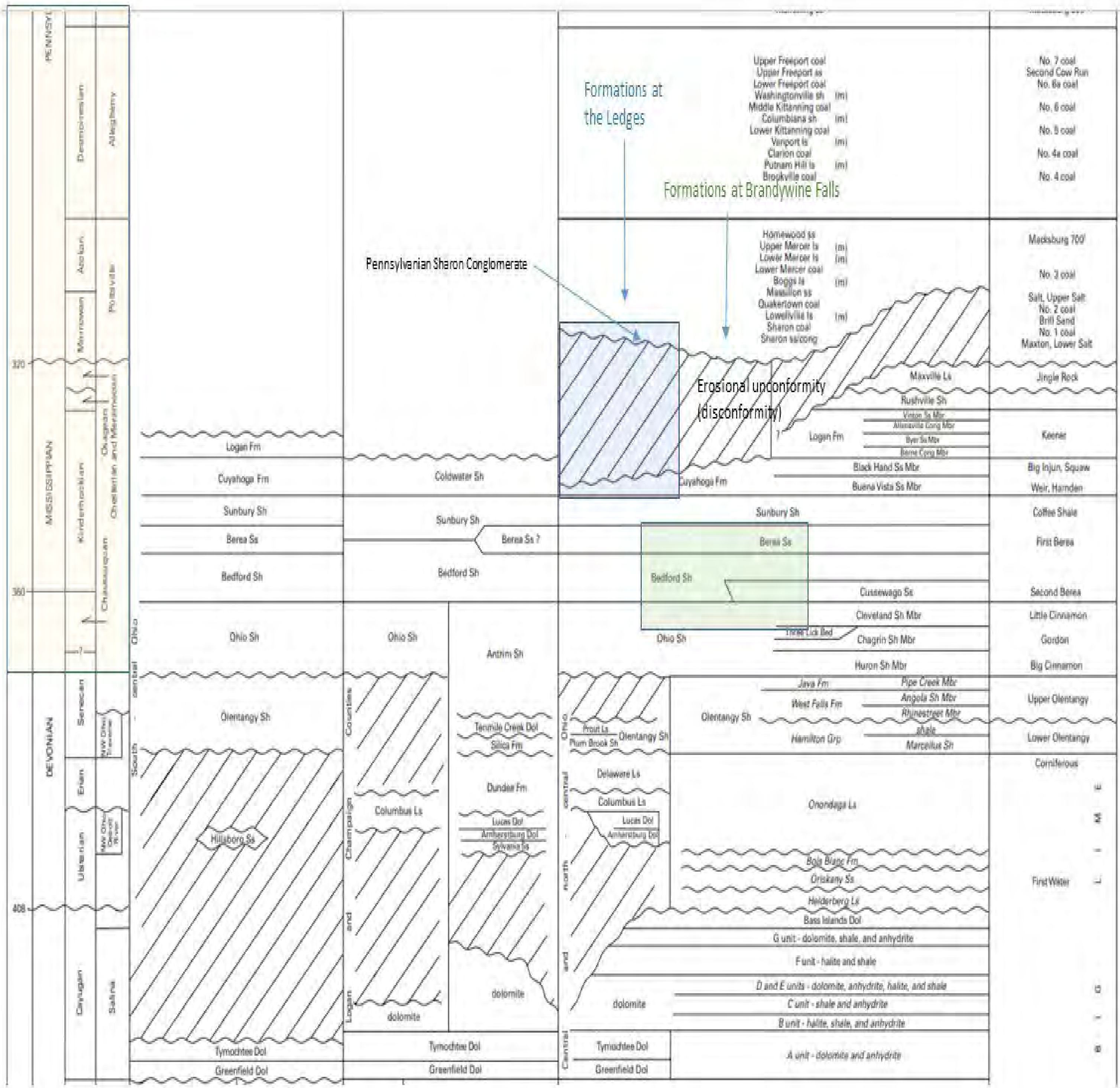


Depth of Glacial Sediments in the Cuyahoga Valley, colored by the author [(7)]

3) BEDROCK GEOLOGY OF THE CUYAHOGA VALLEY

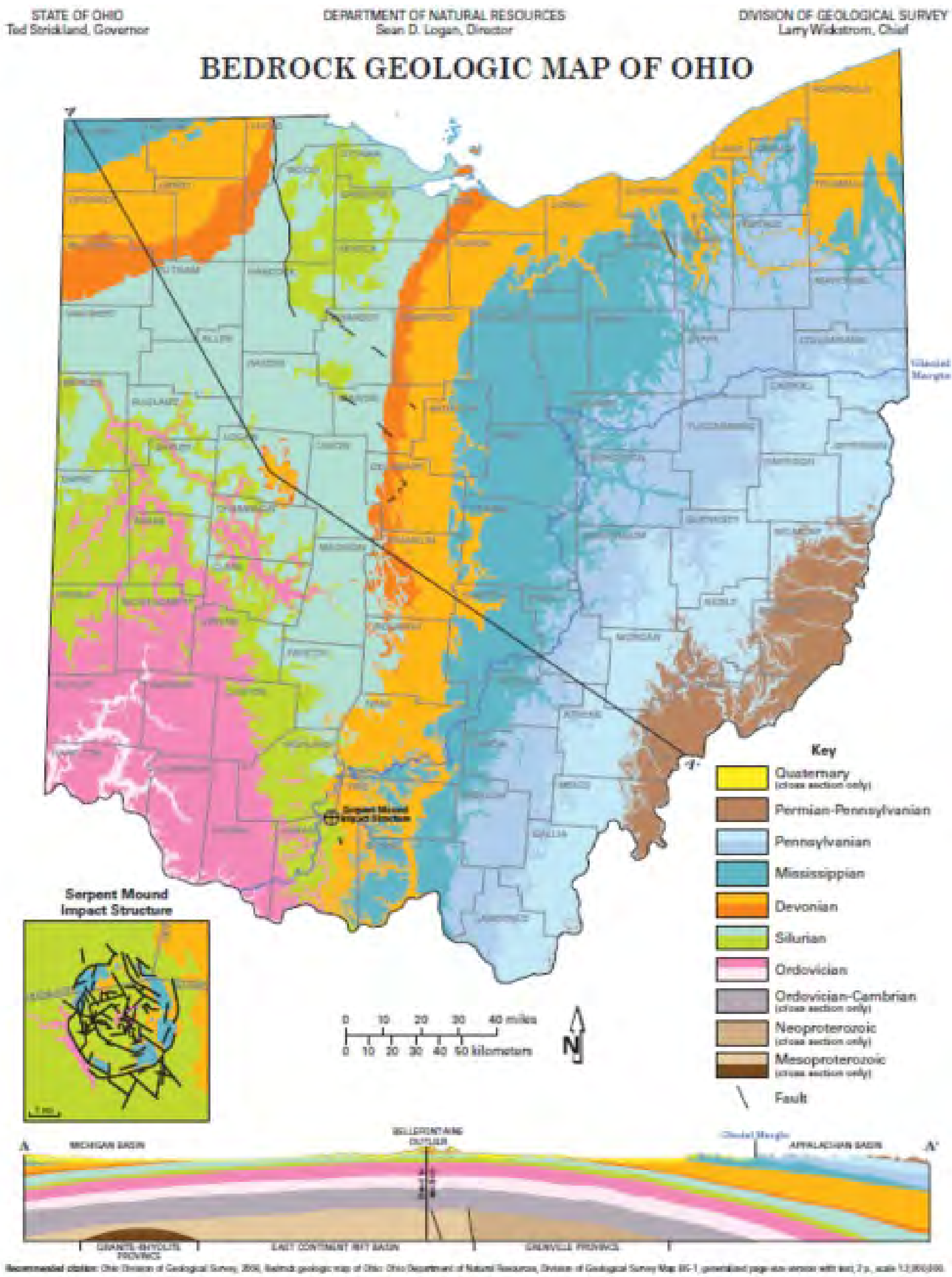
The bedrock in the Cuyahoga Valley is all sedimentary, having been deposited in a variety of environments during a period ranging from approximately 400 to 300 million years ago. At the time of formation (Paleozoic), Ohio was at the equator. The earth is dynamic, and the crust moves over the molten mantle by a process called plate tectonics. For instance, the Atlantic Ocean floor currently spreads about 10 to 200 cm per year (8). As the crustal plates move apart in one area of the earth, they get closer together in other areas. Where they merge, one plate either drops beneath another (subduction zone such as along the South American coast) or pushes against each other (such as the Himalayas). Mountain building occurs when plates converge. Plate convergence was building the Appalachians during the Paleozoic.

Following the Permian Period, which ended about 245 million years ago, a process known as uplift (associated with the closing of the proto-Atlantic Ocean and the formation of Pangea) pushed Ohio's bedrock upward. As a result of the uplift being greatest in the western part of the state, the layers of bedrock were tilted downward to the east across the state (dipping about 2% to the south-southeast). Erosion and weathering of the exposed bedrock followed. The cross-section of Ohio appearing with the map below shows this layering and exposure. This uplift and wearing down of sedimentary rock also resulted in the removal of sediments that may have been laid down during the period extending from the Triassic Period through the Tertiary Period. This explains why we do not find dinosaur fossils in Ohio: these deposits are not present in the state. In the geologic column below, the shaded areas represent the rocks (formations) that can be observed at the surface and in the valley walls in the Cuyahoga Valley.



Geologic Time Scale for the Cuyahoga Valley (9)

The map below shows how the surface rock (bedrock) would appear if the loose materials such as soils, stream gravels, and glacial deposits were stripped away. The diagram below the map represents a cross section of the state showing that the rocks of different ages are layered on top of one another. The older layers are beneath the younger layers. (10)



The successive layers of bedrock within the valley tell a story of a progressively shallowing sea, from deep sea to near shore environments. A long period of erosion (disconformity) occurred approximately 320 million years ago, followed by an influx of sediments via streams at the margins of a shallow sea.

The following are the bedrock formations that will be encountered on hikes in the CVNP in the order from oldest to youngest.

a) The Ohio Shales including the Cleveland Shale and the Bedford Shale

There are two members of the Ohio Shale Formation that crop out in the CVNP, the Devonian Cleveland Shale Member and the Devonian Bedford Shale Member.

i) The Cleveland Shale (~370 MY) –

The Cleveland Shale consists of carbon and clay rich platy and fissile shales. It represents a deep-sea environment. Its carbon content is high enough that it has often been explored for use as oil shale. It is famous for the discovery of the armored fish Dunkleosteus, unearthed during construction of I-77 (11).

The Cleveland Shale crops out in the bed of Brandywine Creek and is one of the three formations that can be observed at Brandywine Falls.

ii) The Bedford Shale (~360 MY) –

The Bedford Shale consists of red and gray mudstones, thin sandstones and siltstones, and thin limestones. These are thought to be near shore and deltaic deposits. Although in places there is a clear erosional boundary with the overlying Berea Sandstone, in other places, the Berea Sandstone appears to have been deposited over the still soft Bedford sediments (eg, in Berea). At one time, the contact between the Berea Sandstone and the underlying Bedford was considered to be the boundary between the Mississippian and Devonian Eras, however an extensive study of brachiopod, conodont, and spore fossils in the Bedford Shale and Berea Sandstone, did not find evidence of lower Mississippian conodonts in either rock formation (12). This study led to the relatively recent placement of both formations in the upper Devonian.

b) The Berea Sandstone (~359 MY) –

The Berea Sandstone was first described by Newberry as the Berea Grit (13). This dense formation of Late Devonian Age (12) is a dense relatively uniform sandstone. The accepted origin for this sandstone (14) is a deltaic deposit from the emerging Appalachian Mountains extending west into a shallow inland sea. Lewis (15) of Cleveland State presented evidence that the Berea represented beach deposits.

> "Berea sandstone, a potential Global Heritage Stone Resource, has been one of the most widely used sandstones in North America. This Paleozoic sandstone, quarried for more than 200 years in Ohio, has been used across much of the continent. Thousands of commercial, residential, ecclesiastical, government and other structures have been built with Berea sandstone, including Thomas Worthington's mansion in Chillicothe, Ohio, the Michigan Capitol in Lansing, Michigan, the Carnegie Library and Natural History Museum Building in Pittsburgh, Pennsylvania, and parts of the Parliament buildings in Canada. Grindstones made from Berea sandstone were shipped throughout North America, as well as to the Caribbean, South America, Europe and Asia. The stone is celebrated in a number of locations, notably Berea and Amherst, where quarries have been important historical sources of this stone. It has been known by a number of different geological and commercial names, including Berea grit and Amherst stone, complicating its identification from historical sources. Stone from the most productive quarries, however, was known to be homogeneous and can be identified by its quartz–arenite to sublithic–arenite composition, its fine to medium sand (125–350 µm) grain size and iron-cement spots. Berea sandstone continues to be quarried today in Erie and Lorain counties." (16)

Further south and southeast, the Berea is drilled for oil, gas, and brine. The natural brine content in the Berea makes it unsuitable for development of groundwater (17) resources but has been exploited as a source of salt in the Akron-Barberton area.

