Reeking of the Ice Age

How glaciers and meltwater created the scenery of the Park[1] we all adore

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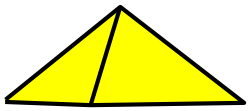
[1]*Meaning Harriman State Park, New York*

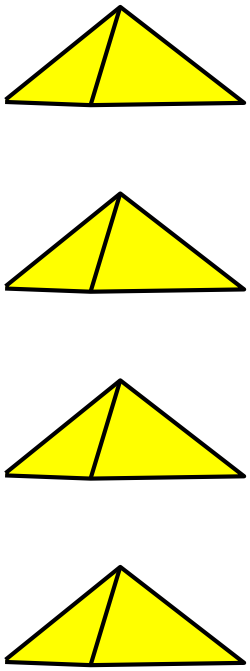
Everything Changes

Great Pyramid at Giza
roughly 5000 years old



1 pyramid

5000 years



Imagine

what
Harriman State Park
was like
4 Pyramids Ago ?

(20,000 years)

Whitetail Deer

Whitetail Deer


Greenland Ice Sheet

Absolutely nothing

lived in the Harriman Park

20,000 years ago


Late Wisconsinan ice sheets and glaciers
Maximum extent of older Pleistocene glaciations
Unglaciated terrain
22.4
Approximate age of regional Late Wisconsinan maximum
0
1000 km
Alaska
Cordilleran Ice Sheet
Laurentide Ice Sheet
Keewatin
Foxe Basin
Ungava
Nouveau Québec
Labrador
Harriman State Park

Harriman State Park
was shaped by the Ice Age

Almost everything you see there
is a reminder of its action

In my opinion
the many south-facing scarps
Are the Park's most distinctive
- and beloved -
features

Where’s this?


Ramapo Torne

And this?

Claudius Smith Den

And this?

Nearly Perpendicular

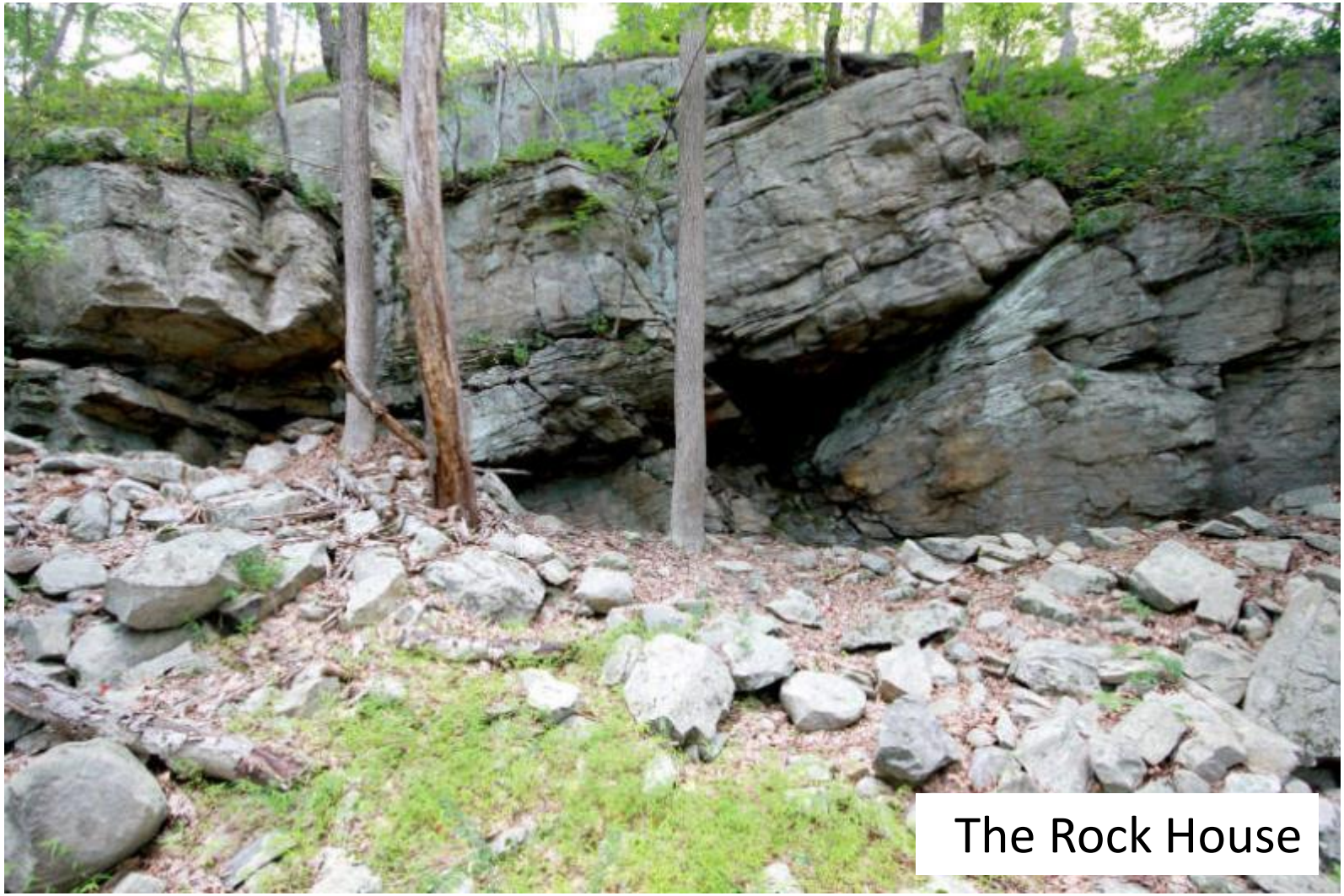
Blue Disk Trail

And this?

Cat’s Elbow

Ramapo Dunderburg Trail

Some others …



The Rock House

Monitor Rock


The Kitchen Stairs

Note how few rocks are at the base. Where did they go?

