Hunter College
Geology Field Trip

Central Park

Shruti Philips

Field Trip stops in Central Park

Stop #1

Stop #2

Stop #3

Field trip path

Enter CP here on 5th Ave Between 66th and 67th street

N

Enter the Park from 5th Ave between 66th and 67th street

Walk past the Billy Johnson Playground (on your right) and approach a small intersection. You will see a rock exposure ahead of you.

Stop-1
Outcrop A


Foliated
metamorphic Rock

Outcrop A
Foliated metamorphic Rock

STOP-1: Outcrop A

The direction of foliation at stop-1

Click on the video to see the direction of foliation on a compass.

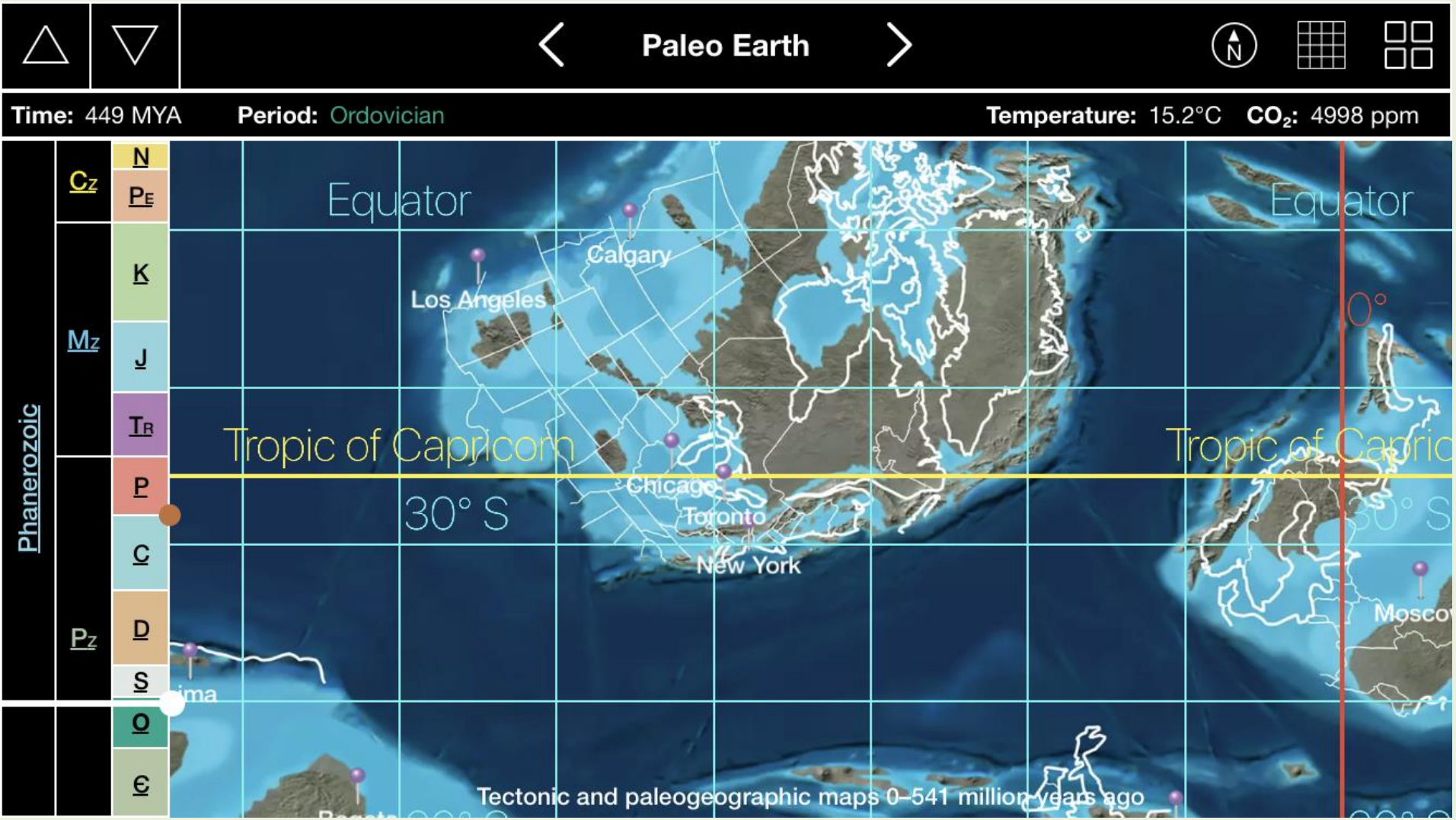
This rock displays layering (foliation) on the **outcrop** scale as well as the **hand specimen** scale