The Berea was quarried in the Peninsula Area and one of those quarries can be explored at Deep Lock Quarry. In the Cleveland Area, the Berea was quarried for building stone, grindstones, sidewalks, and curbs. There are examples of Berea Sandstone in sidewalks along the south side of US Rte. 303 in Peninsula. You will be able to identify ripples in the blocks used for sidewalks.

c) The Cuyahoga Formation (~ 350 MY) –

The Cuyahoga Formation was deposited in shallow seas. Although the specific members are not identified throughout most of the CVNP, the Sharpsville Member is extensive enough in the Gorge Metropark (SMP) for a positive identification. The Cuyahoga Formation is composed of thin shales (clay rich), thin sandstones, and thin limestones (14). When weathered, the shales create clay-rich soil. Many of the upland areas along the Buckeye Trail between Blue Hen Falls and Brecksville traverse soils developed on the Cuyahoga Formation. These portions of the trail do not drain well and tend to be very muddy. The Cuyahoga Formation crops out along the west side of Riverview Road near the Valley Picnic Area.

d) The Sharon Conglomerate (~320 MY) –

There is a disconformity (erosional unconformity) which represents a long break in the sedimentary record between the Cuyahoga Formation and the Sharon Conglomerate member of the Pottsville Formation.

The Sharon is primarily composed of sandstone (more than 90% quartz) within the CVNP, but there are abundant layers of conglomerate composed of rounded quartz pebbles (lucky stones), in a sandstone matrix. These rounded pebbles indicate that the sediments experienced numerous episodes of erosion, transportation (called reworking), and then redeposition. The cement is primarily iron oxide (hematite); the Sharon Conglomerate is not tightly cemented and is easily eroded. The Sharon Conglomerate is interpreted to have been deposited as a braided stream (18). A modern-day example of a braided stream is the Platte River. Note in the picture of a braided stream below the stream crosscuts and direction changes.

Photo by **Trey Ratcliff** Braided rivers, South Island of New Zealand, May 2020 (Flickr)

The Sharon Conglomerate is mined in Northeast Ohio for sand and gravel. Its cementation is not strong enough to be important as a building stone. The Sharon Conglomerate is very permeable and is considered an excellent source of groundwater (aquifer) where it is persistent (19). Although not fossiliferous in the CVNP, just a little further south in Akron, the Sharon contains coal seams, and there are abandoned coal mines in the area around Barberton.

The most spectacular outcrop of the Sharon Conglomerate is found at Ritchie Ledges in Virginia Kendall Park. The formation is absent throughout most of the CVNP with the exception of a few sandstone knobs capping hills. I have provided a rather comprehensive description of sedimentary features that can be found in the Sharon Conglomerate in the section on the Ledges.

e) Distribution of Bedrock within the southern portion of the CVNP.

The following map (20) shows the rough distribution of the bedrock subcrops/outcrops within the southern portion of the CVNP. Note, the older rocks are found centered on the river valley.

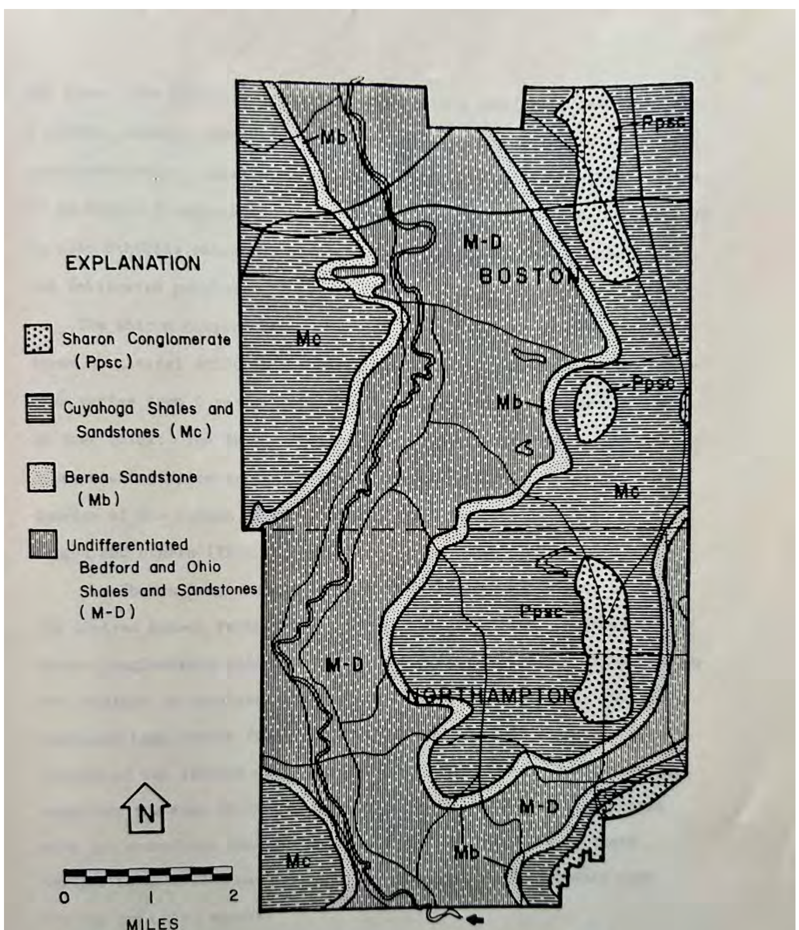


Figure 9. Bedrock geology map of Boston and Northampton townships (modified after Rau, 1969b).

4) THE TRAILS

There are so many hiking opportunities in the CVNP and in adjacent areas including the Cleveland Metroparks and the Summit Metroparks. The area is rich in history, flora, and fauna. Geology underpins all these wonderful features. Geology is responsible for the presence of arable land, for the presence (or absence) of groundwater, for mineral resources, and for the vistas we all take such delight in. A knowledge of geology informs our understanding of the landscapes we hike through. This document deals primarily with the geology of the trails. For excellent individual trail descriptions see, the "Trail Guide: Cuyahoga Valley National Park, 4th edition" published by the Cuyahoga Valley Trails Council and written by Peg and Bob Bobel. This geologic field guide is written in reference to the Trail Guide. Page numbers in the following sections refer to the page numbers in the Trail Guide (TG).

a) THE TOWPATH

i) Lock 39 Trailhead to Frazee House Trailhead (TG p 29)

The Cuyahoga River in this section flows through a rather wide flood plain following an ancient buried valley. This section of the river has developed wide meanders. Where the river is visible from the towpath, note the locations of sand accretion (point bars). Point bars develop on the inside of curves where the stream current is slower. When the stream has less energy, larger particles such as sand and gravel drop out of the stream. Note that there is no accumulation on the outside of curves; these are cut banks where erosion occurs. Meanders in the river are caused by this combination of erosion and deposition. (*Photo from Google Earth)*

ii) Hemlock Creek Trail (TG p 29)

Hemlock Creek Trail climbs out of the Cuyahoga Valley to the west of the river north of the Canal Exploration Center. The valley walls here are composed of Devonian Aged Ohio Shales. The trail passes by a former "haydite" mine. There is no mineral named haydite; the mined materials were Cleveland Shale. Haydite® is a manufactured lightweight aggregate for concrete made from expanded shale, expanded clay, and expanded slate (ESCS). Clay rich rocks are expanded by heating in a rotary kiln at temperatures over 1000° C. This aggregate was originally developed in 1908 and patented by Stephen J. Hayde in 1918 as Haydite® (21).

The Cleveland Shale Quarry at the old Haydite Facility. The photo is from Google Earth.

Some of the old Haydite® plant can be seen from the trail, but not the quarry.

The photos below show part of the former rotary kiln and a piece of Hayditte (which looks like slag but is much lighter).

Remains of Rotary Kiln at the Haydite Plant

Piece of Haydite

Climbing up the hill, there are 5 bridges crossing back and forth across Hemlock Creek. Looking down from the bridge with the stone walls, the creek bed is composed of the thin sandstones and shales of the Bedford Shale. Past that bridge, the grade of the trail steepens significantly. This section of the trail climbs up and over the Berea Sandstone.

Outcrop of Berea Sandstone

Berea Sandstone was mined in the second quarry on this trail. The quarry itself is hidden in the woods, but the Hummocky landscape along the trail represent sandstone spoil piles. The quarried area was used to create the Terraced Lakes, an elaborate series of lakes which was part of a large estate on the order of Stan Hewett Hall in Akron. There is little evidence of this former manmade feature. Traces of it are absent on Google Earth. The picture below is the location where the Terraced Lakes once emptied into local drainage. The stonework on the bridge crossing this area is probably a remnant of the lakes.

View up the valley where the former Terraced Lakes once stood.

iii) Frazee House Trailhead to Station Road Bridge Trailhead (TG p25)

This section of the Towpath traverses a narrow portion of the Cuyahoga Valley known as Pinery Narrows. The towpath, the river, and the railroad run parallel in this narrow gorge. The gorge cuts through the Ohio Shales rather than following the ancient Cuyahoga Valley in this section.

iv) Station Road Bridge Trailhead to Red Lock Trailhead (TG p 28)

Along the river you will observe meanders (see the explanation for Lock 39 TG p 29) and the steep sided hills are underlain by the Ohio Shales. Along this section of Towpath there are two locations where you can access the Old Carriage Lane Loop Trail (TG p 136)

v) Redlock Trailhead to Boston Trailhead (TG p 31)

This section of the towpath and the Cuyahoga River traverses a rather wide and flat section of the valley, which aligns with the ancient Cuyahoga Valley. Glacial fill within this area is deep (about 400 feet). At the former Jaite Mill, there are flowing artesian wells (which should be properly abandoned) drilled into the buried valley. These wells were capable of producing many hundreds of gallons of groundwater per minute, which was essential for the operation of the Jaite Paper Mill.

The picture below is of one of the flowing wells that can be found just off the towpath. Groundwater in Northeast Ohio is approximately 40 degrees Fahrenheit year-round (average ambient temperature for this area of Ohio), so the discharge from the well melts the surrounding snow. Artesian wells are those where the pressure within the aquifer (expressed as feet of water) is higher than a confining layer (such as a clay layer). Some of these wells flow above the ground surface, some simply have a water level higher than a confining layer. (see illustration below). The recharge area for artesian aquifers is at a higher elevation than the aquifer (see the diagram below).

Flowing well at the former Jaite Paper Mill

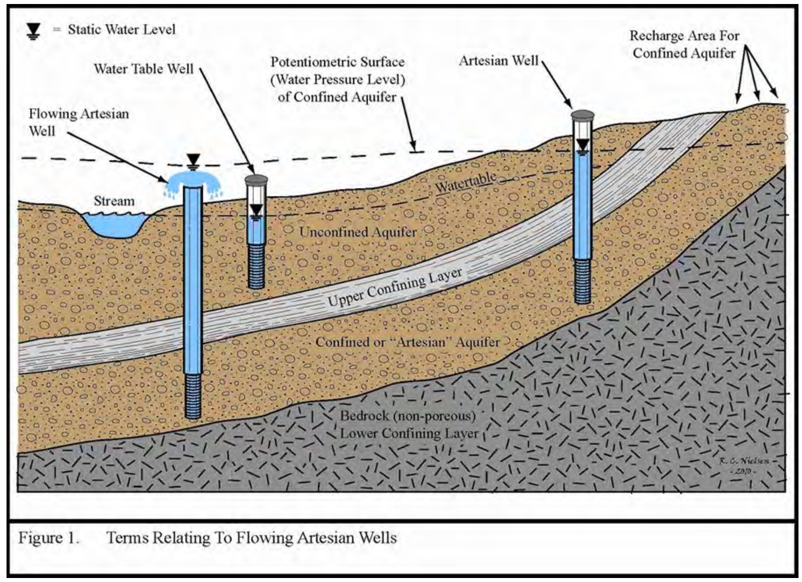


Figure 1 ([Artesian Well Diagram])

The wide floodplain along this stretch of the Cuyahoga River was at one time used for agricultural purposes. Since going fallow, the ground has been reverting to wetlands. Evidence of its former agricultural use includes the presence of barns throughout the Valley such as this one near the Stanford House (known as Helltown).