Long Path near Times Square

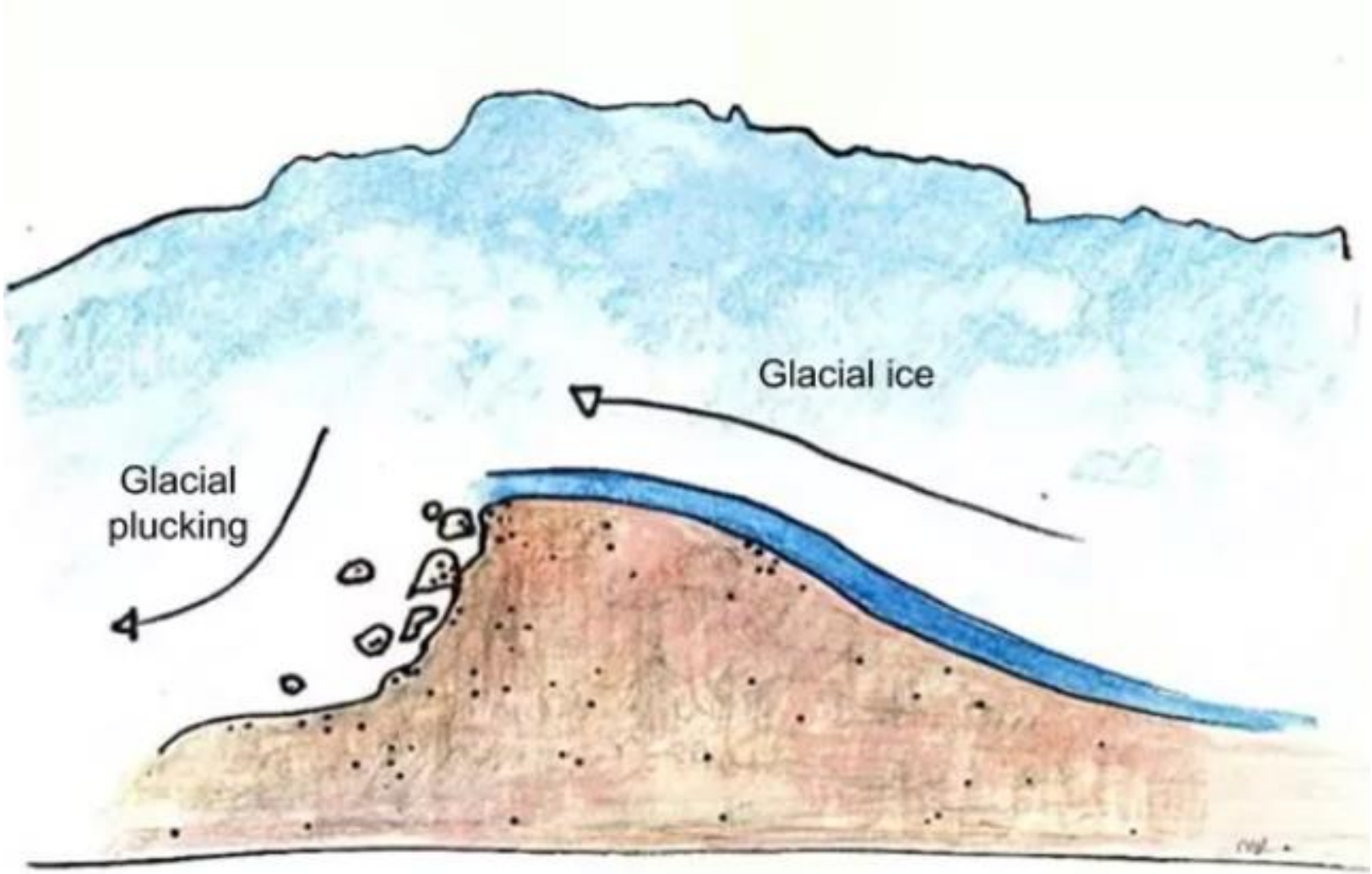
Suffern Bear Mt Trail near the Pines

Tuxedo Mt Ivy Trail near Blauvelt Mt

Scarps
Make for
Spectacular
Views

Atop
Scarp
On
Mt
Pyngyp

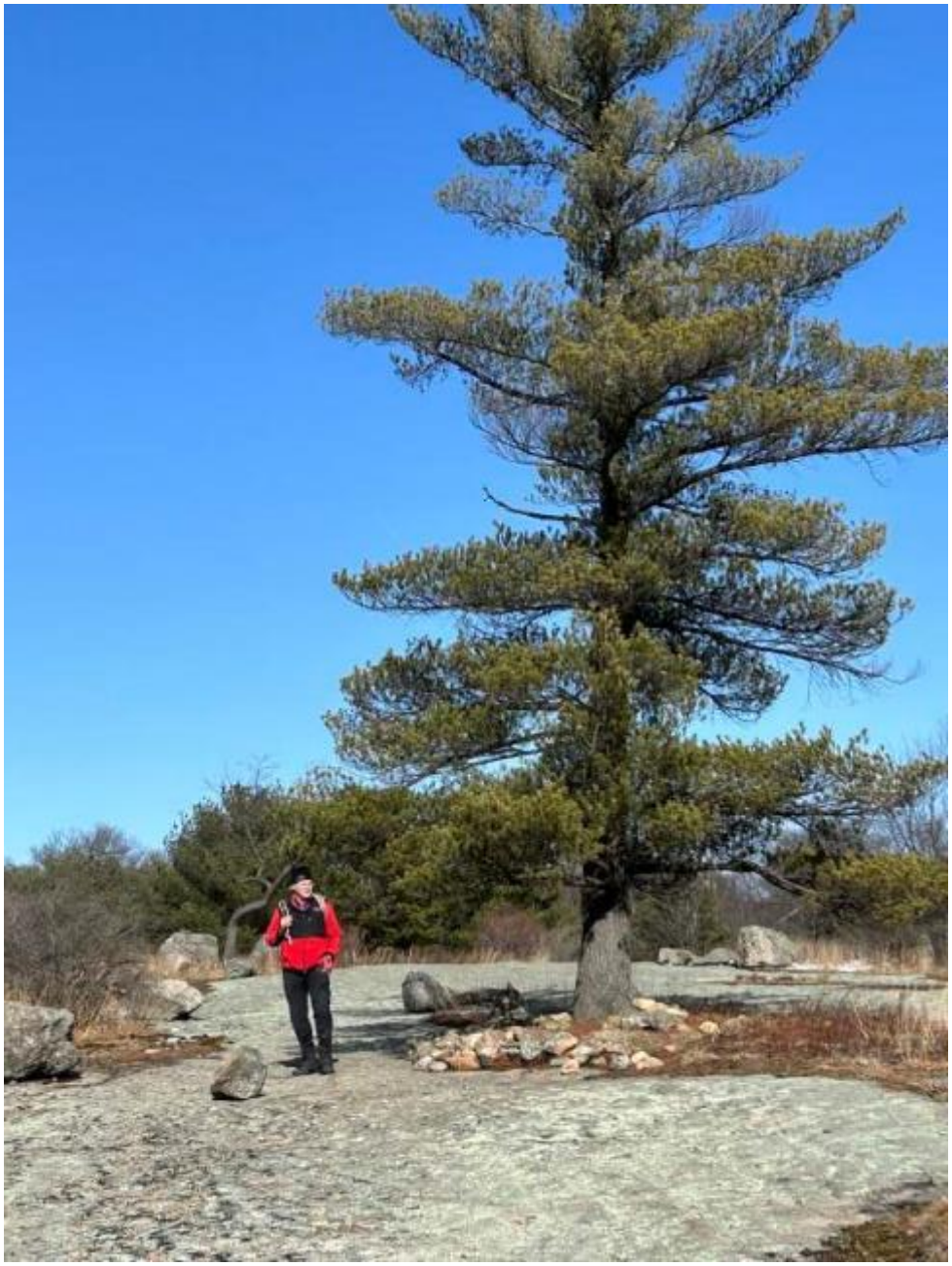
These Scarps are examples of Glacial Plucking



Many of the rocks were carried far away.

Another distinctive class of features is the wide and flat rock pavements

Where’s this?



The Bowling Alley,
along the Dunning Trail

And this?

Bald Rocks (Black Rock Mountain)
Along the Ramapo Dunderburg Trail

And this?

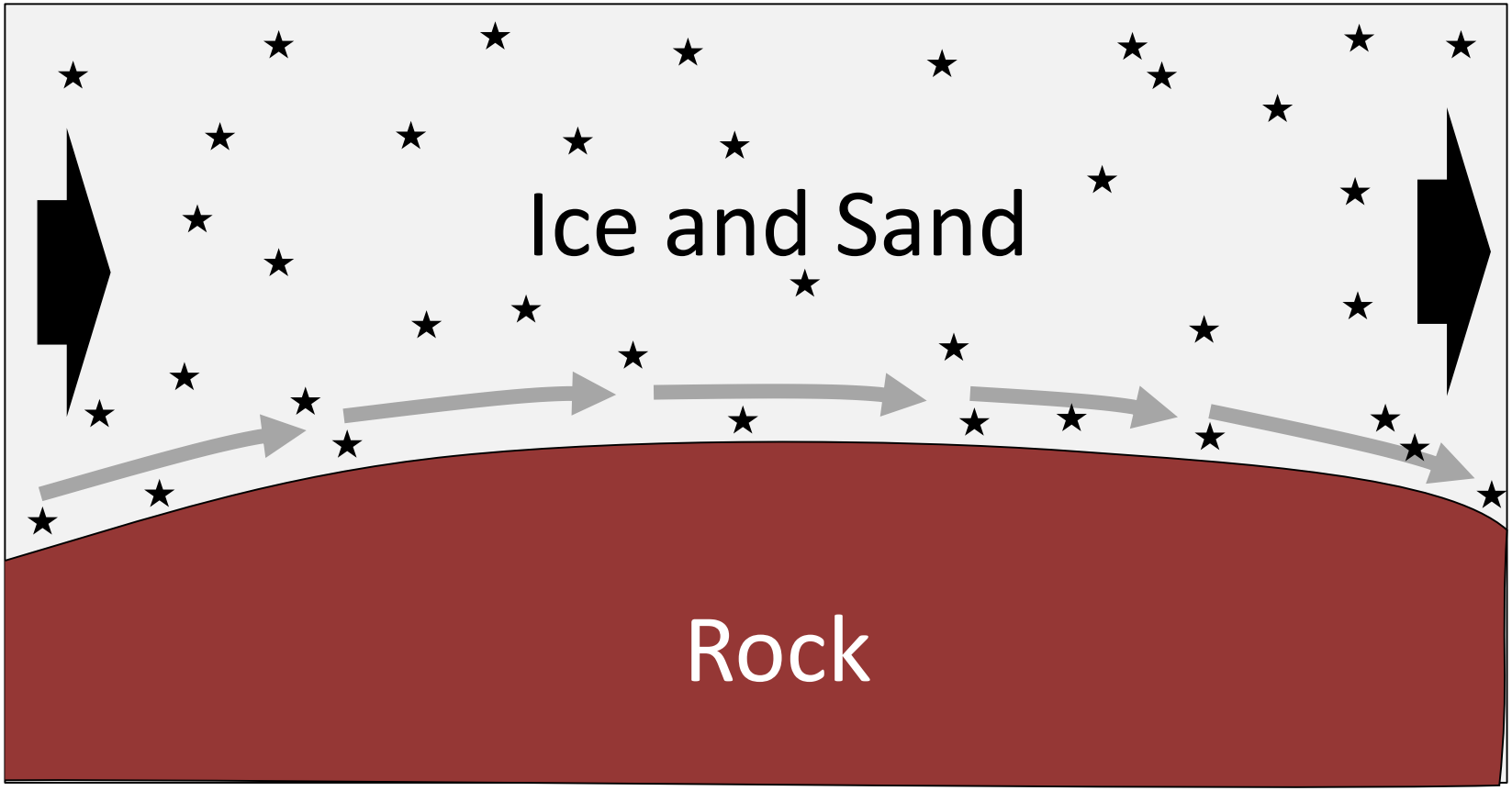
Bear Mountain Summit

These smooth surfaces often cut right across the layering of the rock

And if we go just north to the Park to Schunemunk Mountain

We see that
the
flat surfaces
cut right
through
tough quartz
pebbles
embedded in
the
sedimentary
rocks there