Foliation displays differential weathering

Why do we see these high-grade metamorphic rocks on the surface in Central Park?

A map of the world 449 Million years ago when the rocks in Central Park were forming

Note that New York is ~20 ^{0} S of the equator at that time. It was a shallow seafloor then accumulating sediments.



How the rocks in Central Park formed and metamorphosed during the Paleozoic Era

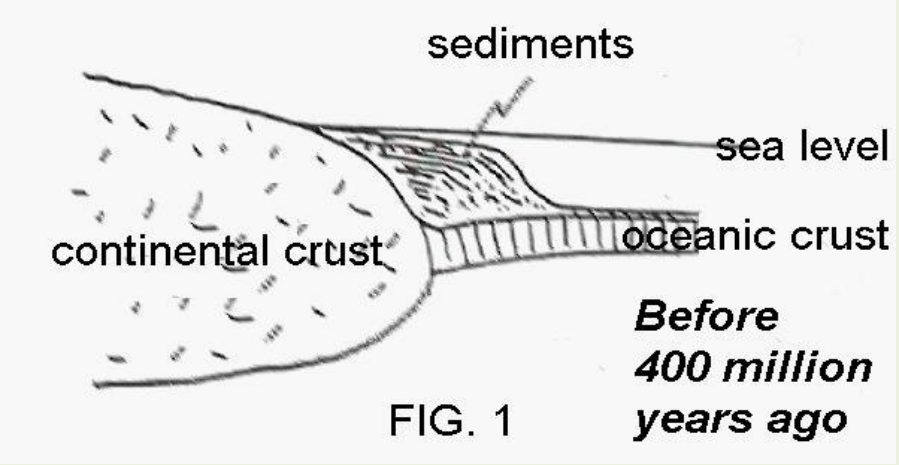


FIG. 1

About 400 million year ago, this region was **shallow sea floor, off the coast of the American Continent**, and was the site of deposition of great thicknesses of sediment derived from the erosion of the nearby land (Fig. 1).

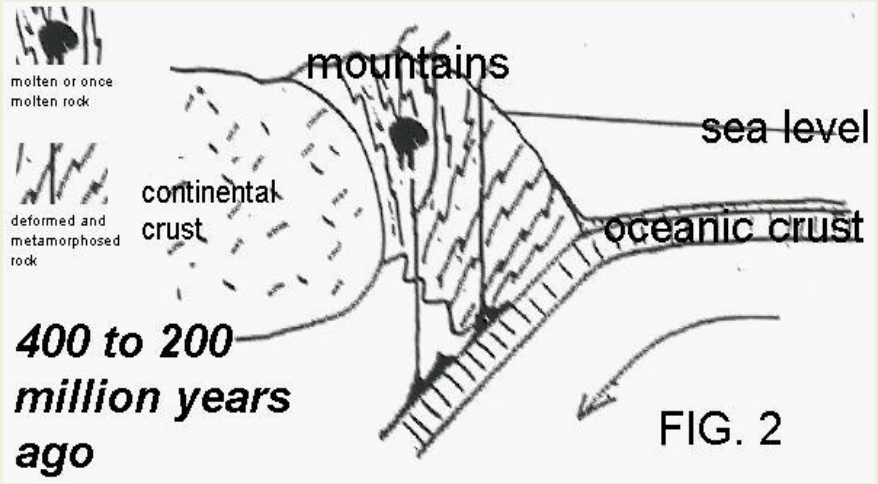


FIG. 2

Fig. 2: A new**, convergent plate boundary** developed here, along which **ocean lithosphere was pushed under continental lithosphere (forming a subduction zone).** As a result, the region became subject to compression, and a mountain range formed. From the subduction zone, **heat, magma and chemically active fluids penetrated the core of the mountain range, deforming and metamorphosing the sedimentary layers.**