Abandoned Barn along Stanford Road

vi) Boston Trailhead to Lock 29 (TG p 34)

The northern section of this trail, just south of the Boston Trailhead, traverses a wide floodplain. In this section, the Cuyahoga River flows in alignment with the ancient Cuyahoga Valley. This is the section of trail that is crossed by both the I-80 and I-271 bridges, both impressive structures, and Stumpy Basin.

Upon approaching the Village of Peninsula, the valley narrows, and bedrock is observed in the stream bed and along valley walls. In this section of the stream, the Cuyahoga River does not follow the ancient Cuyahoga. The River cuts through the Devonian Bedford Shale. Looking up at the valley walls, a line hemlock trees can be seen. These hemlocks suggest the presence of sandstone, the Berea Sandstone. Closer to Peninsula, the Bedford shale lines the stream bed.

Bedrock is present in both the streambed and in valley walls along this section of the Cuyahoga River.

The town of Peninsula was so named because it was built on a meander in the river that was closing in upon itself creating a "peninsula". The isthmus (before the railroad cut it off) was only 50 feet wide. The two cut banks would eventually have reached each other forming an oxbow lake. The railroad sped up that process by cutting off the meander (so they only had to construct one bridge). The oxbow lake that was artificially created can be seen on Google Earth and lies north of the Lock 29 parking lot.

The cut bank downstream of Lock 29 exposes a thick exposure of Devonian Aged Bedford Shale. The surrounding hills are capped with the Berea Sandstone.

The cut bank exposes a thick section of the Bedford Shales at Lock 29 in Peninsula

Peninsula has experienced numerous floods over time. Take some time to look at the photos hanging in Fisher's Café, they are stunning. Why is the town of Peninsula so prone to flooding? The valley at Peninsula and upstream is wide can store great quantities of floodwaters. The valley downstream cuts through bedrock and is very narrow. When the river reaches flood stage, the narrow downstream gorge restricts the flow of the river, causing floodwaters to back up into Peninsula; the water simply cannot drain fast enough.

vii) Lock 29 Trailhead to Hunt House Trailhead (TG p37)

The section of towpath from Peninsula to Deep Lock Quarry is (in the Author's opinion) one of the prettiest; the river gently falls over a series of rapids underlain by Berea Sandstone and Bedford Shale. South of Deep Lock Quarry are rich farmlands, both current and former, developed on the river floodplain. When hiking, note the manmade levees built to protect fields from flooding. Although floodwaters carry sediment that enriches farm soil, flooding can also cause erosion and wash away seeds. In one area along the towpath, a cutoff meander forms a small oxbow lake. Look east while traveling on Riverview Road, you can see a number of these oxbows.

On this section of trail, the only bedrock in evidence are eroded platy shale pieces of the Cuyahoga Formation found in stream beds beneath bridges. The Cuyahoga Formation crops out along Riverview Road to the west, and these are eroded from those cliffs.

Active farm fields in the floodplain of the Cuyahoga River

A cuttoff meander forming a bog in the floodplain of the Cuyahoga River

viii) Hunt House Trail Head to Ira Trailhead (TG p 42)

Wetlands flank the towpath along this section. There is a watered section of the canal adjacent to a manufactured home community, a favorite spot for birders. To the west of the Manufactured Home Community, a path leads to Indigo Lake (TG p 45).

Further down the trail you will encounter a boardwalk through the beaver marsh. Before the 1980's, this low-lying area was an automobile junk yard. The beavers built a dam at about that time and the former junk yard started to flood (the cars have been removed). Since the 1980's, beavers built another dam further downstream and the flooded area increased in size.

The Beaver Marsh

These low-lying areas overlie the deposits of the Cuyahoga River buried valley.

ix) Indigo Lake to Hale Farm (p 45)

Indigo Lake was a sand and gravel quarry. The sand and gravel were deposited in this location as glacial outwash and terminal moraine. This quarry was a rather large operation, but historical topographic maps show the locations of other sand and gravel pits in this area along Riverview Road. When the gravel pit operations intersected the water table, groundwater filled the gravel pit creating the lake we see today.

Indigo Lake

A hill lies to the west of and adjacent to Indigo Lake. Its conical shape and the sand and gravel mining that occurred on the side of the hill suggest that this hill is a Kame. There is a paved path that goes up and over the hill to Hale Farm and Village. Along this path are numerous granitic boulders, which are glacial erratics. These rocks were transported to Ohio from Canada via the glaciers.

Glacial erratic

x) Ira Trailhead to Botzum Trailhead (TG p 47)

The towpath here runs along the base of an upland area to the west. These uplands are composed primarily of terminal moraine. The confluence of Yellow Creek with the Cuyahoga River is close to the intersection of Riverview and Bath Roads. Yellow Creek carries a high load of sediment. Sand bars form at the mouth of Yellow Creek, and during floods, the sand bars at the confluence often change dramatically.

Just east of Riverview Road along Bath Road, there is a blue heron viewing area. In early spring, very Suess-esque nests can be seen in the trees growing in the wetlands by the Akron Wastewater Treatment Plant. The nearby shallow water and sand bars at the confluence of Yellow Creek and the river provide productive hunting grounds for the blue herons.

b) BUCYEYE TRAIL (TG p 51)

The portions of the Buckeye Trail within the CVNP offer some of the most challenging and beautiful trails in the park. Along its course, every geologic feature discussed in this document can be observed.

i) Egbert Picnic Area (Bedford Reservation) to Alexander Road (TG p 55)

The Buckeye Trail skirts the very deep Bedford Gorge in just a few places along this section. Other trails in the Bedford Reservation hug the gorge more closely. Tinker's Creek cuts a deep narrow gorge through the Berea Sandstone and the Ohio Shales. Where the trails run close to the gorge, the views are impressive. The photo on the right was taken at the overlook along this trail.

The Gorge of Tinker's Creek

View from the Overlook of Tinker's Creek

About half-way between The Egbert Picnic Area and Alexander Road the Buckeye Trail passes Bridal Veil Falls. These falls flow over the contact between the thin sandstones and shales of the Bedford Shale and the underlying [Cleveland Shale] (black shales). At this location, thin sandstones in the Bedford Shale form the caprock. If you look closely in the streambed at the top of the falls, you will see ancient ripple marks which were formed in sands of the near shore environment in which the Bedford was deposited. You will also see sharply defined, nearly orthogonal (perpendicular) jointing. Joints form when rocks are deeply buried. Stresses create planes of weakness in the buried rock orthogonal to the direction of stress. When the overburden is removed by erosion, the stress is relieved and the rock breaks along those planes of weakness.

Th top of Bridal Veil Falls showing cap rock composed of shales and thin sandstones of the Bedford Formation

The gorge downstream of Bridal Veil Falls

Bridal Veil Falls showing the contact between the Bedford shale and the underlying Cleveland Shale

ii) Alexander Road to Frazee House (TG p 57)

This section of the Buckeye Trail primarily travels through dense woods along steep ravines and descends into the Cuyahoga Valley. The trail passes by a twin waterfall (Linda Falls), which are best seen after rain. The bedrock members exposed at these falls are Ohio Shales. The caprock is the Bedford Shale. The contact between the Bedford Shale and the Cuyahoga Shale is clearly seen at this outcrop.

Linda Falls showing the Contact between the Bedford Shale and the Underlying Cleveland Shale

iii) Frazee Road Trailhead to Station Road Trailhead (TG p 58)

Please see the discussion under the Towpath (TG p 25)

iv) Station Road Bridge to Jaite and Redlock Trailhead (TG p 60)

This section of the Buckeye trail leaves the Valley and enters the Brecksville Reservation. The trail follows deeply incised valleys caused by rapid downcutting through bedrock in the post glacial period when the rate of crustal rebound was high.

Deeply Incised Valley in the Brecksville Reservation

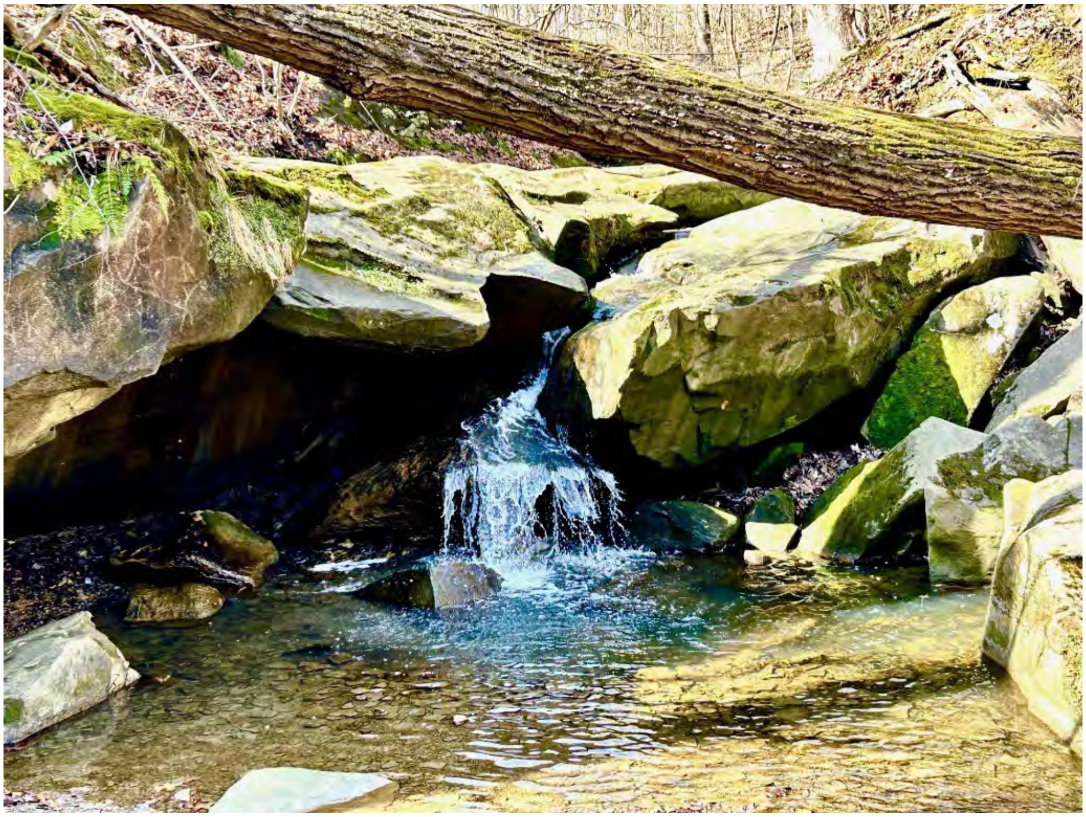
Two Points of interest along this trail are well worth exploring.

The first, My Mountain Overlook, provides inspiring views of the Chippewa Creek valley.

My Mountain Overlook

The second is Deer Lick Cave, which is located near the three way junction of the Buckeye Trail before the trail turns either south or west. Deer Lick Cave is an outcrop of Berea Sandstone. The cave is so named because deer are known to lick the rocks, which are salty due to the natural brine content of the Berea Sandstone. There are a series of small waterfalls and rapids in the area around Deer Lick Cave. These can dry up in times of draught.

Deer Lick Cave. The contact between the Berea Sandstone and the Underlying Bedford Shale is exposed here.



Small waterfall upstream from Deer Lick Cave

The trail from Deer Lick Cave to Jaite is one of the most challenging sections of the Buckeye Trail, descending and ascending through deeply incised valleys. The underlying bedrock is composed of the Cuyahoga Shales. The shale does crop out at some stream crossings. There is a section of the trail that follows an old road in the upland area. This is one of the muddiest sections of the trail, with the soil being derived from clay rich shales. It is best hiked when dry or when frozen.

Following the Buckeye Trail south from the Brecksville Reservation takes you down old roads with evidence of former residences. Famously, there is an old bathtub along the trail.

Along this section of trail, there is a low wide area that intersects with Riverview Road. This area is a buried valley (a tributary of the ancient Cuyahoga River) and probably would yield good supplies of groundwater.

The approach to Jaite (Snowville Rd) is routed through a wetland, fortunately, there is now a boardwalk through this section.

v) Jaite and Redlock Trailhead to Boston Trailhead (TG p 66)

This section of the Buckeye Trail seems very remote when hiking. It traverses and skirts deeply incised valleys which were formed by post glacial downcutting. Bedrock (Cuyahoga Shales) crops out only in stream beds between Jaite and Columbia Road. Columbia Road represents a high point on the trail. Upon the descent toward Columbia Run, Hemlock trees (which only grow on sandstone in the CVNP) are encountered, and soon after, outcrops of Berea Sandstone appear. The outcrop at the stream crossing shows the contact between the Berea Sandstone and the underlying Bedford shale. At this location, the two formations interfinger.