Glacial movement “sandpapers” rock pavement

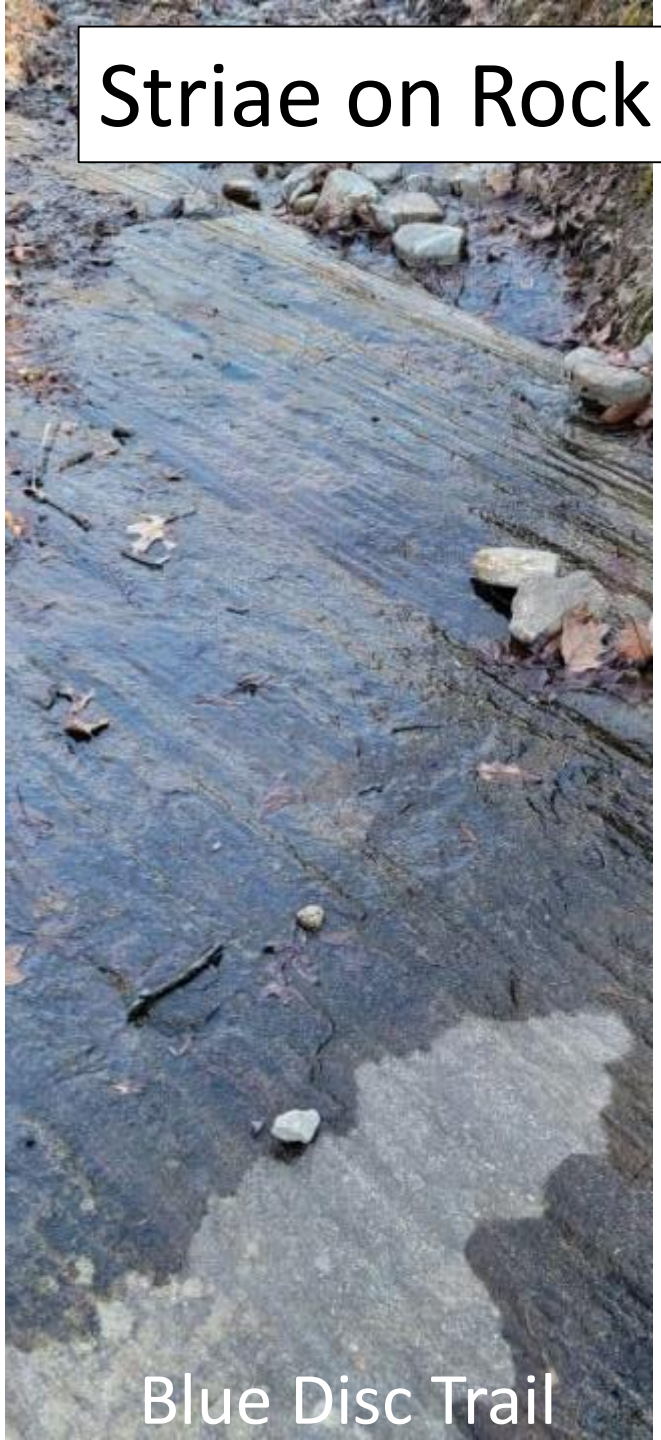


Glacial Scratches

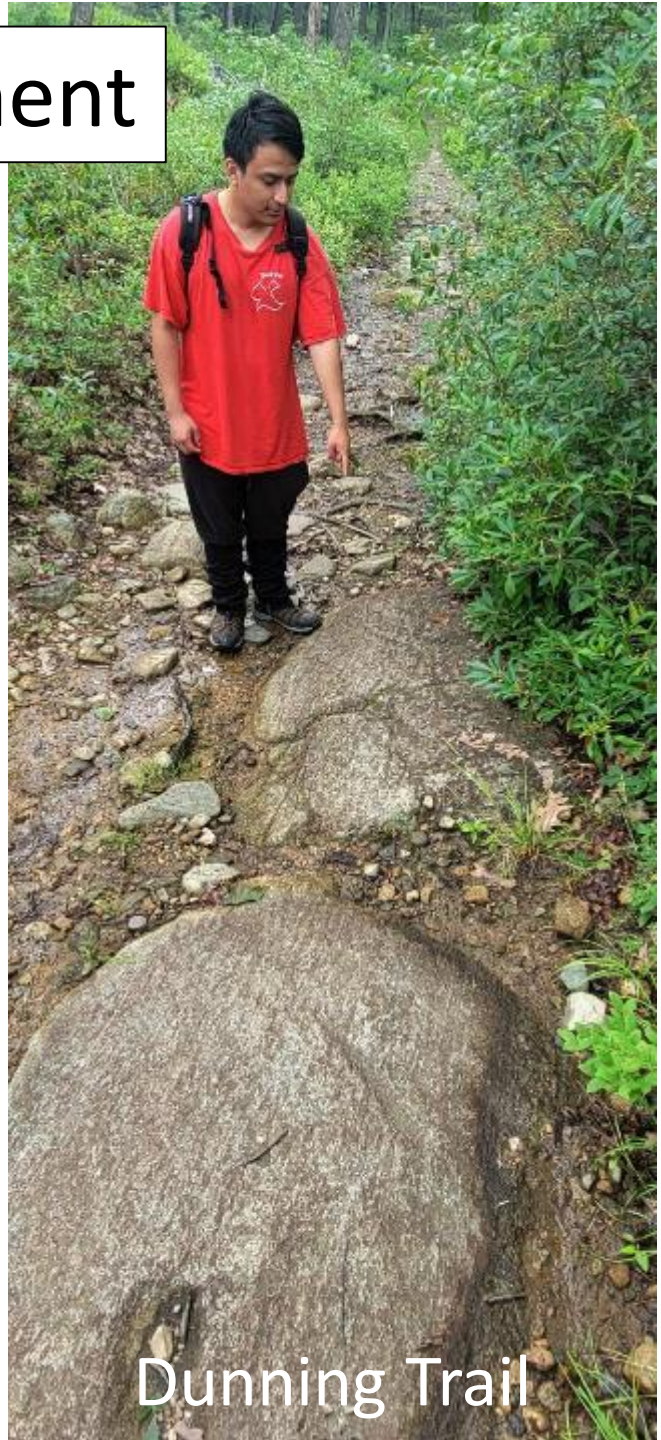
“Striae”