About 200 million years ago, the region ceased being a convergent plate boundary, and active mountain building processes came to a halt. Gradually the mountains were eroded away until the rocks which composed their igneous and metamorphic roots were exposed at the surface (Fig. 3). The deformed rocks at which you are now looking are the roots of that ancient mountain range.

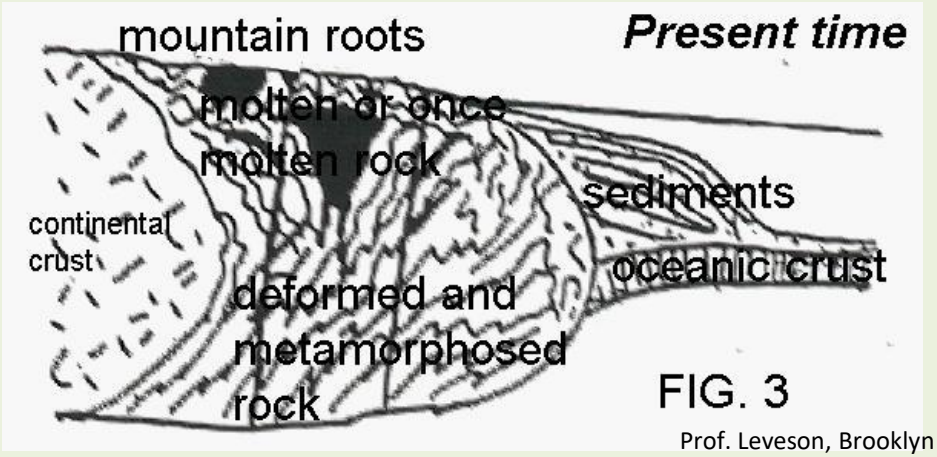
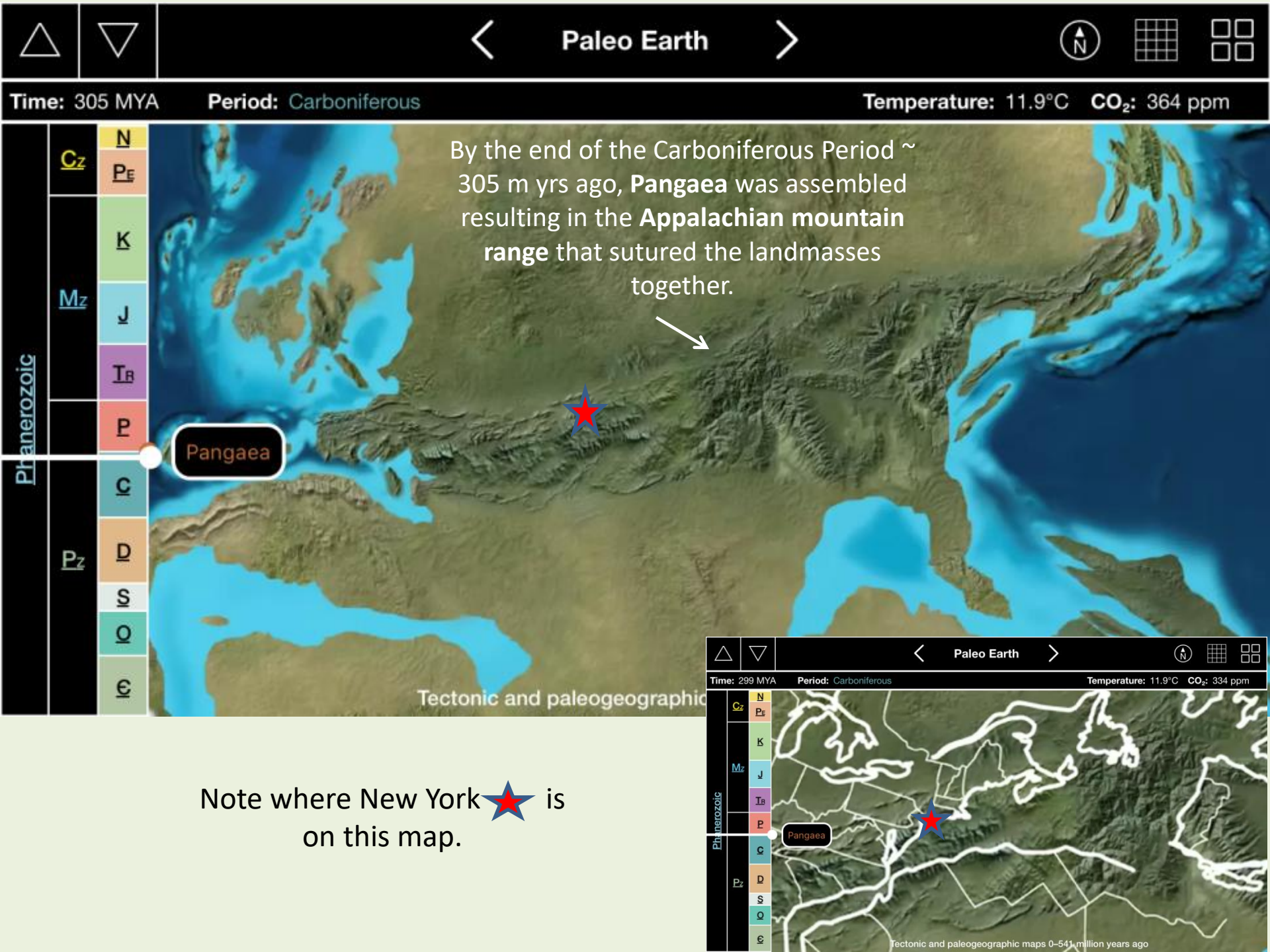