Outcrop of Berea Sandstone interfingering with the Berea Sandstone. Note the Hemlock Trees

Outrcop of Berea Sandstone at its contact with the underlying Bedford Shale down at Columbia Run.

The stream crossing at Columbia Run can be tricky if the water is high or when hiking in winter, but it may be one of the prettiest (and quietest) sections of the CVNP.

Stream Crossing at Columbia Run. Note the Bedford Shale in the streambed.

Upon reaching the uplands between Columbia Run and Blue Hen Falls, there is a section that is very muddy. The soil here was developed on clay-rich rock of the Cuyahoga Formation. It is best hiked when frozen or very dry.

A short side trail to Blue Hen Falls appears before the trail crosses Boston Mills Road. The Berea Sandstone serves as the caprock and the highly erodible Bedford Shale lies beneath.

Blue Hen Falls

Although shales are generally not considered a good source of groundwater because their high clay content makes them almost impermeable, groundwater can flow between bedding planes and along vertical joints. In the Cuyahoga Valley you will see these as seeps along valley walls. These seeps become very identifiable when frozen, sometimes forming spectacular icicles, such as shown here in the Bedford Shale by Blue Hen Falls.

Icicles at seeps in the Bedford Shale at Blue Hen Falls

Between Boston Mills Road and the Visitor's Center, there is one more deeply incised valley to cross, one of these slopes has steep stairs (155 to be exact).

The slope with 155 (steep) steps

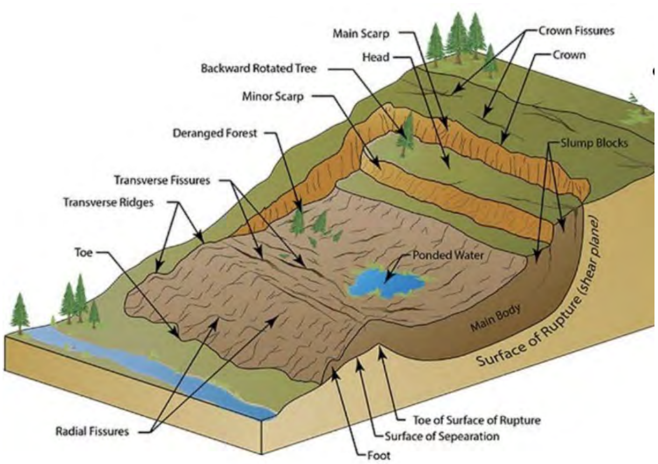
Outwash Deposit in the streambank near the 155 steps

The hill with the steps is composed of glacial till and outwash. This can be observed along the stream bank just south of the bridge at the bottom of the steps. Outwash deposits are largely sand, which has little cohesion. Boston Mills Ski Area is also underlain by the same low strength glacial materials. When saturated these soils can flow. Circa 1980 there was a simultaneous rainfall and snowmelt, saturating the ground. The hillside by Boston Mills collapsed covering Boston Mills Road with at least 20 feet of landslide material.

vi) Boston Trailhead to Pine Lane Trailhead (TG p 70)

The north end of this section of trail passes under the I-271 bridge and then climbs the Cuyahoga Valley Wall which is underlain by Devonian Rocks. However, bedrock crops out only in one stream crossing, where a thin sandstone of Bedford Shale forms the caprock.

The other feature in evidence on the section of trail between I-271 and I-80 are a number of small landslides. Slump blocks can be seen along the valley walls. These slump blocks create depressions where water accumulates. Water accumulating in these depressions increases the water pressure along the slip planes (think of it as lubrication) which encourages even more earth movement.



WSGS - Rotational

Slump block with ponded water

Slump blocks can be observed throughout the Cuyahoga Valley. The combination between steep sided slopes, unconsolidated glacial deposits, fractured bedrock, and easily eroded shales sets the stage for unstable slopes.

There is a section of trail that parallels Boston Mills Road; this section is very muddy, the soil having been developed from Cuyahoga Formation shales.

The trail south of I-80 has been rerouted to the east side of a stand of pine trees. If you follow the old route of the Buckeye trail through the trees, you will see a large depression to the west of the pines. This is a borrow pit that was used to mine “soil” for the construction of I-80. The “soil” that was mined was largely shales from the Cuyahoga Formation. Here we find one of the quirky differences between definitions used by highway engineers and geologists. For engineers, any rippable (easily excavated) material is soil; for geologists, what was mined here was bedrock. Over the years, this area has evolved from a barren almost vegetation free zone to a large meadow.

Former Borrow Pit for I-80

Before heading up to the Pine Lane Trailhead, there is a stream crossing that can be impassable after rain. There is, however, a board tied to a tree on one end. When the water is high, it floats pointing downstream. When the water recedes, the board tends to float back creating a bridge. Because of the steep sided valleys, the stream levels rise very fast after rain. Hemlock trees near the top of the slope indicate the presence of Berea Sandstone.

One of two stream crossings with a board tied to a tree

vii) Pine Lane Trail Head to Hunt Farm (TG p 73)

This trail leads downhill from Pine Lane along the old Rte 303 into the town of Peninsula. A description of the Buckeye Trail from Peninsula to Hunt Farm is presented in the section of this guide, "Lock 29 Trailhead to Hunt House Trailhead (TG p 37)"

viii) Hunt House Trailhead to Botzum Trail Head (TG p 77)

Please see the section of this guide "Hunt House Trail Head to Ira Trailhead (TG p 42)" for the first portion of this section of the Buckeye Trail.

At Ira Road, the trail follows Ira Road for a short distance, crosses a glacial erratic filled stream, and then turns south and heads uphill above the Botzum Farm and then into O'Neil Woods.

Before reaching O'Neil Woods, the trail skirts some deeply incised valleys (formed due to rapid post glacial downcutting). Much of this area of the CVNP is underlain by thick glacial till and terminal moraine which is susceptible to landsliding. Between Ira Road and Deer Run Trail in O'Neil Woods, the trail follows a series of arcuate ridge lines. Looking down, the terrain is hummocky; these are landslides. Once in O'Neil Woods on the Deer Run Trail, active landsliding is in evidence near Bath Road. When a slope's toe support is removed by a stream (or sometimes by a road cut) landsliding often occurs in unstable soils and rock, as shown in the pictures below.

Landslides caused by removal of toe support by the adjacent stream. Note the arcuate scarp faces. These slides occurred in unstable glacial till.

After crossing Bath Road, the Buckeye Trail approaches Yellow Creek. Yellow Creek in this section surges around the abundant glacial erratics that were eroded from the surrounding thick glacial till.

Glacial erratics in Yellow Creek

The Buckeye Trail exits O'Neil Woods to Bath Road, following it for a short distance before rejoining the towpath to reach the Botzum Trailhead. When crossing Yellow Creek on Bath Road, note the thick glacial deposits on the east side of the stream. Yellow Creek is actively eroding the toe of that slope along the cut bank. Before about 2004, the cut bank of Yellow Creek was on the opposite side of the stream.

Severe flooding occurred on Yellow Creek during a combined rain and snow melt event. When waters receded, the course of the creek had changed; the cut bank moved from the west side of Yellow Creek to the east side of Yellow Creek at the bridge. A rapid change in the course of a stream is called evulsion.

Thick deposit of till being undercut by Yellow Creek, just south of Bath Road at the bridge

c) BIKE AND HIKE TRAIL (p 83)

The Hike and Bike Trail is primarily flat or low grade and travels along upland areas east of the valley. The Bike Trail Encounters two outcrops of note along its approximately 10 mile length. The Bike Path goes past Brandywine Falls (TG p 141) and it cuts through an outcrop of Pennsylvania Aged Sharon Conglomerate. This portion of the trail is constructed on an old railroad bed. To create an even grade, the railroad blasted through the rock. Along the walls of this rock outcrop are star shaped fractures which were created by the rock blasting and drill holes for placing the explosives. The Sharon Conglomerate (known here as the Boston Ledges) seen along the Bike Path is the same sandstone knob that is present along the the eastern portion of Boston Run Trail (TG p 163).

Bike path following the old railroad cut through Boston Ledges

Tim Holmes, 2025, used with permission

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Drill hole used to place explosives

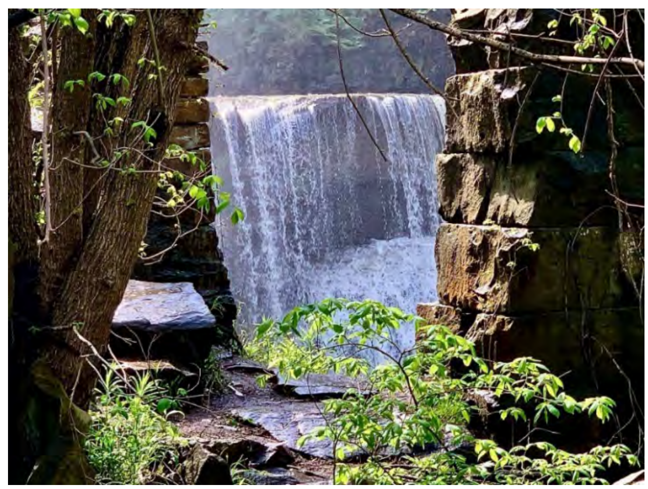
Tim Holmes, 2025, used with permission

d) BEDFORD RESERVATION AND VIADUCT PARK (TG p 91)

The guide (TG) describes a number of trails within the Bedford Reservation. The section describing the geology of the Buckeye Trail from Egbert Picnic Area to Frazze House are applicable to the "All Purpose Trail" (TG p 94), "Bridal Veil Falls" (TG p 96), and the south side of the "Bridle Trail" (TG p 103). See Egbert Picnic Area to Alexander Road (TG p 53). Pinery Narrows (TG p 107) as described in the Towpath Section of this guide.

i) Viaduct Park Loop Trail (p 110)

The Viaduct Park Loop Trail leads to the Great Falls of Tinker's Creek. The Berea Sandstone forms the cap rock of these impressive falls.



Two views of the Great Falls of Tinker's Creek, Viaduct park, Bedford, Ohio

e) THE BRECKSVILLE RESERVATION (TG p 113)

The Brecksville Reservation has a number of trails, many of which can be combined in different ways to create unique hiking experiences, both easy and challenging. Before going, check out the Cleveland Metroparks map of the Brecksville Reservation. Brecksville-Reservation-Trail-Map.pdf.ashx (clevelandmetroparks.com)

i) All Purpose Trail (TG p 117)

From its intersection with Riverview Road the All Purpose Trail begins a long (and often steep) climb to the west. The trail bifurcates, one section following the edge of Chippewa Creek Drive, and the other following Valley Parkway. These steep hills are underpinned by Devonian aged rocks. Although glimpses of bedrock along the trail are rare, we can identify the presence of the Berea Sandstone when we see Hemlock trees, since Hemlock trees only grow on Sandstone in the Cuyahoga Valley.

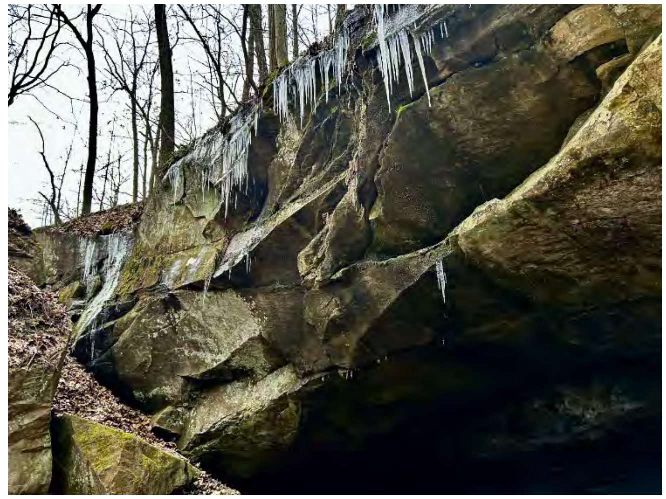
ii) The Wildflower Loop Trail (TG p 118) and the Prairie Loop Trail (TG p 119)

These trails are developed in the upland areas of the Brecksville Reservation and are underlain by ground moraine (less than 50 feet thick). The bedrock underlying this area is the Mississippian Aged Cuyahoga Formation.