Pebbles in glacier scratching the rock

Striae on Rock Pavement

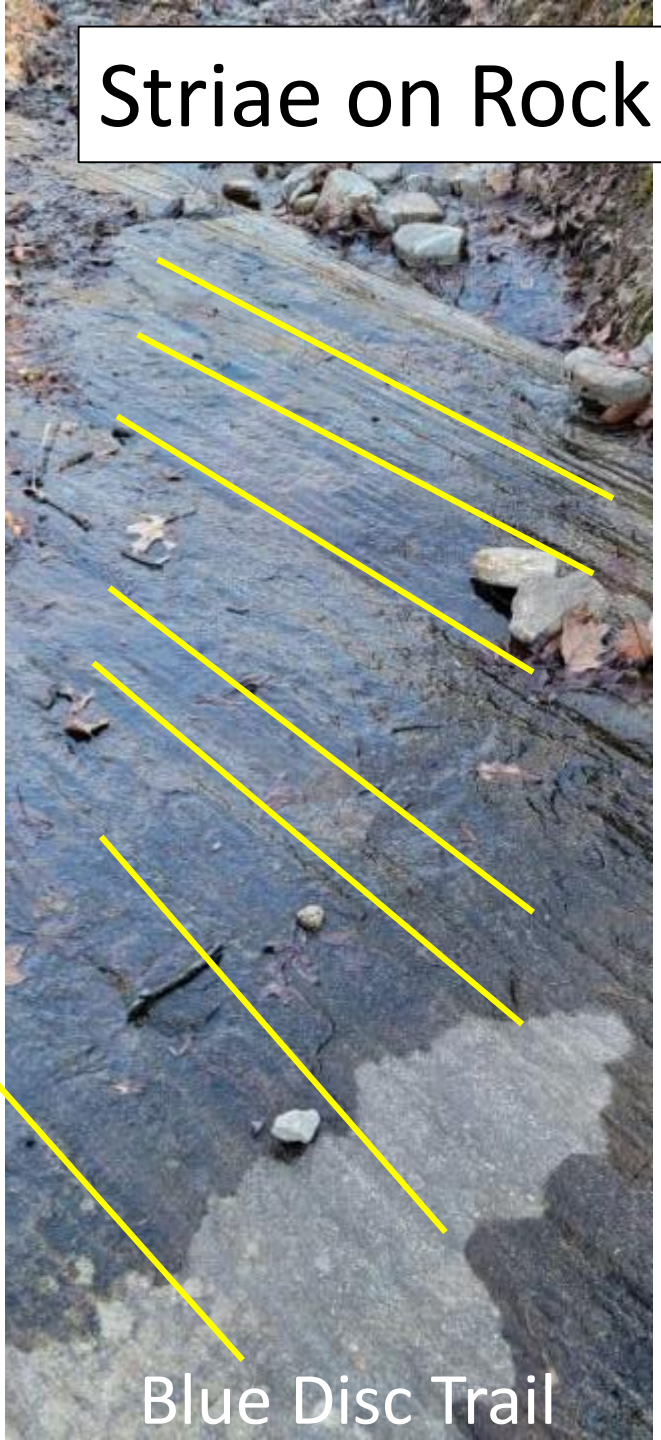


Blue Disc Trail



Dunning Trail

Striae on Rock Pavement

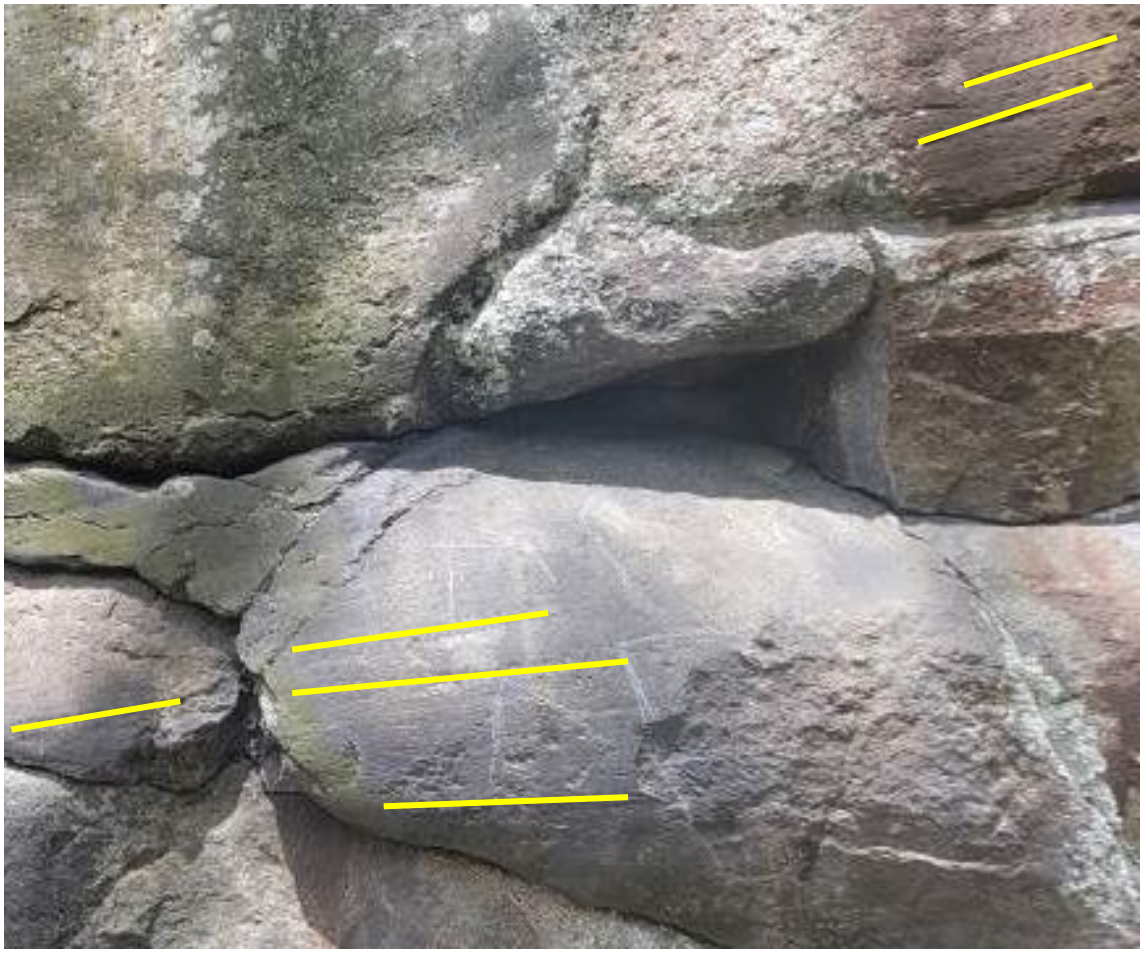


Blue Disc Trail

Dunning Trail

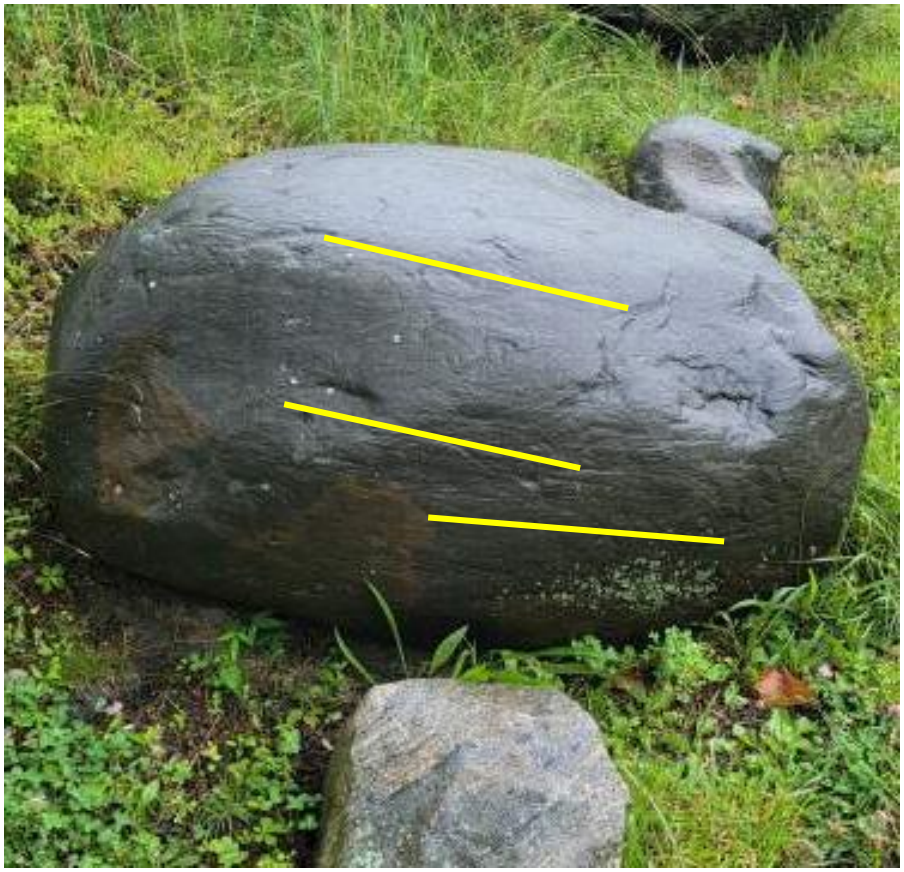
Striae at the top of a scarp

Striae on a Scarp



Striae on a Scarp

Striae on Boulders



Striae on Boulders

Speaking of Boulders

They are one of the wonderful
Decorations of the Park's Hilltops

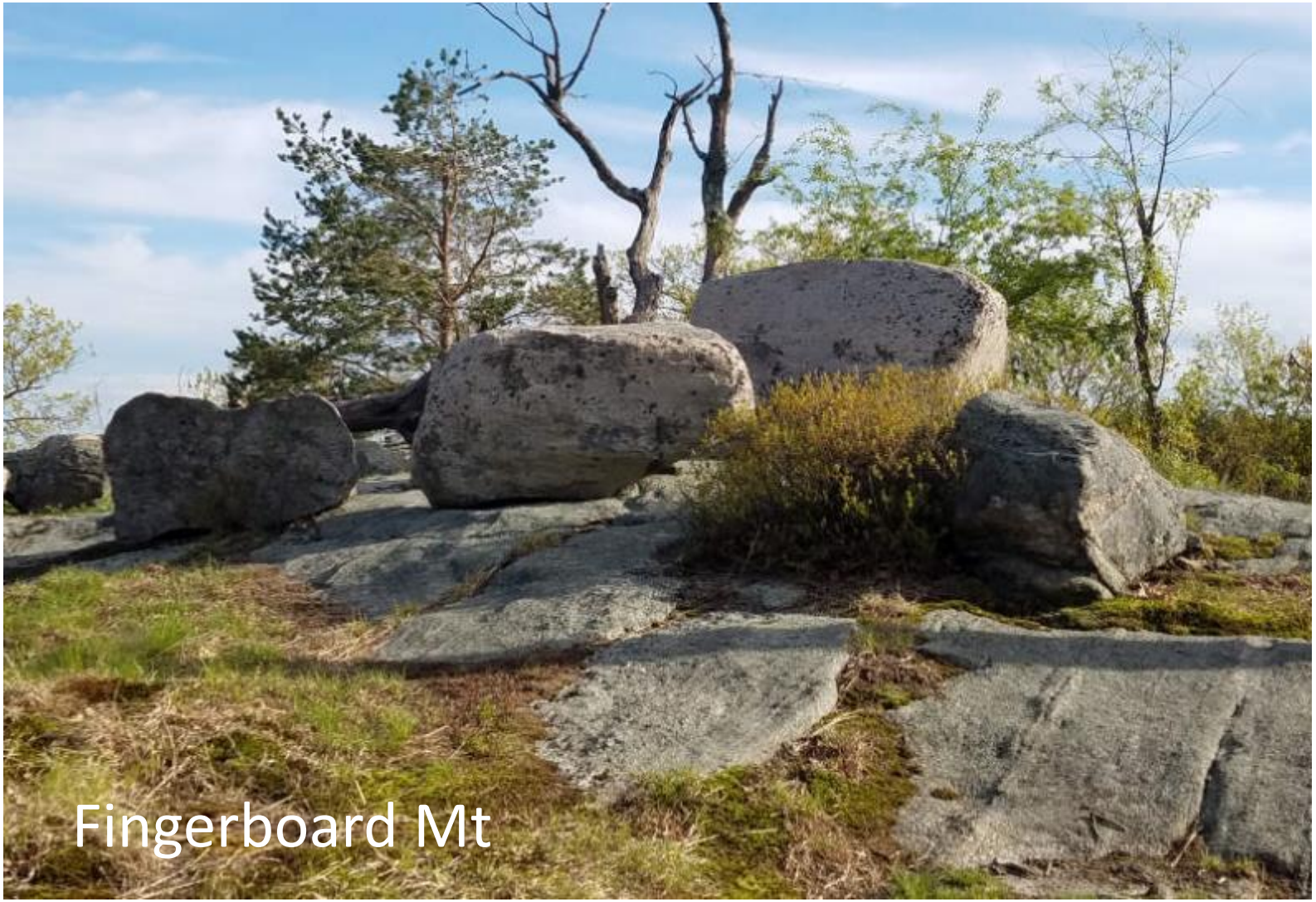