FIG. 3

Prof. Leveson, Brooklyn College.



Note where New York ★ is on this map.

Some veins or intrusions rich in quartz can be seen within the layers

In the roots of the mountain range where these rocks formed, pockets of melt developed which were then squeezed and forced (intruded) into the adjacent solid rock. When the melt cooled, it formed bodies of rock called **"intrusives**". Such intrusives can be seen here.

Layers are deformed

Walk towards the statue of **Balto** the Sled dog to the tunnel

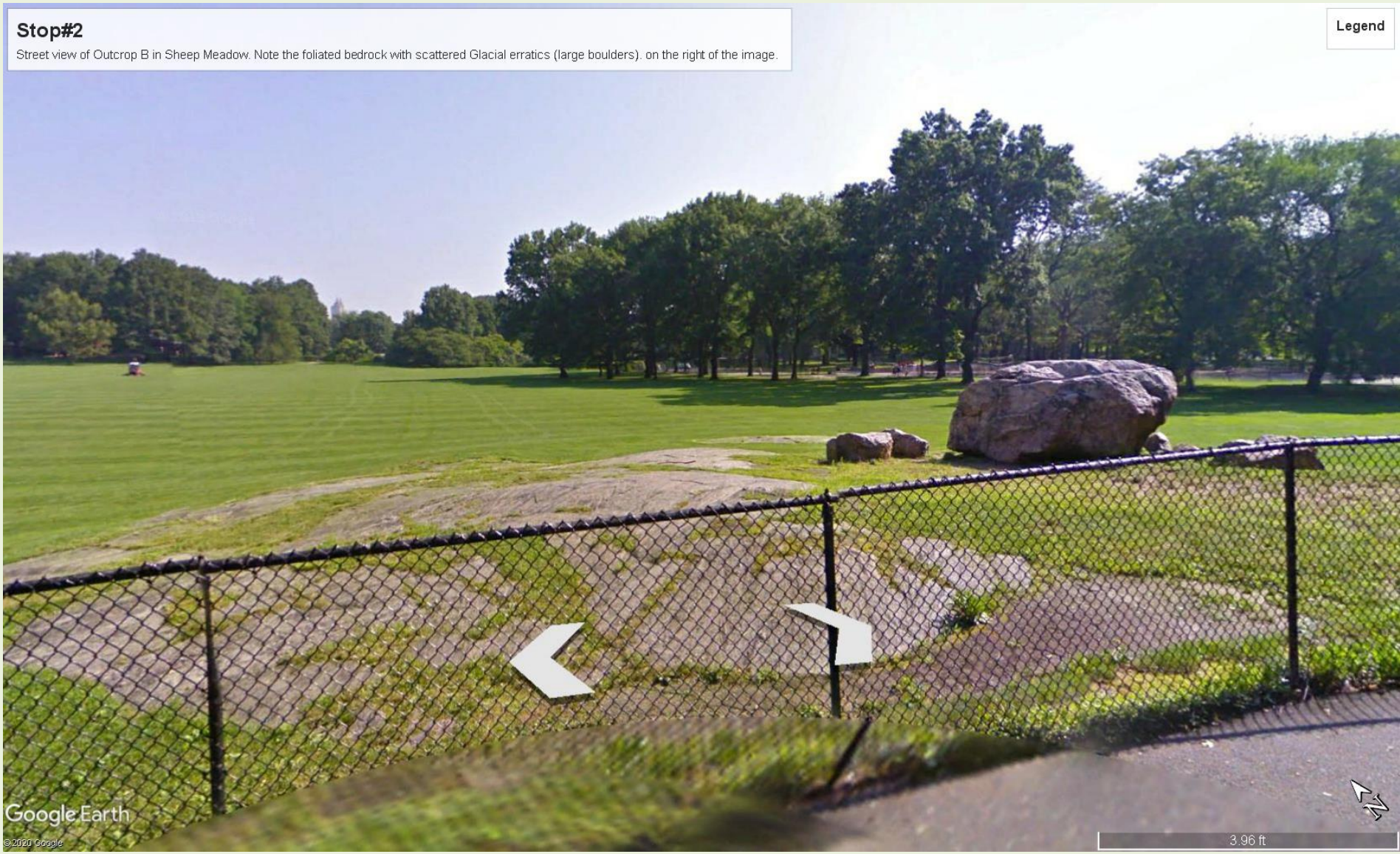
Enter Sheep Meadow to reach Stop-2

STOP#2: Sheep Meadow

Bird's eye view of Outcrop B.

Note the bedrock exposed in the center of the image and the boulders on the East side of the outcrop. Note the crisscrossing lines on the surface. The folded layers of the bedrock are oriented NESW and the glacial grooves are oriented NWSE.