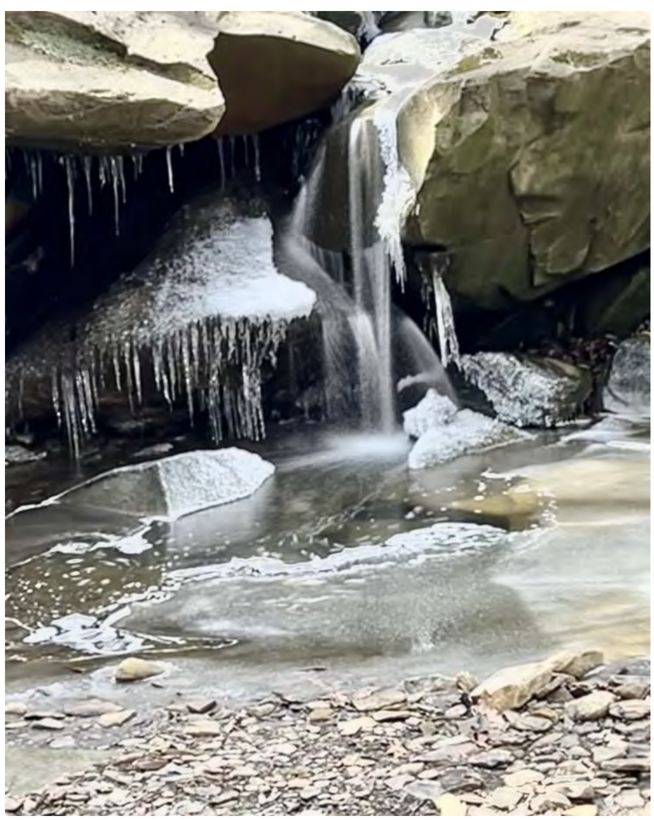
iii) The Deer Lick Loop (TG p 120)

From its lowest point at the intersection of Chippewa Creek Drive and Valley Parkway to its highest point, the trail traverses terrain underpinned by Devonian Bedrock and glacial till. There are some steep climbs. The presence of the Berea Sandstone can be traced by the presence of Hemlock trees. The jewel of this hike is the area around Deer Lick Cave which is described in this guide under the section "Station Road Bridge to Jaite and Redlock Trailhead (TG p 60)". This outcrop of Berea Sandstone and the streams running through it are, in the author's opinion, a magical place, especially in winter.

Deer Lick Cave



Icecles hanging from the contact between the glacial till and the underlying Devonian Aged Berea Sandstone



The waterfall upstream of Deer Lick Cave

iv) Hemlock Trail (TG p 124) and the Gorge Loop

The Hemlock Trail and the Gorge Loop follow the south side of Chippewa Creek and the deep gorge created by the creek during post glacial downcutting. Beginning at Rte 82 in Brecksville, Chippewa Creek cascades over the Berea Sandstone at the bridge.

Rte 82 Bridge with water falling over an outcrop of Berea Sandstone

Further downstream, the creek continues to cascade over large blocks of Berea Sandstone that have fallen into the creek from the valley walls.

Note the large boulders downstream of the Rte 82 bridge

Looking to the south across the creek, the reddish Bedford Shale crops out on the valley wall.

Note the red Devonian Aged Bedford Shale cropping out in the stream bank across Chippewa Creek. The boulders in the foreground are blocks of the overlying Berea Sandstone transported from upstream and/or upslope.

The Gorge Loop, which is rocky, allows access to this section of Chippewa Creek. Many of the sandstone blocks in the creek are rounded, indicating transport by the creek and a high sediment load in the creek during flooding. One of the sedimentary features in evidence within the creek is the presence of imbricated rocks (where rocks overlap in a way that resembles toppled dominos); the rocks dip toward the upstream direction.

Imbricated shale pieces in Chippewa Creek

As the Hemlock Trail heads east past the Harriet Keeler Memorial, the trail hugs the deeply incised Chippewa Creek Gorge. The Hemlocks lining the trail are growing on Berea Sandstone.

Chippewa Creek Gorge

The trail descends over unseen Devonian Aged rocks (Bedford and Cleveland Shales) until it reaches the floodplain of the Cuyahoga Valley. The lower portions of this trail are muddy, the soils having been derived from the clayey Cleveland Shales. Numerous glacial erratics are observed in Chippewa Creek, at the terminus of the Hemlock Trail.

v) White Oak Trail (TG p 127), My Mountain Trail (TG p 129), and Bridle Trail Brecksville (p 130)

Portions of these trails overlap with the trails described for The Buckeye Trail section "Station Road Bridge to Jaite and Redlock Trailhead (TG p 60)". Understanding the geology of the Buckeye Trail in this area is applicable to these trails as well.

f) JAITE/BOSTON AREA (TG p 135)

i) Old Carriage Lane Trail (TG p 136)

The Old Carriage Lane Trail is a lovely fairly low gradient (once you have climbed up the hill) following the edges of deeply incised valleys. These deeply incised valleys are a result of the rapid post glacial downcutting. There is one section of the trail that is always muddy because of the presence of a spring. A spring occurs where groundwater intersects with the ground surface.

At the apex of this trail is a prehistoric Indian fortress. Erosion has reduced the earthworks to a point where they are almost gone, but you can still see some evidence of these ruins.

The underlying bedrock consists primarily of the Ohio Shales. However, the Berea Sandstone is also present in this area. We cannot see the sandstone cropping out, but we know it is there where we see Hemlock Trees. Hemlock trees in the Cuyahoga Valley ONLY grow on sandstone.

Hemlock Trees on the valley edge indicate the presence of Berea Sandstone

ii) Stanford Trail (TG p 141) and Brandywine Gorge (TG p 141)

When hiking here, you are hiking through time.

The hike from up the Stanford Trail and up the Gorge Loop Trail to Brandywine Falls takes us through about 50 Million Years of geologic history, from the early Devonian to the late Devonian. It also tells the story of a progressively shallowing sea. The author strongly recommends hiking up the Gorge Trail on the north side of Brandywine Creek. This direction affords the best views of the gorge and rapids.

As we walk upstream from the bridge on the north side of Brandywine Creek………….

We see the Devonian Cleveland Shale in the stream bed and along the stream banks. This clayey shale is high in carbon content and has been explored as a source for oil shale. It was deposited in a deep sea environment.

Devonian Cleveland Shale in stream bed and cropping out along the banks of Brandywine Creek

Further upstream and looking at the slope to the left (north) there is an outcrop of the Bedford Shale. This formation consists of thin sandstones and silty shales in this area, but elsewhere it is characterized as a red clayey shale. This formation was deposited in a shallow sea.

Outcrop of the Devonian Bedford shale on the wall of Brandywine Gorge

Brandywine Creek flowing over platey Ohio Shales. Scattered glacial erratics in the stream indicate that glacial trill overlays the bedrock.

The Bedford Shale here has numerous layers of thin sandstone, as a result, we see hemlock trees growing on the north side of the southern slope of the gorge.

Toward the top of the slope. we see the trail littered with sandstone blocks and then come upon the late Devonian Berea Sandstone cropping out on the side of the gorge. This rock was quarried in the Cleveland Area for building stone, grist stones, sidewalks, and curbs. This formation was deposited as a delta and/or beach. Look for ripple marks on the sandstone blocks. Symmetrical ripples indicate deposition on a beach where there was back-and-forth water motion; asymmetrical ripples indicate deposition in unidirectional flowing water such as a river.

Large scale symmetrical ripples, indicating deposition on a beach

Small scale ripples suggesting deposition in very shallow water

Berea Sandstone cropping out on the side of the gorge near the top of the trail

We see in these pictures both large-scale ripples and small-scale ripples in blocks littering the trail. Eventually, toward the top of the trail, we come across the outcrop of Berea Sandstone. You have just reached a tropical Devonian Beach.

All three of these formations are exposed at Brandywine Falls. At low flow, the contacts between the formations are easily seen. The Berea Sandstone forms the caprock at the falls.

Photo by permission from Jackie Fedack, June 11, 2023

Berea Sandstone

Bedford Shale

Cleveland Shale

The falls are different at every visit varying from low flow as shown above, to a roaring cascade at high flow.

Brandywine Falls after an ice melt, February 2025

iii) Blue Hen Falls (TG p148)

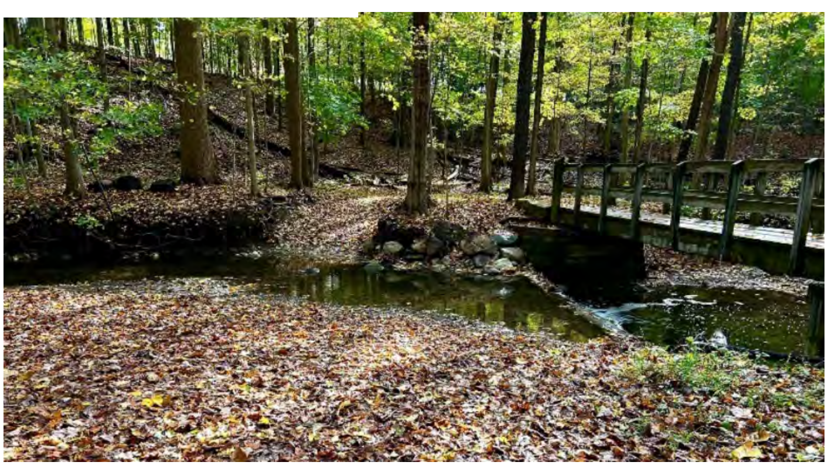
Blue Hen Falls was described in the section on the Buckeye Trail, "Jaite and Redlock Trailhead to Boston Trailhead (TG p 66)"

g) FURNACE RUN METROPARK (TG p151)

There are three trails within the Furnace Run Metropark, the Old Mill Trail (TG p 152) which connects with the Rock Creek Trail (TG p 154). The Daffodil trail is east of Cleveland Massillon Road (TG p 156). All three trails are family friendly. The rocks seen in stream beds are primarily glacially derived from till.

Daffodil Trail

Old Mill Trail



Rock Creek Trail

h) HAPPY DAYS LODGE (TG p 159)

i) Haskell Run Trail (TG p 161)

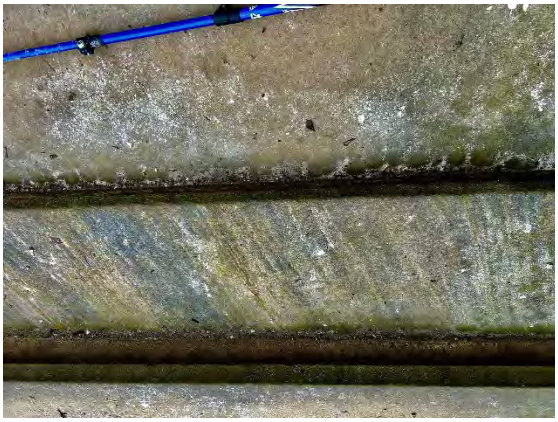
Haskell Run Trail is a short trail south of Happy Days Lodge and lies between the Boston Run Trail (p 163) and the Ledges Trail (p 167). The trail passes an old cemetery (Madre de Dolorosa). In this cemetery there are headstones of varying ages and rock types. It is an excellent place to examine the effects of weathering on different types of rocks. These days most cemeteries require the use of granite or bronze for headstone materials. Walking through this cemetery, it is obvious why granite is preferred and usually required. There is one sandstone headstone (unreadable), a number of marble headstones (very weathered), and headstones of granitic composition (various granite like rocks, such as gneiss are often commercially identified as granite) which despite their age, look brand new. The stones below are roughly contemporaneous. From left to right, sandstone, marble, granite (actually, granodiorite, but let's not be technical).

ii) Boston Run Trail (TG p 163)

Not much bedrock can be observed on this trail, but it is not far beneath the surface. A row of Hemlock trees occurs along the eastern section of the trail, lining the edge of a slope. One cannot see sandstone, but it is there. Just off the trail is a bench overlooking a ravine. Across the ravine we can see sandstone crop out along a slope, and there is shale in the stream bed. The Sandstone, part of the Boston Ledges (TG p 87), is the Pennsylvanian Aged Sharon Conglomerate (the same rock found at Ritchie Ledges – (TG p 167) and the underlying shales are Mississippian Aged Cuyahoga Formation. Shale is seen in some of the stream beds. Few glacial erratics are observed on Boston Run Trail. There is one large boulder of Sharon Conglomerate which was obviously locally derived and probably transported a very short distance by the glaciers.

One last note, the stone steps leading up and down to the tunnel from the Parking lot to Happy Days Lodge are made from late Devonian Berea Sandstone (Deep Lock Quarry TG p 191). If you look closely, you can see ripple marks in the sandstone.