And glaciers put them there

Where’s This?

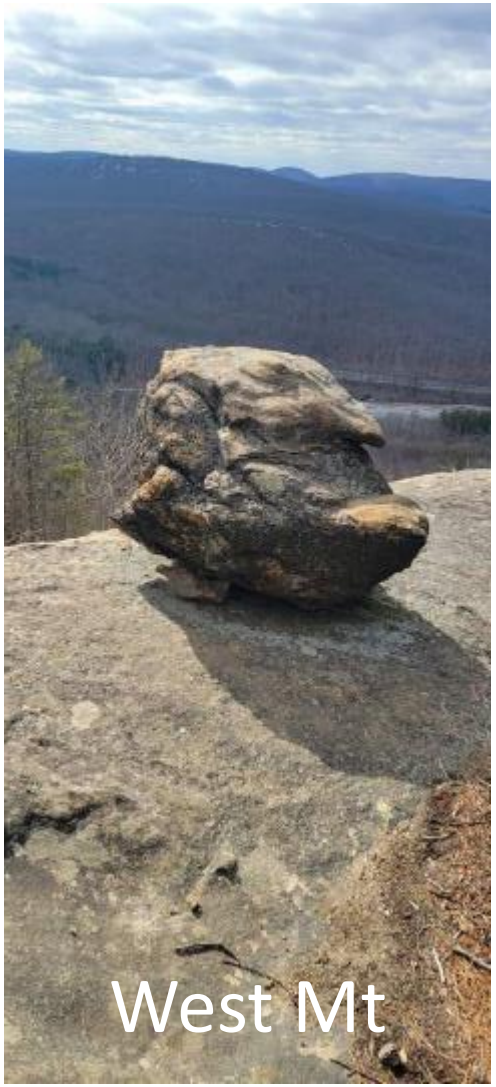

Popolopen Torne

And This?

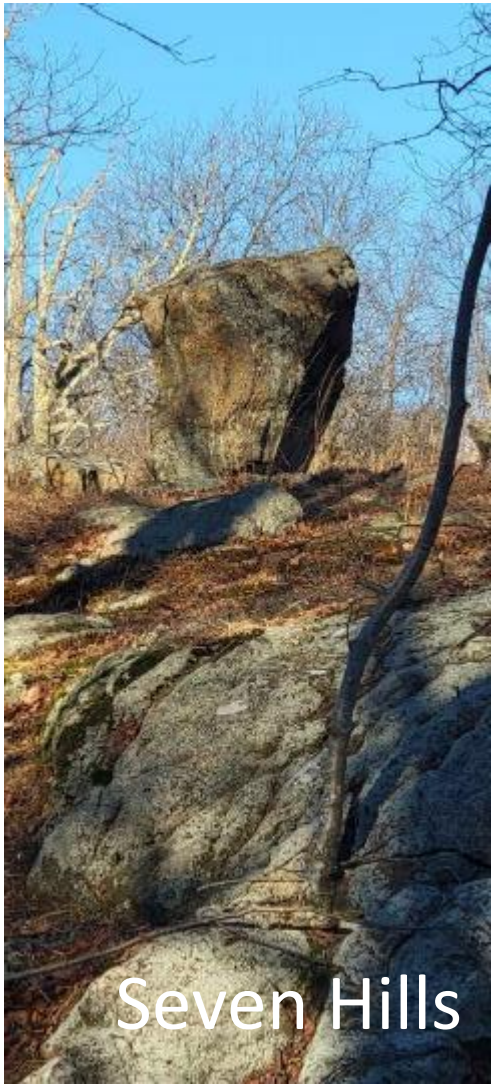
Irish Potato


Fingerboard Mt


Panther Mt


West Mt


Fawn Trail


Seven Hills


Blue Disc

Boulder Being Transported By a Glacier

Erratic Boulders

Non-local rock type

Sandstone on Fingerboard Mt

Quartzite
On
Chipmunk
Mt

Limestone on Hogencamp Mt

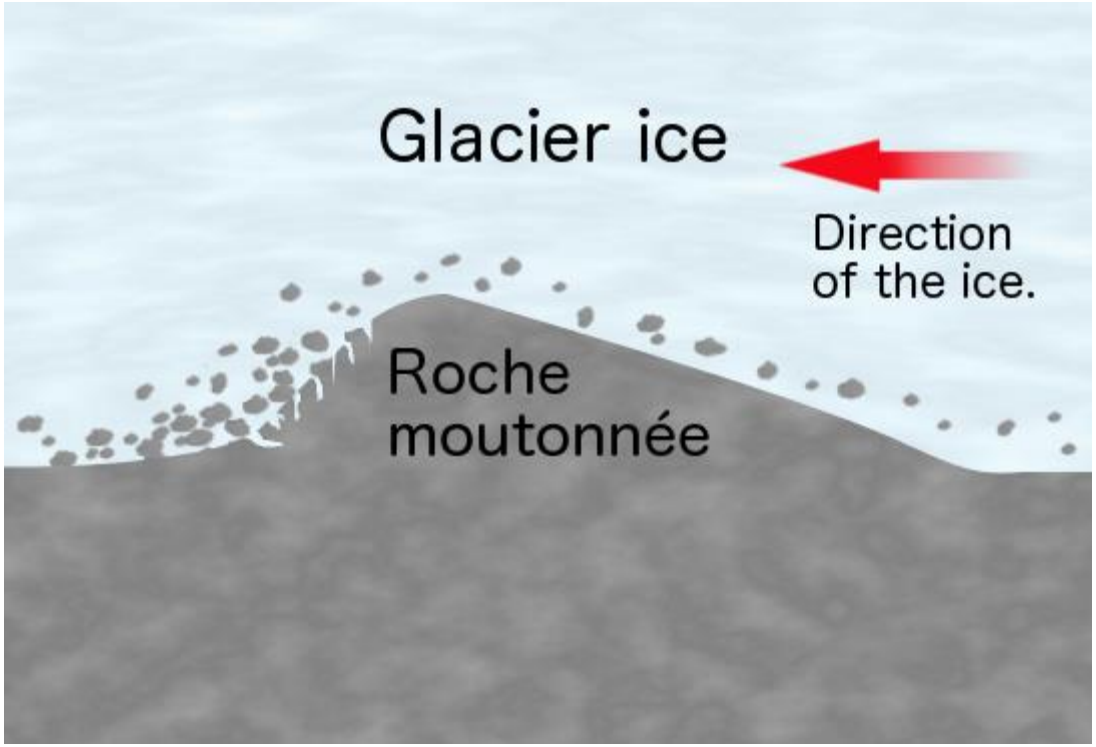
Conglomerate Along the SBM near Minisceongo Creek