Street view of Outcrop B

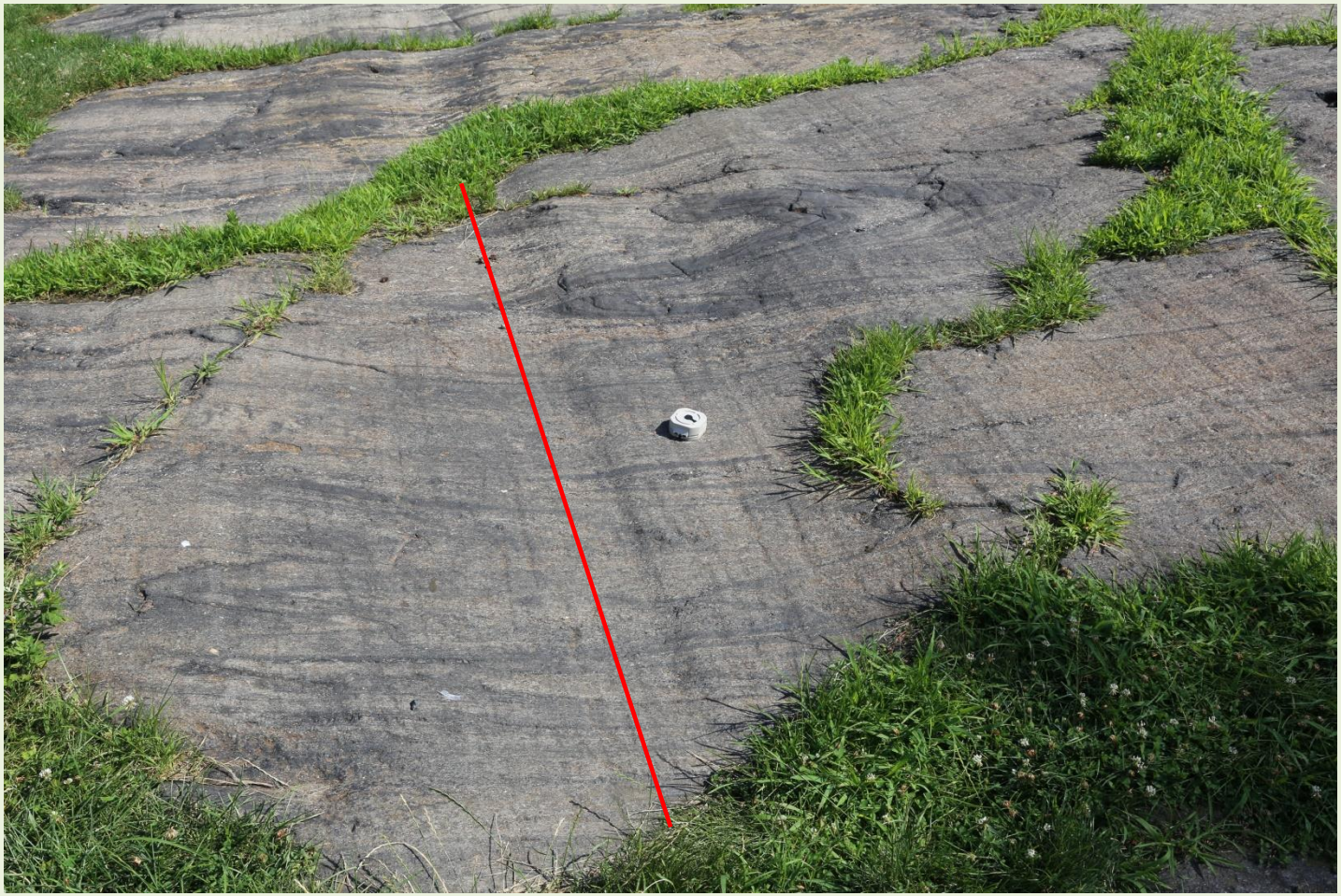


Stop-2: Outcrop B

The red arrows show direction of pressure that produced the folding observed.

Glacial Ridges and Grooves

Glacial striations parallel to the grooves



Glacial striations parallel to the grooves

Foliation in the bedrock is oriented approximately NESW

Glacial Erratics perched on the bedrock of Manhattan

Close up of the Large erratic

Can you identify this mineral?

Name **three minerals** that you can see in this rock?

What rock type are the glacial erratics at this stop made of?

Erratics

Leave Stop #2 and walk toward the **Central Park Carousel**. Turn left at the carousel and **enter the tunnel** to arrive at Stop #3.

Approach Stop#3

Turn left at the carousel and **enter the tunnel** to arrive at Stop #3.

View of Outcrop C from the street.

Note that the scarp on the left side (SE) of the mound of rock and the gently sloping right side (NW). This feature called a **'Roche Moutonnee'** meaning 'sheep back' is produced by the glacial ice moving over the rock and plucking the front of the mound and carrying it away as an **erratic.**

Stop-3: Outcrop C

Observe the shape of the Roche Moutonnee

Stop#3

Observe that the surface of this outcrop is shaped into waves. The axis of each wave or ‘groove’ is oriented NWSE.

Glacial grooves on Roche Moutonnee indicate direction of Glacial movement

Can you say in what direction the Glacier was moving?

The End