Hemlock growing on a hidden Pennsylvanian Aged Sharon Conglomerate



Sandstone steps made from Berea Sandstone; note the ripple marks

Sandstone and pieces (not glacial material) line the stream beds

Boulder of Sharon Conglomerate; it lies above the outcrop. The author hypothesizes that the glacier plucked it from a local outcrop and transported it to this location.

i) THE LEDGES (P 167)

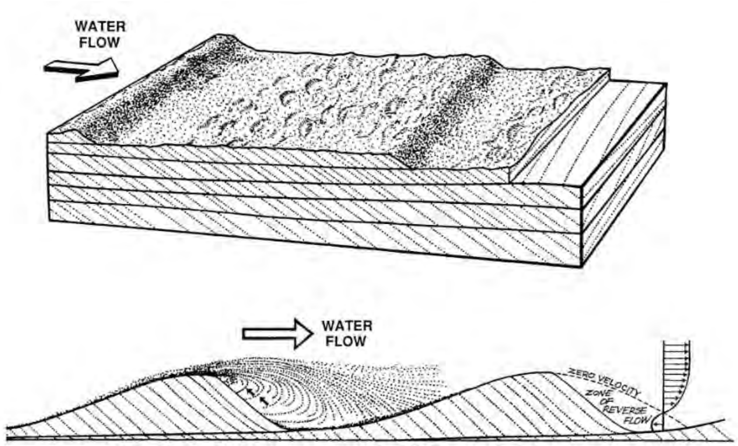
The Ledges are a world class outcrop (exposure of rock at the surface). This sandstone knob is composed of the Pennsylvanian Age (if you were in Europe it would be called the upper Carboniferous) Sharon Conglomerate. A conglomerate is composed of pebbles within a sandstone matrix. The Sharon was deposited in braided streams formed as the Appalachian Mountains were forming. At the time, the crust of this portion of the world was at the equator.

i) The Ledges Trail (Ritchie Ledges at Virginia Kendall) (P 169)

The sedimentary features in the Sharon Conglomerate at the Ledges provide textbook examples of both common and extraordinarily rare features.

Features of Interest at the Ledges

Cross Bedding – When sand is deposited in streams, it forms cross beds within individual layers. Geologists use these to determine the direction of water flow.



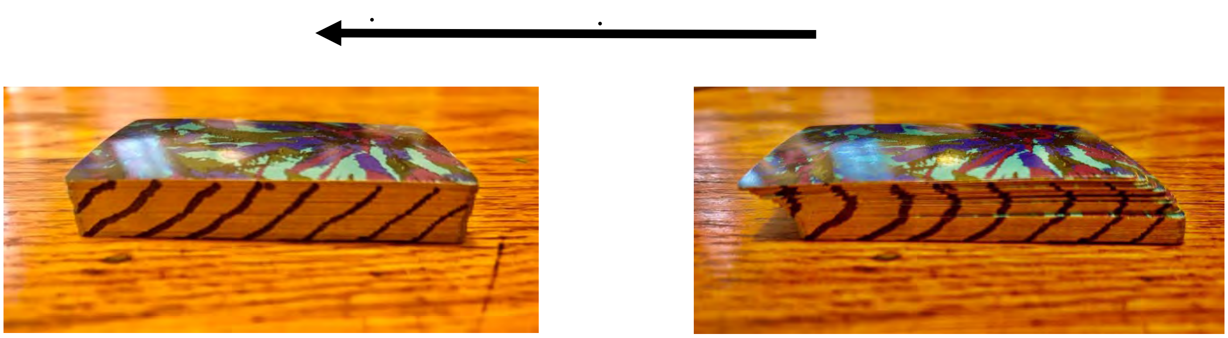
Steve Austin, Grand Canyon: monument to catastrophe", ICR, 1995

Outcrop of Sharon Conglomerate showing crossbedding

Recumbently Folded Cross-Bedding – Imagine the cross-beds above have been deposited. The sand is pretty well consolidated into a cross bedded layer, but a flood occurs, producing a shearing force on the top of the cross-bed. This shearing force can cause the cross-beds to deform, creating the appearance that tops have been turned over. Imagine that happens repeatedly. That is what Wells, Richards, et. al. (22) hypothesized for this formation. Although this feature can be found at other Sharon Conglomerate outcrops, they are very prevalent at this location, making this an extraordinary outcrop.

Recumbent crossbed in the Sharon Conglomerate

The deck of cards below is used to illustrate how the soft sediment deformation could occur. The arrow represents the direction of flow of water. After applying a shearing force (e.g. flood) to the top of the layer, the top sands roll over the lower ones causing the bedding to look as if it is recumbently folded.



Cross-Cutting Channels -- Note the channel cut filled with conglomerate (pebbly rock). This is a location where the stream cut through previously laid deposits.

Channel Cut filled with conglomerate at Ritchie Ledges

Morrell Weathering -- This weathering (aka, honeycomb weathering) feature is named after the mushroom reflecting its pitted surface. There is some controversy regarding how this forms. Some say it happens when the pebbles pluck out of the rock, and the hole is enlarged by weathering. However, in some places, morrell weathering occurs where the conglomerate phase is absent. Looking closely at the rock, this very permeable poorly cemented rock which allows water to flow through it. You will see iron staining around some of the weathered pits. The ironstained portions of rock are more resistant to weathering (Liesegang bands). It is likely that more than one process is at play.

Note in this picture, the tree roots anchored in the crevices of the rock. Plants growing into the rock accelerate the weathering process.

The pitted surface is an example of Morell Weathering, which is common at Virginia Kendall's Ritchie Ledges

Liesegang Banding -- Liesegang bands occur within many sedimentary rocks. At some point after the rock formed it is buried and saturated with iron-rich ground water and the bands, which are typically composed of iron-rich minerals such as limonite (yellow) or hematite (red), precipitate within the rock in bands or rings. Later, when the bands are exposed at the surface and the softer sandstone erodes away, leaving the harder rings standing in relief on the rock.

Iron banding, morrell weathering, and Liesegang Banding

Liesegang Banding

Jointing -- Note the very angular blocky joints in the rocks; it looks as though someone has sawed through them. When a rock is buried, stresses are built up within the rock perpendicular (orthogonal) to the direction of stress. When the stresses are released by the removal of overburden, the rock cracks along those planes of stress and create joints. At the ledges, big blocks of rocks have separated from the main body of the Sharon Conglomerate and are slip-sliding along the underlying shale toward local drainage.

Nearly orthogonal jointing in the Sharon Conglomerate. Note also the Hemlock trees. In the photo on the left not the mosses (dark green) and lichen (blusih green).

It is always fun to squeeze into this joint. There are several petroglyphs there, but on the walls of this joint show layer after layer of recumbent cross-beds.

Vegetation -- Flora play an important role in the weathering of the ledges. Trees and ferns force their roots into the crevices of the rock, splitting the rock apart. On the eastern side of the Ledges, is a grove of hemlock trees. These lacy evergreen trees ONLY grow on sandstone or sandy soil. If you are hiking in the woods and come upon hemlocks, you can be sure there is sandstone underfoot, even if you cannot see it. Hemlock trees are one type of vegetation that is a holdover from the ice age.

Lichen and moss also play an important part in weathering the rock. They attach to the sand grains in the rock and pull it apart, bit by bit. In the upper left photo above, the dark green growths are mosses, and the light greenish blue areas are lichen.

Additional Notes on Weathering – The nature of weathering is much more severe on the western side of the Sharon outcrop at the ledges. The prevailing winds are from the west – southwest. The west side gets direct hits from rainstorms. Here in Northeast Ohio, the freeze-thaw cycle is also very important in weathering. When water in the rock freezes, it expands and breaks apart the rock. When the ice melts, sand grains fall from the formation.

Ice Box Cave – Ice box cave has been closed for a number of years to protect the bat population. However, if you were to walk into the cave this summer, it would feel cold. If you were to walk into the cave on a cold winter day, it would seem warm. If you look inside of Ice Box Cave, you will see water dripping from the rock. This is groundwater. Groundwater remains the average ambient temperature of the air year-round, which in this part of Ohio, is about 40 degrees F. The constant temperature of the cave is why it is named "icebox" cave.

The Contact – Just to the north of Ice Box Cave you can observe the contact between the Pennsylvanian Sharon Conglomerate and the underlying Mississippian Cuyahoga Formation. The Cuyahoga Formation looks like clay at the base of the sandstone, but that clay is weathered shale. This is the surface upon which the sandstone blocks are sliding towards local drainage. The contact represents a period of erosion (about 20 million years) and is called a disconformity (erosional unconformity).

ii) Pine Grove Trail (TG p 172) and Forest Point (TG p 174)

Both of these trails are walks in the woods. The bedrock beneath the trails consist of the shales of the Cuyahoga Formation. As a result, at times, these two trails can be muddy. Both trails follow the edges of deeply incised post glacial valleys, cut into the rock as the crust rebounded after overlying glacial ice (a mile thick) melted.

j) KENDALL LAKE (TG P 177)

i) Cross Country Trail (p178) and Lake Trail (p 182)

The only place to observe bedrock on these two trails is at the bottom of the hill on the Cross Country Trail. There we see the platey shales of the Cuyahoga Formation lining the bottom of a stream. These rocks contain numerous trace fossils.

Shales of the Mississippian Cuyahoga Formation lining the stream bed

Based on its location across the street from the Ledges, the long climb to the east on the northern leg of the trail is most likely underlain by the Cuyahoga Shale at the lower elevations and the Sharon Conglomerate at the higher elevations.

The trail passes through former fields; there is a horsehead oil pump in one of the fields before you descend into the woods again. During the 1980's there was a big oil drilling boom in and around the Cuyahoga Valley. This well is probably drilled into the Clinton Sandstone, approximately 7,000 feet deep. These sediments were deposited in a delta during the Silurian Period (440–420 million years ago). Most of these wells have played out.

Horsehead pump at an oil well

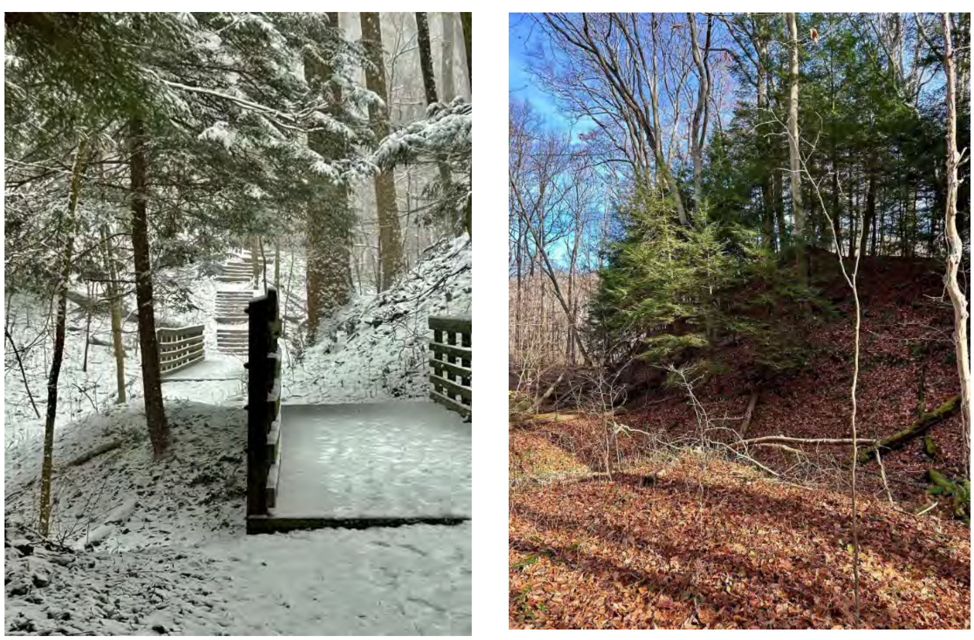
Hiking westward from where the fields are located, we descend into the forested hills and then the meadows of the Kendall Hills.   The Kendall Hills are an excellent example of terminal moraine. When the edge of a glacier is static, the rate of advance being about equal to the rate of melting, great quantities of soil and rock (till or moraine) get deposited. The rolling hills we see in the Kendall Hills were formed by the glaciers dumping their sediment load as they melted. Typical of end moraine, we find kames (conical hills) and kettles (closed depressions).

The conical shaped hill is a kame.

Rolling Hills formed by Terminal (End) Moraine

ii) Salt Run Trail (TG p 184)

Although you cannot see rock outcrops on Salt Run, we know that the late Devonian Berea Sandstone is present just under the surface in the northern section of the trail where we see hemlock trees.