Conglo-
merate

About 10 miles

Roche Moutonnée

Glacial shaping and plucking at a small scale



Roche Moutonnée

“Roche”
Rock in French

18th Century French Wig “The Moutonnée”

Dunning Trail near the Bowling Alley

Suffern Bear Mt Trail near Stone Memorial Shelter

Ramapo Dunderburg Trail at the Bald Rocks

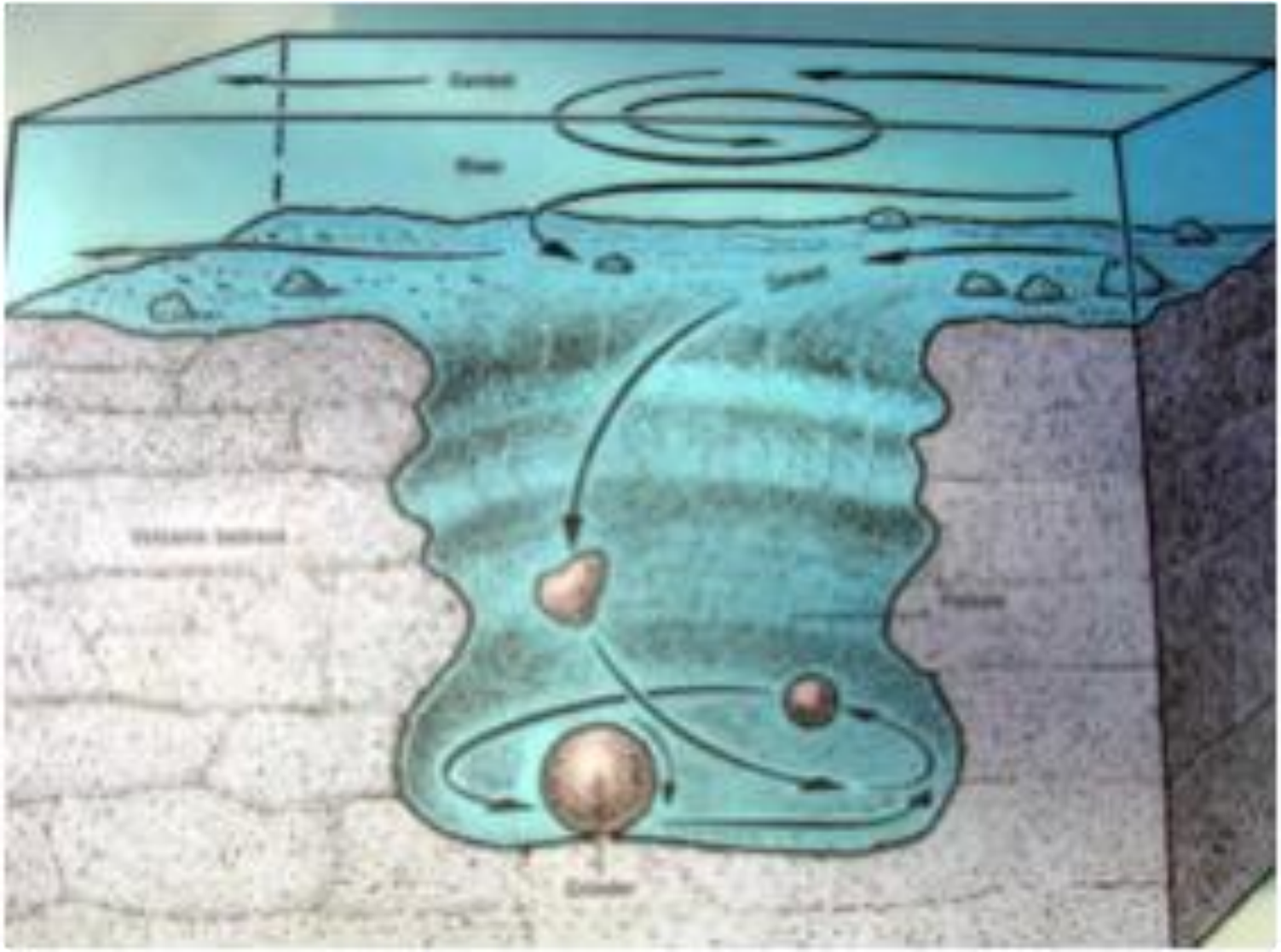
Woods road north of Little Long Pond

Glacial Flutes

Near Bald Rocks Shelter

Dunning Trail near the Bowling Alley

Glacial Potholes



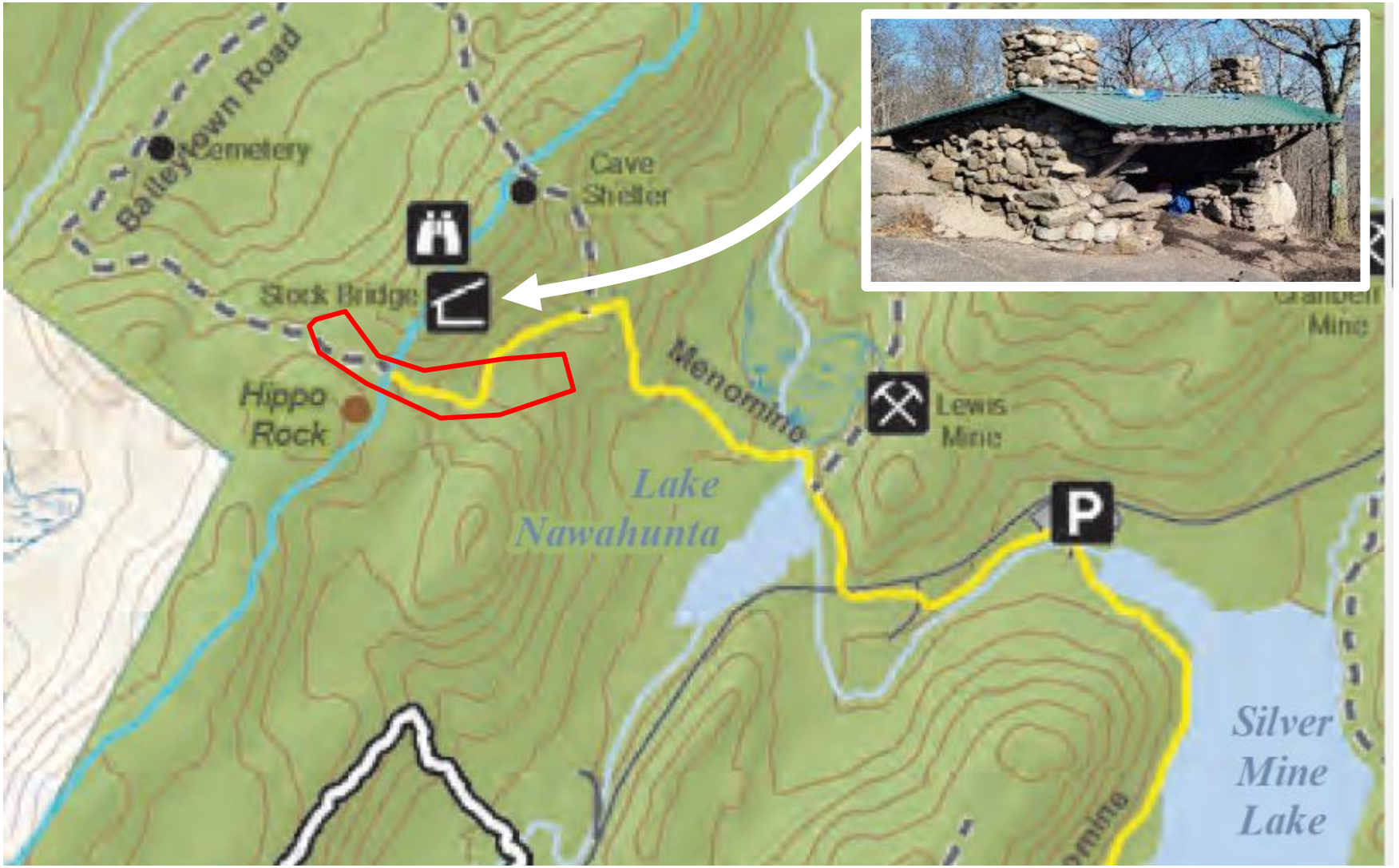
Glacial Pothole

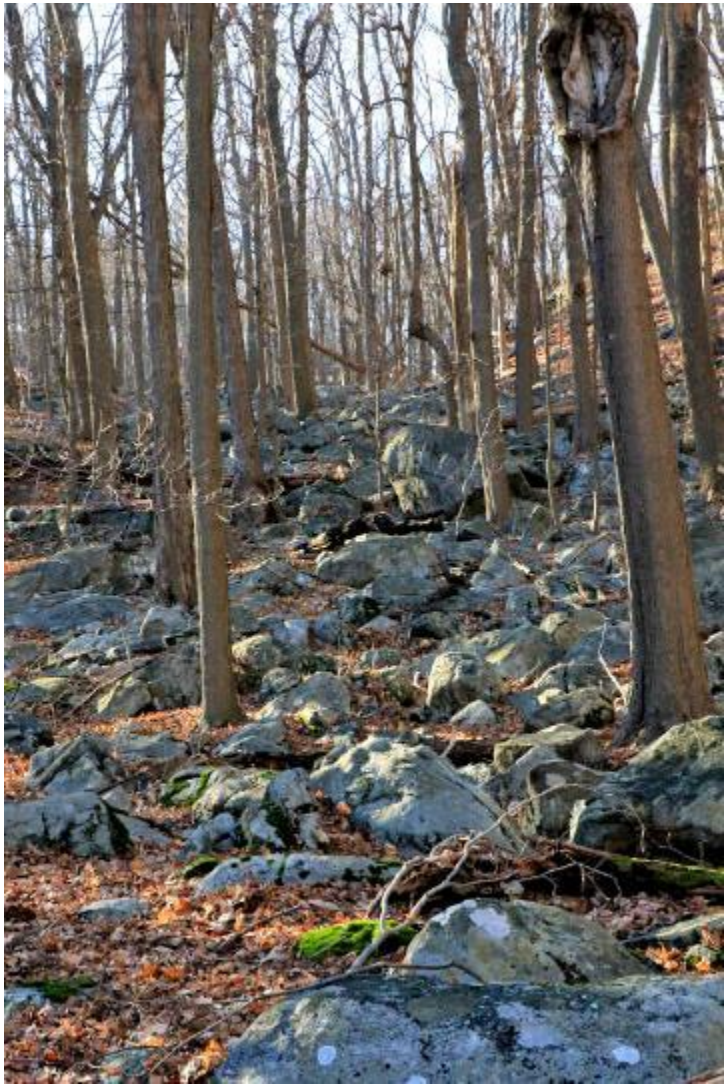
Near
Hurst
Trailhead

Inwood Park
In
Manhattan

Subglacial River along the Menomine Trail

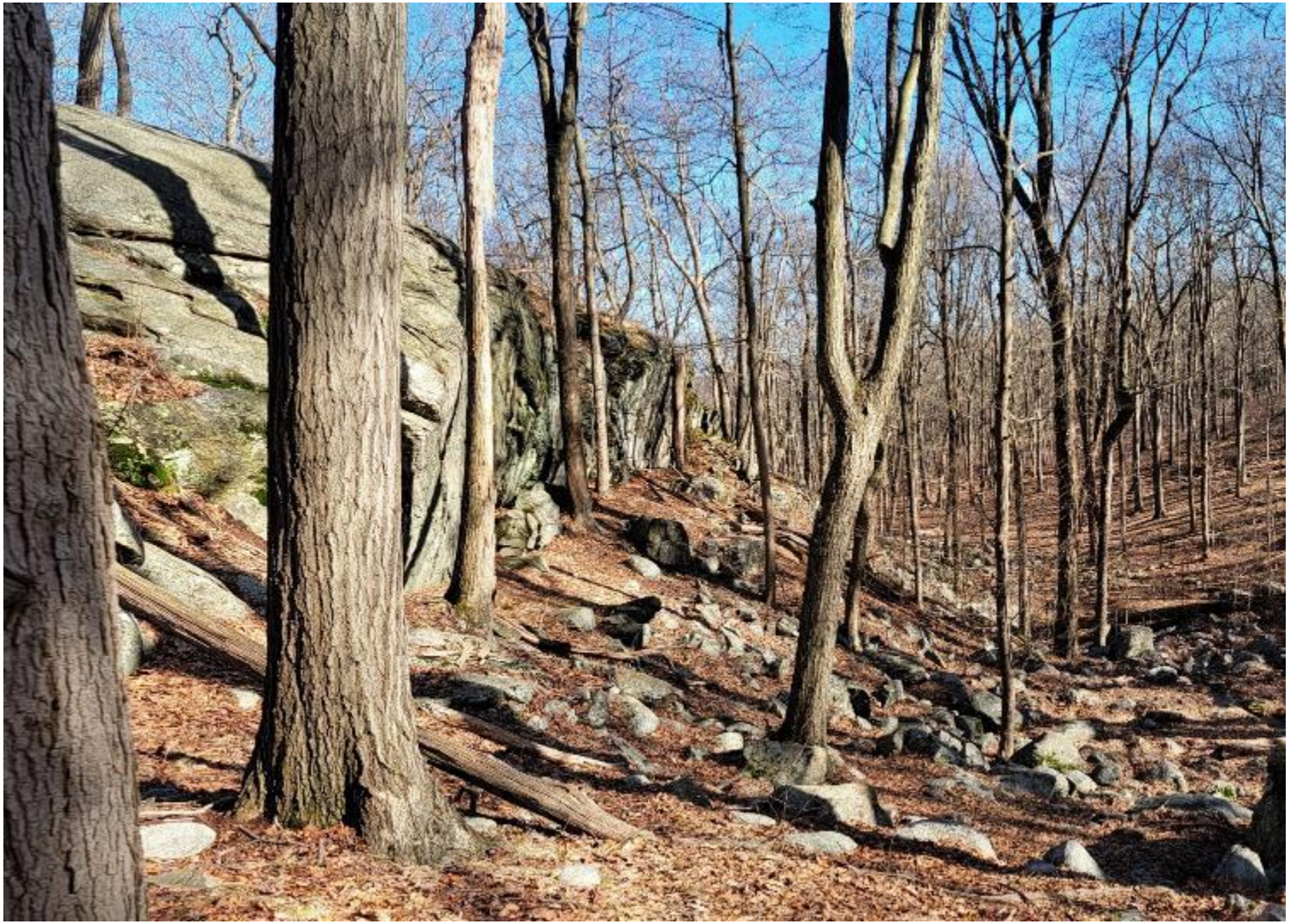
Below Stockbridge Mountain Shelter

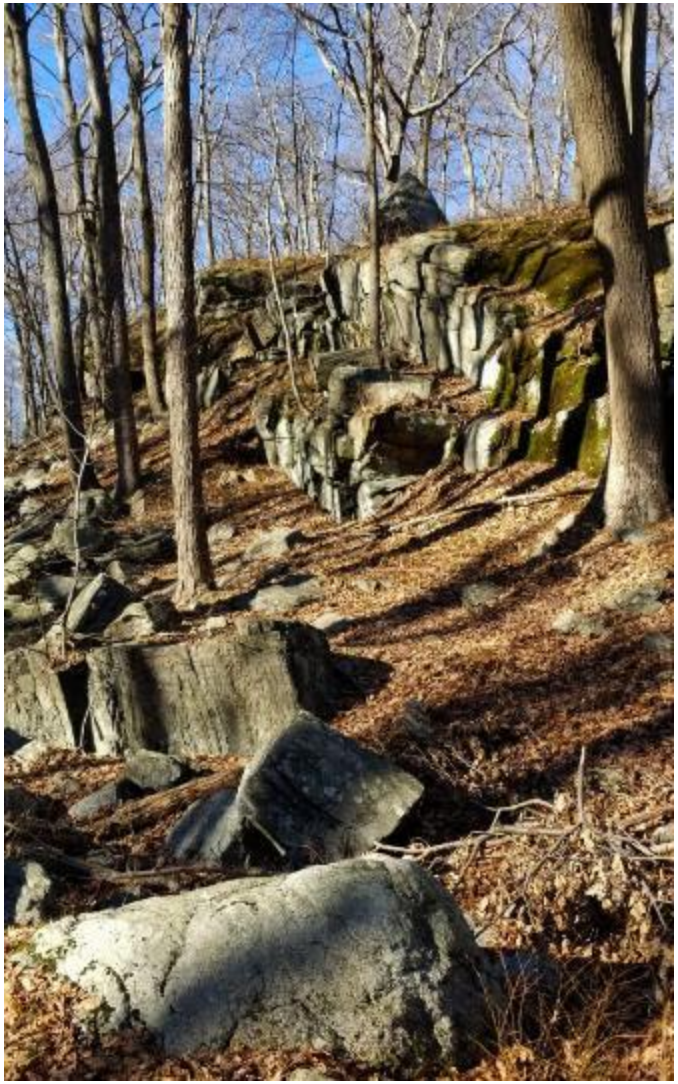

Bailey Town Road
Cemetery
Cave
Shelter
Stock Bridge
Hippo
Rock
Menomine
Lewis
Mine
Lake
Nawahunta
P
Silver
Mine
Lake



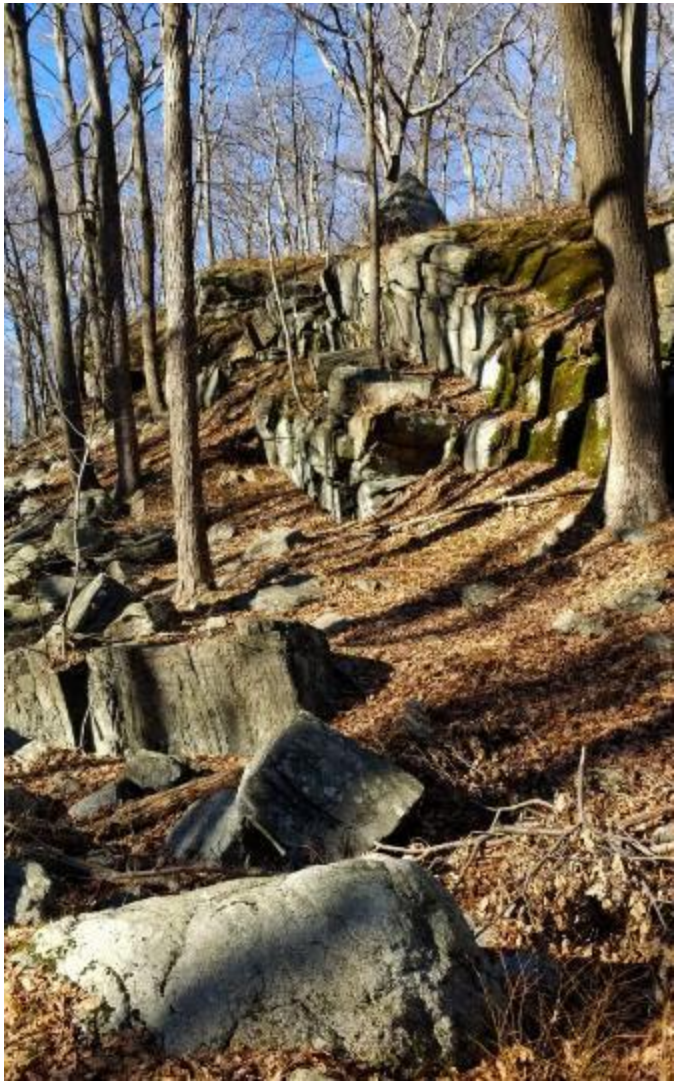
Boulders
North
Of
Trail

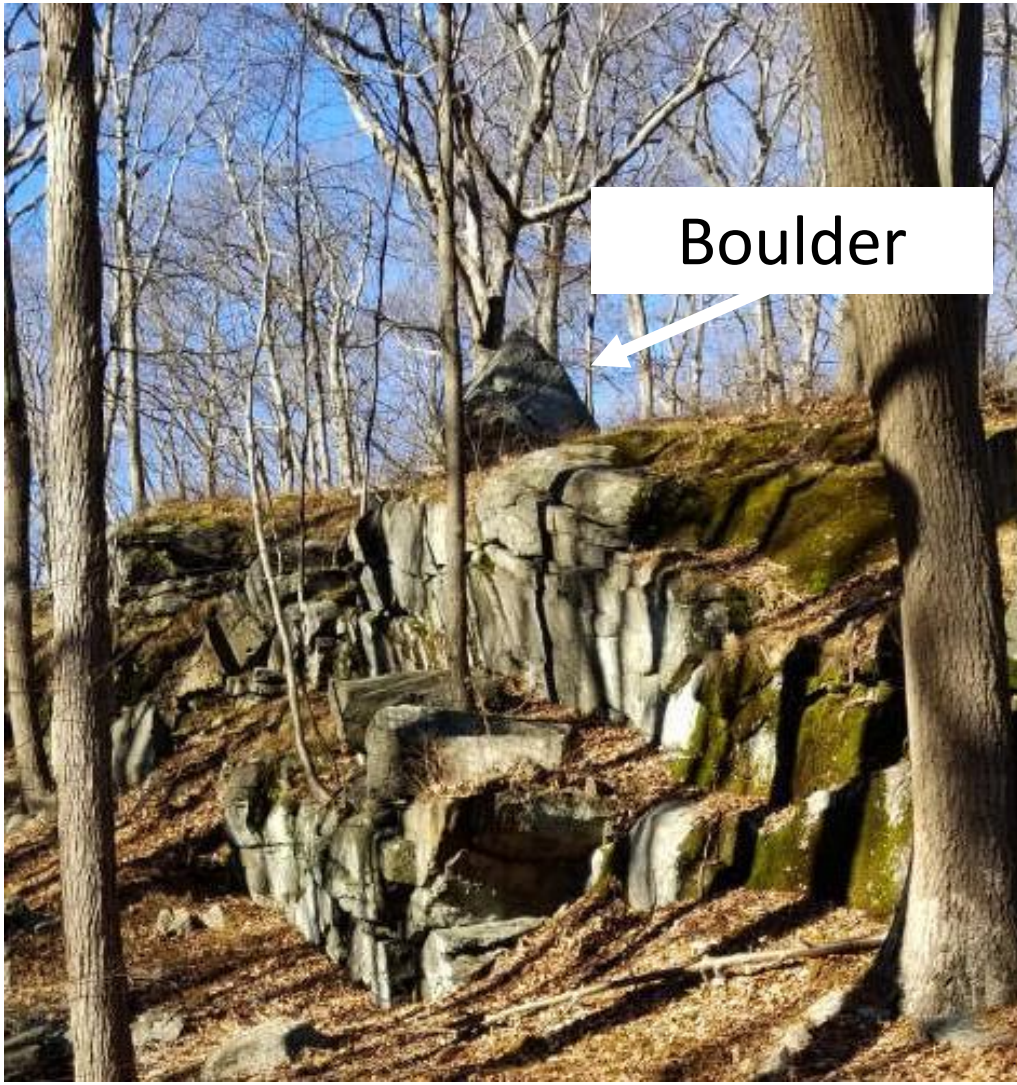
Cliff





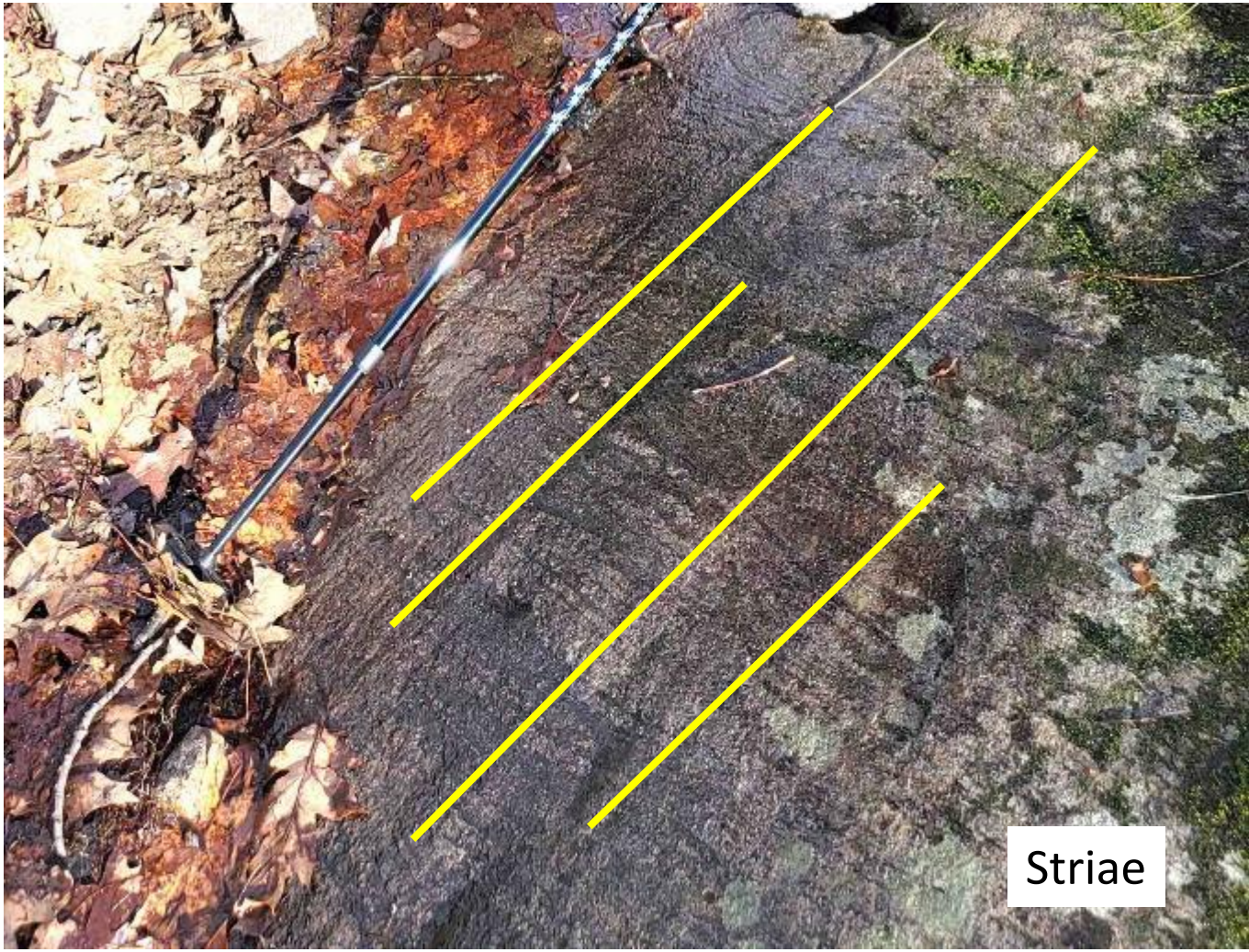
Cliff

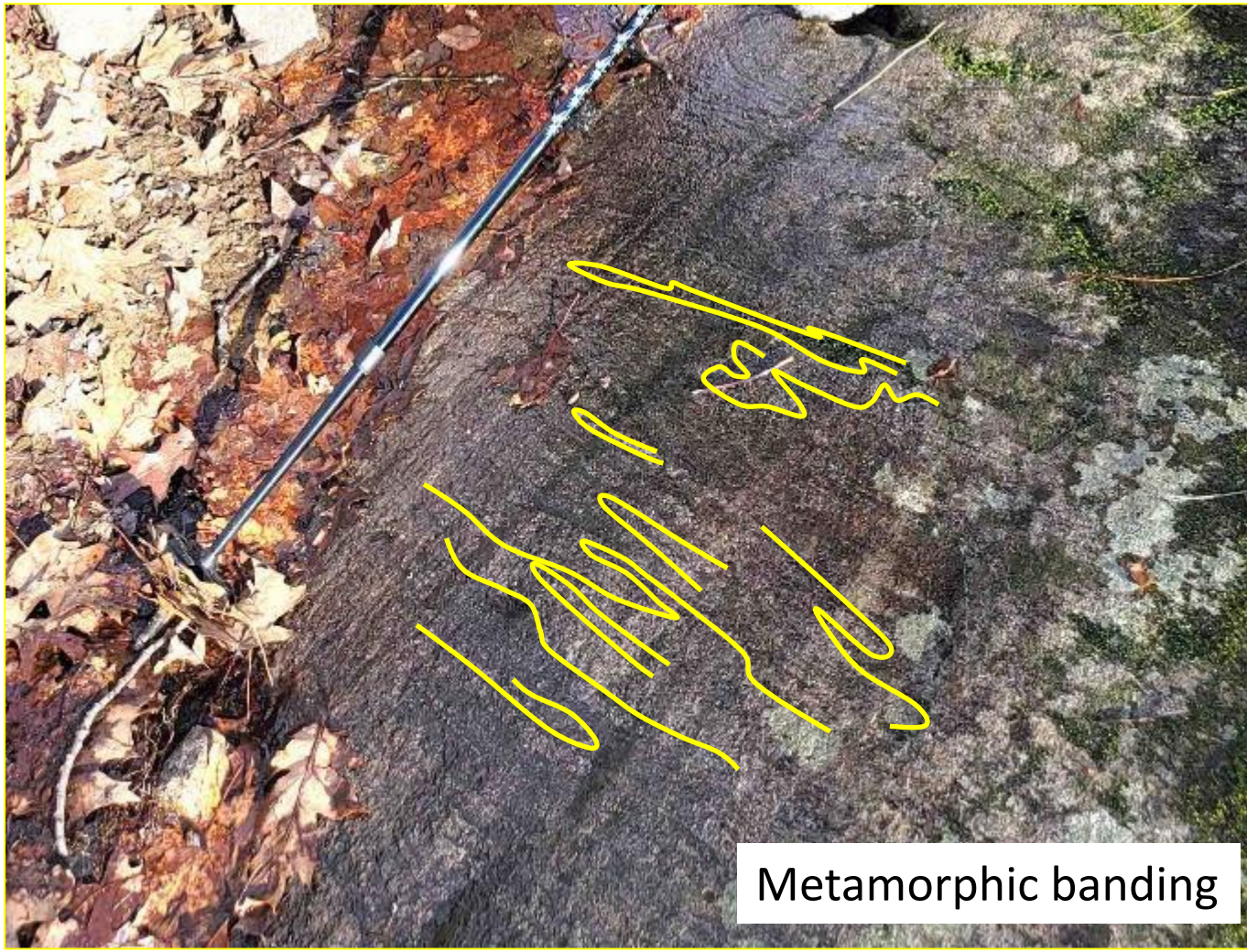



Boulder

Striae Parallel to Cliff

Striae Parallel to Cliff

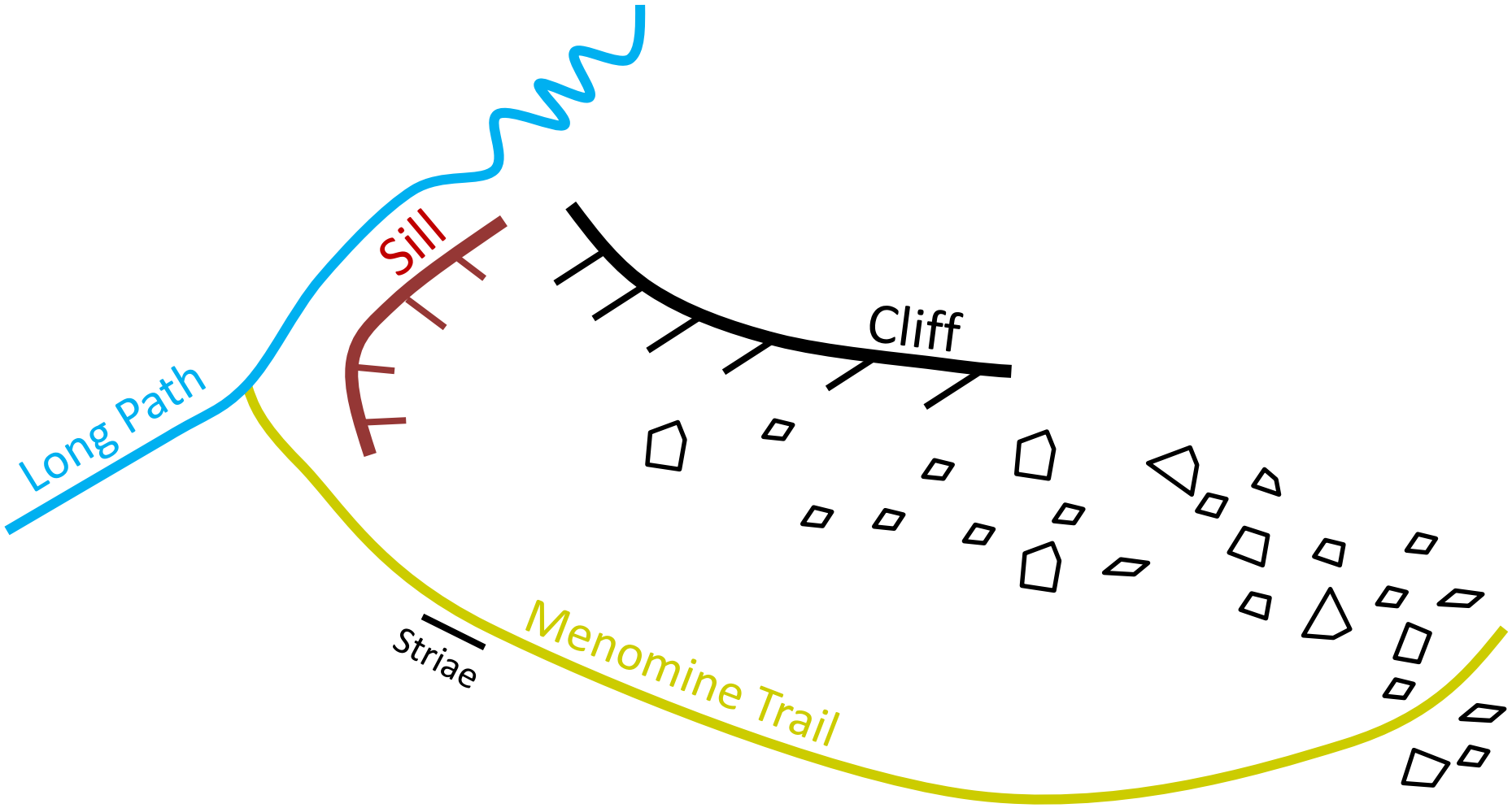


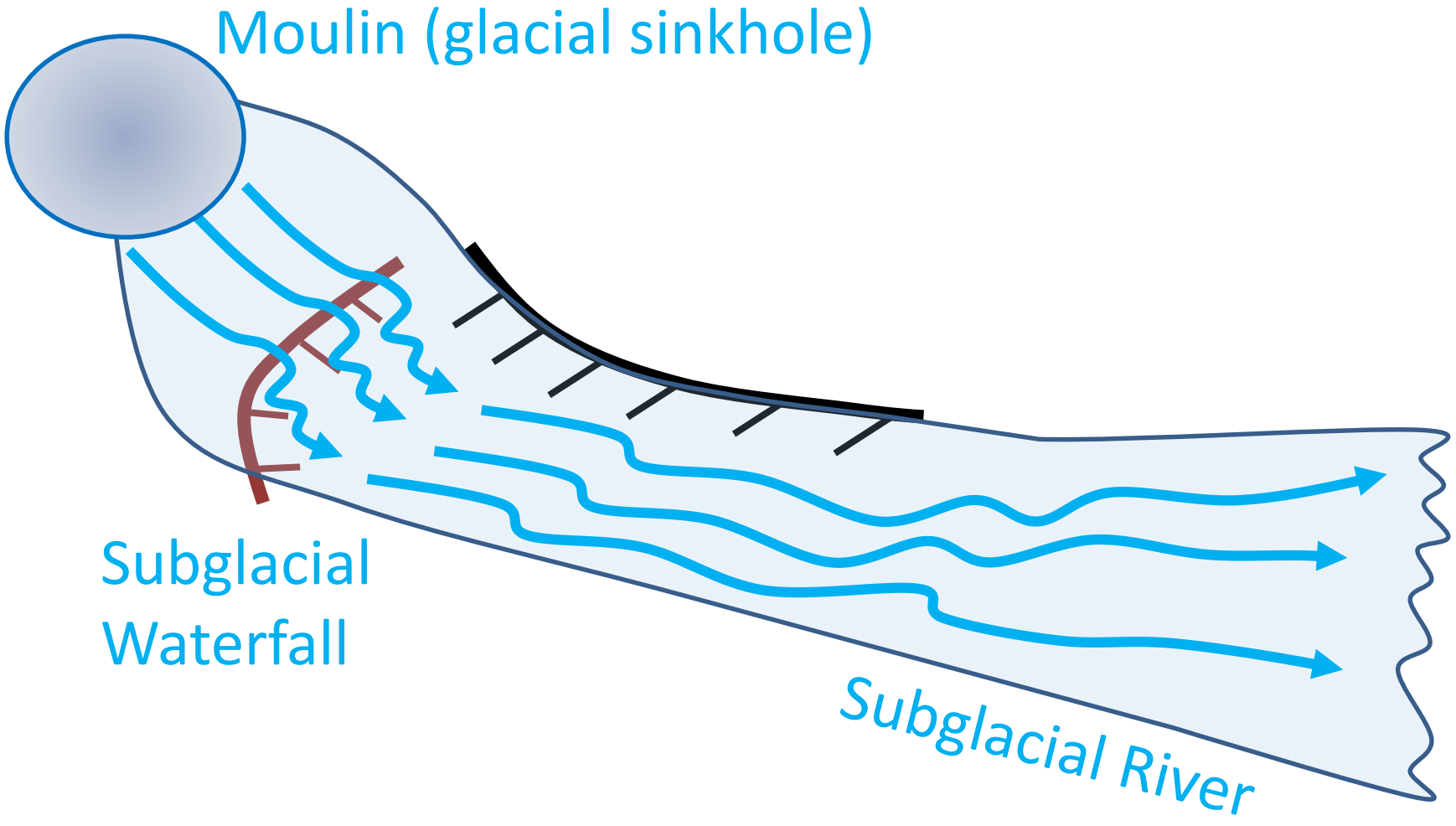

Metamorphic banding

Site of Waterfall

Stream Above Waterfall

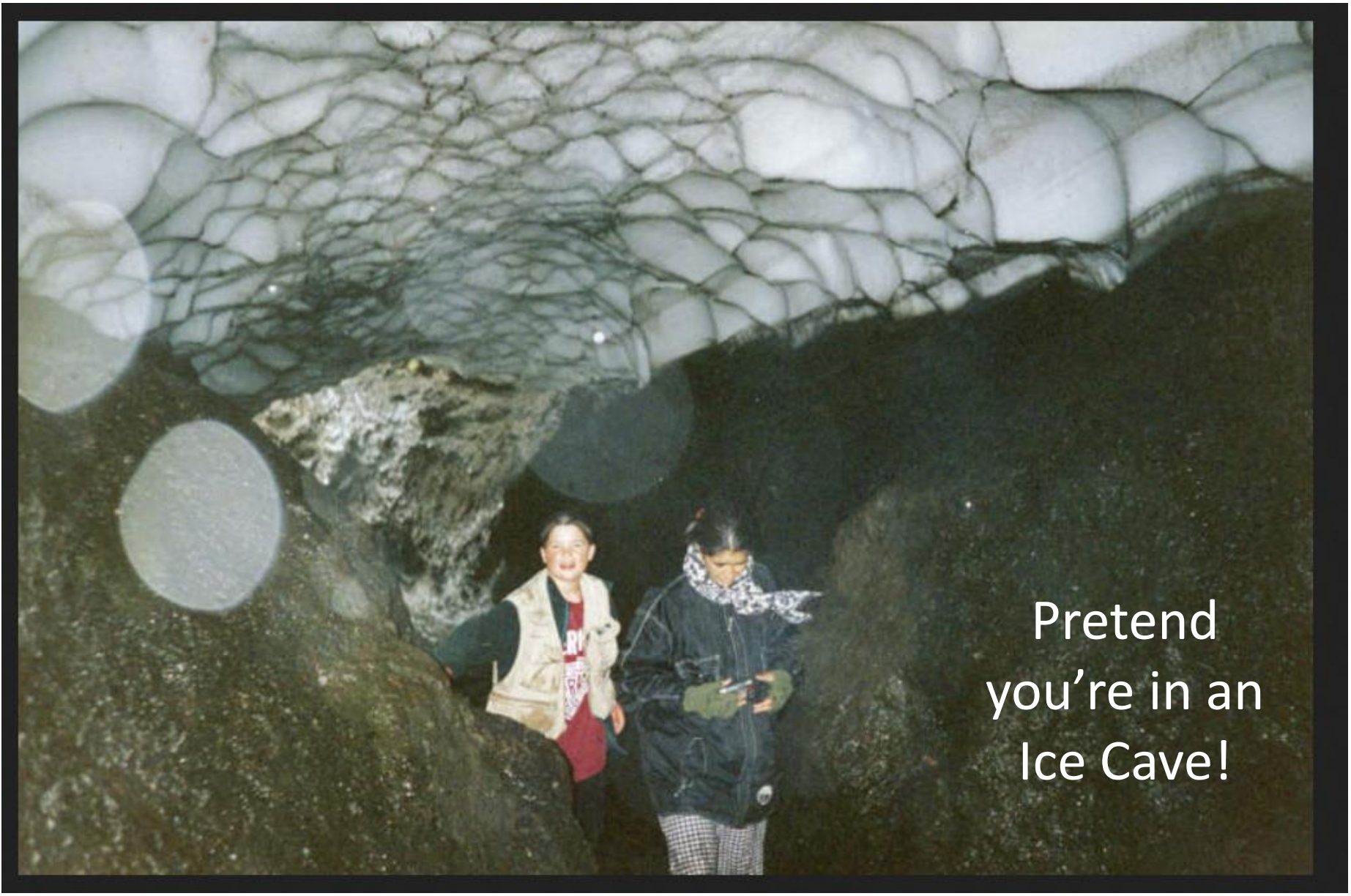
Tiny Watershed


Long Path
Sill
Cliff
Striae
Menomine Trail


Moulin (glacial sinkhole)
Subglacial
Waterfall
Subglacial River

Moulin (Glacial Sinkhole) In Greenland

So, the next time you're out hiking
And the sky is grey,
and a few drops of cold water fall from above
to make your skin prickle …


Pretend
you're in an
Ice Cave!

Teaser: As you hike the Menomine Trail (blazed in yellow) west from Silvermine Lake towards Stockbridge Mountain Shelter, you cross a section of hillside littered with large angular boulders. Shortly after, you pass their apparent source, a tall rocky cliff on the north side of the trail. The little stream flowing past the cliff and among the boulders seems wholly inadequate to have moved so much material and to have sculpted such a dramatic escarpment. As you connect with the Long Path (blazed in blue) and take it northward towards the shelter, the stream makes a bit of a cascade as it trickles over a rock shelf. Looking further west, you find that you have almost reached the ridgecrest; the stream is insignificant because it has only the tiniest of watersheds. Yet once the rock shelf hosted a mighty waterfall and the stream was a raging torrent capable of moving boulders ten feet across. The water was being supplied by a river flowing through the slowly-melting glacier that covered all these HighLands.

Bio. Bill Menke is a professor of earth science at Columbia University, a conservationist and an avid hiker. His geophysical research is focused on earthquakes and volcanic phenomena. Over the years he has conducted fieldwork in Iceland, California, submarine volcanoes beneath the Pacific ocean, offshore Washington State and near Tonga, as well as in New York and New England. He regularly teaches courses at Columbia, including Introductory Earth Science, Solid Earth Dynamics, Environmental Data Analysis and Environmental Hazards and Disasters. Back in 2003, he finished hiking the complete Harriman State Park trail system, and has subsequently introduced many students to the wonders of the Park.