The presence of Hemlock trees indicate the presence of the late Devonian Berea Sandstone along Salt Run

Streams usually earn their names, and Salt Run certainly did. At one time, there were salt works located along the stream. The source of the salt is the interstitial water in upper Devonian Berea Sandstone (why it is difficult to develop good groundwater sources in much of the valley). Salt production was very important to pioneers for use in preserving food. More place name evidence of salt in the Berea can be found at Deer Lick Cave in Brecksville (TG p 120), so called because deer go there to lick the salt from the Berea Sandstone.

There is spot along the southern leg of the trail named White Oak Spring. Springs occur when groundwater intersects with the ground surface. It is likely that this spring occurs where a more permeable layer (sand or sandstone) overlies a less permeable layer (clay or shale).

White Oak Spring

k) DEEP LOCK QUARRY METROPARK (TG p 189)

i) Quarry Trail (TG p 191)

On the approach to Deep Lock Quarry, quarry walls composed of the upper Devonian [Berea Sandstone] present a solid wall of rock, the same rock that forms the caprock at both Brandywine and Blue Hen Falls.

The Berea Sandstone at Deep Lock Quarry

West side of Deep Lock Quarry

The Berea Sandstone (originally named the Berea Grit by [Whittlesey]) was (and still is) quarried for building stone, curbs, sidewalks, and as evident along the trail, grindstones. The Berea is a tightly cemented massive sandstone formed as delta and/or beach deposits. The most common cement is quartz, making this a very strong and weather resistant rock. Evidence that it was in part formed in shallow water can be seen in the ripple marks that are observed in some slabs. Take a short walk up the sidewalk west of the River on the south side of Rte 303 and you will see sidewalk slabs exhibiting ripple marks. You are walking on a Devonian beach....a beach that was at the equator at the time of its formation.

View from the Quarry Rim

Abandoned grindstones. Many of these stones went to the Schumaker Mills, (later Quaker Oats). Schumaker owned part of the quarry.

Note the tool marks on the face of the quarry wall

I) OAK HILL AREA (TG p 195)

The Oak Hill Area is primarily located in upland areas of the valley. It was formerly farm and pastureland. Several ponds were built in this area for the many dairy farms. These farms produced cheese, hence the nickname "Cheesedom".

i) Tree Farm Trail (TG p 197)

This trail is located across Riverview Road from Deep Lock Quarry; Deep Lock Quarry (TG p 189) is well drained and pretty good to hike when wet. However, The Tree Farm Trail is a muddy mess when not frozen or very dry. The trail is at an elevation above the Berea Sandstone (found at Deep Lock Quarry) and covered in glacial till (ground moraine). The soil is very clayey suggesting the glacial till is composed of ground up Cuyahoga Shales which lie above the Berea and beneath this trail.

ii) Oak Hill Trail (TG p 200), Plateau Trail (TG p 203) and Hemlock Ravine

The geology on this trail is hidden for the most part, but there are always clues to what lie beneath.

The section of trail from the parking lot, past Chestnut Pond, and to the turnoff to the north is underlain by thick glacial till. Along the trail we see numerous glacial erratics. There are two easily identifiable kettles (depressions often filled with water) in the woods along the trail. Kettles form when a block of ice from the glacier gets entrained in the glacial till. Eventually, the ice melts, leaving a depression. As you hike along the northern part of the trail, there are some deeply incised valleys. The exposed soil along the valley slopes is glacial till. In front of the bench on this portion of the trail is a landslide; the bench sits on an arcuate ridge with the slump block forming a terrace downslope.

Kettle hole filled with water and iced over

glacial erratic

The first evidence of bedrock we see on the climb up the trail to the south is a grove of hemlock trees on the east side of Oak Hill (these trees do not look healthy). We see no rock, but Hemlocks only grow on sandstone bedrock. Based on the elevation in this area, the underlying bedrock is the Pennsylvanian Sharon Conglomerate, The same rock found at the Ledges.

The next evidence of bedrock is found in the deeply incised valleys on the approach to Hemlock Ravine. There is a small waterfall in a ravine below a bench there. The bedrock seen in the valley walls is the Mississippian Cuyahoga Shale Formation.

Hemlock Ravine is the author's favorite spot at Oak Hill. Here we find a grove of (healthy looking) Hemlocks growing on the steep slope below the trail. Again, we cannot see the bedrock, but we know it is there because of the Hemlocks. Based on the elevation, the underlying bedrock is the Sharon Conglomerate. If you continued down the ridge, you would eventually come to Riverview Road. The Cuyahoga Shale crops out along the section of road downslope from Oak Hill.

Hemlock Ravine – Hemlock Trees indicate presence of Sharon Conglomerate beneath the surface.

Water falling over the platy Cuyahoga Shales in a creek bed.

Oak Hill and Plateau Trails take us past 4 ponds (Chestnut, Sylvan, Meadowedge, and an unnamed pond along the northern leg of the Plateau Trail. Three of these were created by building dams across valleys. I have not been able to find evidence of a dam at Chestnut Pond. It is likely this was originally a kettle that was later excavated and enlarged.

Sylvan Pond – created by damming a valley

Chestnut Pond -- no evidence of a dam

The spillway (called a glory hole spillway at Sylvan Pond. The pipe is a distance from the dam, minimizing flowing water near the dam preventing erosion. The pipe goes down and under the dam, discharging downstream. There is an overflow spillway at the side of the dam to prevent floodwaters from overtopping and eroding the dam.

pond on the North leg of the Plateau Trail. Note the notch in the dam, the location of dam failure.

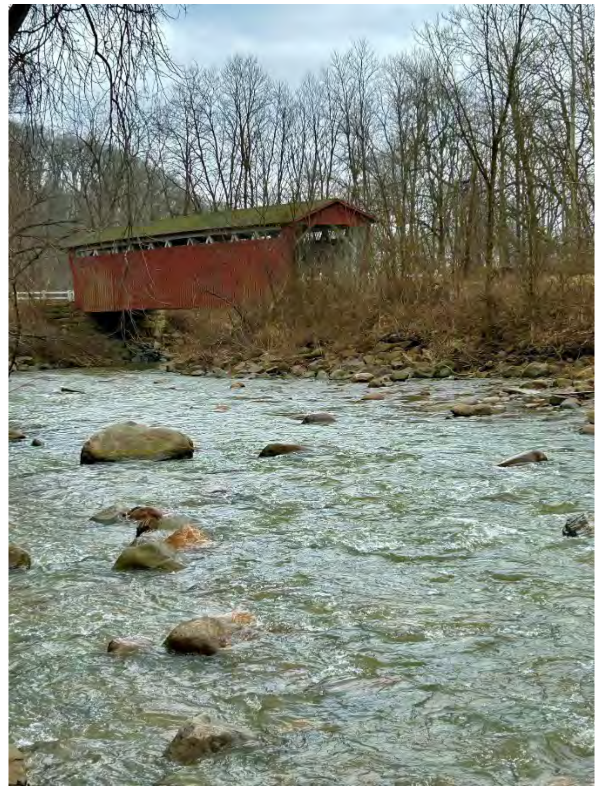
iii) Furnace Run Trail (TG p 206)

Just as described for Oak Hill (TG p 200) and Plateau Trails (TG p 203), The geology along the Furnace Run Trail is mostly hidden. However, this trail descends to a lower elevation than at Oak Hill, and bedrock is exposed along Furnace Run.

Glacial Till overlies and obscures the Sharon Conglomerate and the Cuyahoga Formation shales in the uplands. However along Furnace Run and underneath the Purple House, the Devonian Berea Sandstone crops out along the stream bank.

The Berea Sandstone cropping out along the stream bank of Furnace Run

Numerous large glacial erratics along with large blocks of Berea Sandstone are found within the stream bed of Furnace Run. During times of flood, floodwaters are capable of moving these large rocks downstream. The higher the flood, the greater the energy in the stream; this high energy water flow can carry large amounts of sediment including boulders. The force of these floodwaters carrying boulders and other debris caused the destruction of the original Everett Road Covered Bridge in 1975. The reconstruction was completed in 1986 (23).



Sandstone blocks and glacial erratics in Furnace Run

m) WETMORE AND RIDING RUN BRIDLE TRAILS (TG p 211)

i) Wetmore Trail (TG p 212) and Table Top Trail (TG p 215)

This area, across Quick Road from Kendall Hills is continuous with the end moraine described in "Cross Country Trail (p178) and Lake Trail (p 182)". Again, the deeply incised valleys were formed in the post glacial period as the crust rebounded from being depressed by one mile of ice. As we descend from the higher elevations, where the fields are located, into the forested hills, the landscape is defined by terminal moraine. When the edge of a glacier is static, the rate of advance being about equal to the rate of melting, great quantities of soil and rock (till or moraine) get deposited.

There is one small outcrop of bedrock on this trail at a stream crossing where a thin sandstone forms the caprock for a small waterfall. Based on its elevation, this is the Mississippian Cuyahoga Formation, the same rock that can be observed in a stream crossing along the Cross Country Trail.

Cuyahoga Shale at stream crossing on the Wetmore Trail

There is a relatively wide valley downhill of the Wetmore trailhead. The stream meanders here. One of the pictures below shows a meander. You can observe the cut bank on the outside of the curve and the point bar on the inside of the curve. In a stream, water flows fastest on the outside of the curve, and hence erosion occurs. Water flows slowest on the inside of the curve so deposition occurs. This slower water does not have as much energy, so the entrained sediment falls out of the stream. This floodplain was used as pasture. There are a number of stable ruins in this valley.

Meander is small stream along the Wetmore Trail

Stable ruins in the stream valley along the Wetmore Trail

ii) Langes Run Trail (TG p 217) and Butler Trail (TG p 219)

The most striking things on these trails are the incredibly thick deposits of glacial outwash forming the hills to the south of Langes Run. Outwash deposits form from water flowing off the front of a glacier while it melts. Larger materials are deposited right at the front of the glacier. Further downstream sand, silt, and clay in that order will be deposited. This trail is south of the Kendall Hills and the Wetmore trail, both of those areas represent thick deposits of end moraine, formed when the rate of melt from the glacier was about equal to the rate of glacial advance. The thick outwash (composed primarily of sand) deposits along this trail would be expected to be found off the front of the glacier.

As you can see from the picture of the sand hills in the upper right (below), the slopes are relatively gentle compared to some in the valley. This is because the underlying material is composed of sand. Sand has no cohesion, as a result, there are limits to the angle of repose. Depending on the roundness and moisture content, the angle of repose for sands ranges from 15 degrees to 45 degrees (the maximum). Wet sand, due to surface tension, can support an angle of repose of up to 45 degrees. Dry sand (no surface tension) can support an angle of repose up to 34 degrees. Saturated sands (all pore spaces filled) have an angle of repose of 15 to 30 degrees (24), under these conditions, the sand has no friction. If the toe support for these slopes is removed, the sands tend to slide until they reach a stable angle of repose. Similarly, if sand becomes totally saturated after rain and/or snow melt, it will slide/flow. In the pictures below, you can see scarp faces where the sands became unstable and slid and/or flowed.

Every time I hike this trail, I am in awe of the magnitude of these outwash deposits.

Hill composed of outwash deposits. Langes Run cut the into the base of this hiss removing the toe support.

The maximum slope of these hills are approximately 30 degrees (yes I own a protractor). Sliding occurs on the slope faces adjacent to streams, which remove the toe support.

Close up of the above slope. The bedding from the deposition of the sands can be seen here

This is Langes Run as it crosses Akron-Peninsula Road. Note the sand and small gravel. These sands have been eroded from the sand hills to the east (the other pictures).

Also note the asymmetrical ripple marks in the stream. Asymmetrical ripples are an indication of unidirectional stream flow.

iii) Riding Run Trail (TG p 220)

The geology along the Riding Run trail is mostly hidden. Most of the trail is covered in glacial till. I can only assume the geology is similar to that of Furnace Run (TG 206). This trail is primarily upland. We would expect ground moraine overlying bedrock composed of the Pennsylvanian Sharon Conglomerate and the Mississippian Cuyahoga Shales. The remarkable features along this trail are the very old trees along the ridge line above the abandoned Everett Road. The grandaddy of oaks is located on the southern leg of this trail. Old homesteads are located along the northern leg of this trail.

Old growth White Oak

n) Valley Trail: Covered Bridge to Wetmore Trailhead (TG p 222)

This trail is entirely within the floodplain of the Cuyahoga Valley. Some of it skirts the farm fields of both Szlays' and Kellerman Farms. When you hike past Kellerman Farms, Fredrico (a really sweet dog) may decide to join you. Flood plains make very fertile farmland. The periodic flooding renews and enriches flood plain soils, but if flooding occurs at the wrong time, it can also wash away the seeds in spring. Behind Kellerman Farms, you will be hiking through wetlands; there are a number of bogs along the trail.

> "Bogs occur where the water at the ground surface is acidic and low in nutrients. A bog usually is found at a freshwater soft spongy ground that is made up of decayed plant matter which is known as peat. They are generally found in cooler northern climates and are formed in poorly draining lake basins. In contrast to fens, they derive most of their water from precipitation rather than mineral-rich ground or surface water. Water flowing out of bogs has a characteristic brown color, which comes from dissolved peat tannins. In general, the low fertility and cool climate result in relatively slow plant growth, but decay is even slower due to low oxygen levels in saturated bog soils. Hence, peat accumulates. Large areas of the landscape can be covered many meters deep in peat." (25).

The bogs here were formed primarily in cutoff meanders of the Cuyahoga River. Because this portion of the trail is in the floodplain, it is likely to be muddy.

o) Valley Trail: Boston Trailhead to Brecksville Reservation Stables (TG P 230)

Most of this trail lies within the floodplain of the Cuyahoga River. North of the railroad tracks the trail climbs out of the Valley. As the trail turns west to reach the Brecksville Stables, it coincides with the Buckeye Trail. As the trail gains elevation, the underlying bedrock ranges from the Devonian Cleveland Shale to the Berea Sandstone. These rocks are overlain by ground moraine.

p) O'Neil Woods Metropark (TG p 235)

Please see "Hunt House Trailhead to Botzum Trailhead (TG p 77)"

q) Hampton Hills Metropark (TG p 241)

i) Adam's Run Trail (TG p 242) and Spring Hollow Trail (TG p 244)

Hampton Hills is a couple of miles south of Langes Run where we see outwash primarily composed of sand. Hampton Hills also exhibits outwash deposits, but these deposits contain considerably more fine grained material than found at Langes Run. Since these deposits are further downstream than Langes Run, we would expect to find finer grained material in the outcrops here and we do.

Outwash deposits along Adam's Run

We also see in local drainage [glacial erratics](), suggesting that the surrounding slopes are composed of till as well as outwash. At the lowest elevations in the stream we see a silty layer which may be the basil layer of soil developed by grinding of the local bedrock, which in this case would be the [Cuyahoga Shale]().

Outwash Deposits along Adam's Run. Note the bedding within the outwash.

Glacial erratics in the stream bed of Adam's Run

r) Mountian Bike Trails (TG p 247)

i) Clevland Metroparks: Bedford Single Tack Trails (TG p 248), Summit Metroparks : Hampton Hills

Mountain Bike Area (TG p 250), National Park Service: East Rim Trails (TG 252)

The author has not hiked these trails. These are located primarily on the upland portion of the east side of the valley. We would expect ground moraine underlain by the Pennsylvanian Sharon Conglomerate and the Mississippian Cuyahoga Formation.

s) The Gorge, Babbs Run, and the Cascade Valley Overlook

Although not within the boundaries of the CVNP and not described in the Field Guide (FG), these areas. located in North Akron and Cuyahoga Falls, are significant because it is here that the Cuyahoga River makes its turn from being a southward flowing river to a northward flowing river.

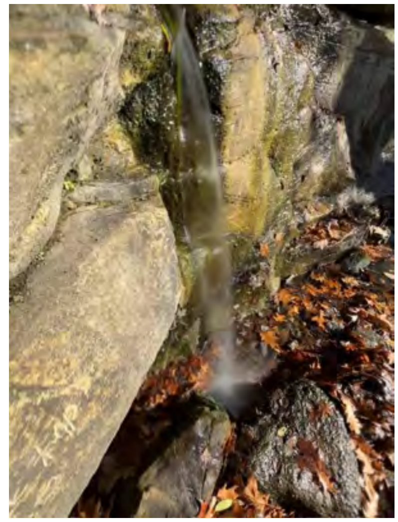
The descriptions provided here, especially for the Gorge, will change over the next few years as sediment is removed from behind the Ohio Edison Dam in the Gorge, and the falls beneath the reservoir are returned to their natural state. The Gorge cuts a narrow valley through bedrock.

i) The Gorge Metropark

There are two trails at the Gorge Metropark, the Glens which is an out-and-back between the parking lot and downtown Cuyahoga Falls and the Gorge Trail.

The entire Glens trail is on the edge of an outcrop of the Sharon Conglomerate. All the features described in The Ledges (TG P169) can be observed along this trail. The trail itself is scenic, but the highway noise from Ohio Route 8 is distracting. The examples of liesegang banding along this section of trail are remarkable.

The narrow Glens Trail between the Reservoir and the Sharon



A spring discharging in a joint

Iron banding cutting across crossbedding

Recumbent dross beds

Liesegang banding

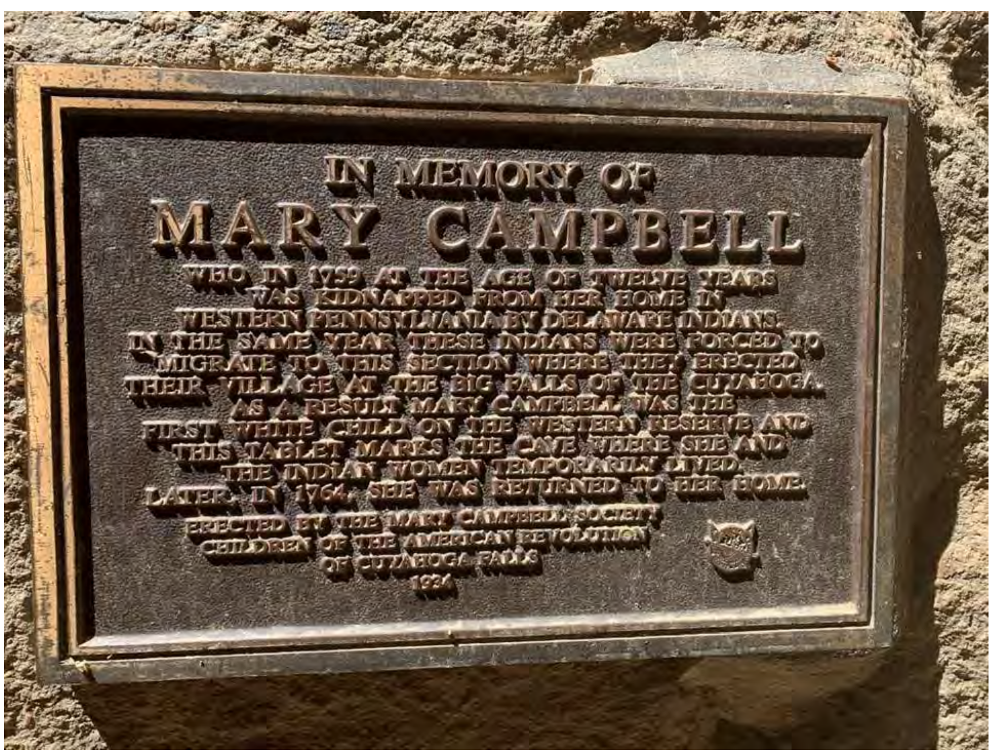
The Gorge Trail heads west out of the Parking Lot. There are a number of options to take the upper and lower trails. The lower trail takes you to an overlook of the Gorge Dam, which will be removed in the next couple of years (26). The upper trail takes you past Old Maid's Kitchen (formerly known as Mary Campbell's Cave). The upper portion of the trail runs adjacent to a thick outcrop of Sharon Conglomerate. If you take the trail west to the high Level Bridge, you are just a few hundred yards from the eastern end of the Babb Run Trail. To get to Babb Run from the Gorge Trail, you would have to bushwack through a very steep ravine.

"The 420-foot-wide, 60-foot-tall dam was built in 1911 for hydroelectric power and later provided cooling water for a coal-fired power plant. The dam, which is no longer functional, is tentatively planned for removal by 2026… The project, which is expected to reveal the buried waterfall for which Cuyahoga Falls is named, will include removing an estimated 1 million cubic yards of contaminated sediment"(26)

Note the structures at the base of the dam. They slow down the cascading water. This reduces the potential for downstream erosion.

The shales of the Cuyahoga Formation are present in the streambed below the dam.

Old Maid's Kitchen (formerly called Mary Campbell's Cave) is a large rock overhang within the Sharon Conglomerate. An archeological dig at this site found no evidence that the site was inhabited on a regular basis. As a result, the Summit Metroparks renamed the site to Old Maid's Kitchen, but the marker with the name Mary Campbell's Cave is still at the site. Mary Campbell was a real person, and she was abducted, but there is no evidence that she lived at the “cave” [(27)](). The contact with the underlying Cuyahoga Formation can be observed at the base of the cave.



Further west along the trail, The Cuyahoga Formation is seen in steam beds and along the valley walls. Hemlock trees are seen in some places along the valley walls below the elevation of the Sharon Conglomerate. These trees mark the presence of sandstone, which in this case is the Sharpsville member of the Cuyahoga Formation. This member is not easily identified in other places in the Cuyahoga Valley.

The thin sandstones and shales of the Cuyahoga Formation are seen in stream beds and along valley walls west of Old Maid's Kitchen.

ii) Babb Run Bird and Wildlife Sanctuary

The entrance to Babb Run Bird and Wildlife Sanctuary is just across the street from Chestnut Cemetery off Chestnut Street (Sackett Ave). This park, owned by Cuyahoga Falls, is just downstream of the western end of the Gorge Metropark. From the entrance to the park to the parking lot, and then along the 1.2 mile trail eastward, you can observe the Sharon Conglomerate, the Cuyahoga Formation including the Sharpsville Sandstone, and in the streambed of the Cuyahoga River, the Berea Sandstone. This is a trip taking you from the Pennsylvanian to the late Devonian (about 40 million years).

Babb Run is the one place you can see the construction of the interceptor sewer and the preparation to move the sediments from the reservoir behind the Gorge Dam to the Chuckery Area of Cascade Metropark. The Chuckery Area is closed while the construction is going on.

The Cuyahoga River downstream of Gorge Metropark, cascading over layers of the Berea Sandstone. Note the High Level Bridge in the background.

A slab of shale from the Cuyahoga Formation. Note the numerous trace fossils which are an indication of shallow water near shore deposition.

Work being conducted (March 2024) at the Chuckery Area. Gunnite was being applied to the shale rock face for slope stability. Gunnite is basically a thin concrete applied with a hose.

View of the Overlook Area from Babb Run.

iii) The Overlook Area at Cascade Valley Metropark

The entrance to the Overlook Area of the Cascade Valley Metropark is just west of the entrance to Babb Run along Sackett Ave. (Chestnut Street). This short (0.5 miles round trip), flat, paved trail provides one of the most spectacular views, especially at sunrise, of the Cuyahoga Valley, right at the location where the Cuyahoga River turns north. This overlook area can also be reached by hiking a trail from the Oxbow Area of the Cascade Valley Metropark.

The outlook is spectacular in any season. Seeing it a sunrise is special.

The slope face to the west of the outlook platform is composed of outwash. Note this slope is easily erodible.

Although, to the east from Babb Run, bedrock crops out along the gorge walls, the overlook, which is just west of Babb Run, is perched on an outwash deposit (outwash terrace). Outwash terraces form along valley walls as glaciers melt. From the overlook you can see Babb Run and the Oxbow Area of the Cascade Valley Metropark.

5) IN CONCLUSION

I leave you with this picture of a restored section of the Cuyahoga River in the Valley View Area as it winds its way northward. Kudos to the Summit Metroparks for all they do!

Golden Hour at Valley View, Cascade Valley Metropark

6) REFERENCES

Although not presented as a citation within the document, this geologic guide follows the organization of the **Trail Guide: Cuyahoga Valley Nation Park,, 4th Edition,** Cuyahoga Valley Trails Council, Gray Publishing Company, Cleveland, ©2007-2024, Written by Peg and Bob Bobel (TG) The trails described in this geologic guide use page numbers within the referenced document, e.g., (TG p 252). This document was written as a supplement to this excellent publication which is available at Trail Mix Stores or through the Cuyahoga Valley Trails Council.

References are in order of appearance in the document. Most of the photos and illustrations in this document were taken by the Author, Susan S Richards, unless otherwise noted.

Some of the information presented in the narrative (such as the discussion of Peninsula) was learned from information placards placed by the US National Park Service. The individual placards are not cited in the document or below.

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