Your Guide to the Geology of York County, Pennsylvania

For Harrisburg Area Community College
Continuing Education

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SCHEDULE

Stop 1. 9:15 – 9:50	Hyde – Heritage Rail Trail County Park – Harpers Formation metamorphic rocks
Stop 2. 10:10 – 10:45	Stoney Brook Diabase Dike into the Conestgoa Formation Limestone
Stop 3. 11:00 – 11:30	Accomac Catoctin Formation metabasalts
Stop 4. 11:45 – 12:45	Rocky Ridge County Park Scenic Overlook and Chickies Formation – Hellam Member Conglomerate and Lunch
Stop 5. 1:10 – 1:40	Sheep Bridge Road Gettysburg Formation sedimentary Rocks
Stop 6. 2:00 – 2:40	Pinchot State Park Toboggan Run Diabase exposure
Stop 7. 2:50 – 3:30	Rossville Diabase and Hornfels roadcuts

ABOUT YOUR HOST

Jeri Jones holds a degree in Geoarchaeology from Catawba College in Salisbury, N.C. He returned back home to York, PA after graduation and became employed by the York County Parks where he is currently the Program Coordinator. Within the Parks, he does educational geological and archaeological programs for all ages.

Jeri has been studying the area's geology for 28 years. In 1998, he formed Jones Geological Services where he provides educational programs and field trips for colleges, civic organizations, scout groups and secondary schools. He also teaches Continuing Education courses for Harrisburg Area Community College. Although he loves to study the geologic history, mining history and dinosaurs fossils of the region, he loves to pass his knowledge on to others. Everyone one of us is affected by geology, either by the location of our homes, our water supply or all of the products we use in everyday life. Jeri has authored or co-authored four books, numerous articles and hosted a 3-part video series known as TimeWalk. He received the Digman Award in Geology by the National Association of Geoscience Teachers, Eastern Chapter in 2006. He has found a way to combine one of its favorite hobbies with his profession as he analyses and recommends clay to be used on area dirt tracks. He and his wife, Lou Ann reside in the Spring Grove, York County area.

STOP 1. Hyde Heritage Rail Trail County Park Exposure
Harpers Formation phyllite and quartzite

1. Harpers Formation derived from Harpers Ferry, WV
2. Southern 33% of York County is composed of metamorphic rocks
3. This ridge (Country Club Ridge) is just south of the dividing line between the Piedmont Lowlands Section (PLS) and the Piedmont Uplands Section (PUS).
4. Walk a portion of the exposure and notice what appears to be layering. Actually this rock has undergone heat and pressure where bedding has become obscure.
5. What you believe is layering is known as foliation – a feature only found in metamorphic rocks where platy minerals in the rock align themselves to produce a flat plane.
6. Notice any folding in the exposure?
7. We are situated very close to a north-south fault. Although most of the rocks in the PUS are folded, these rocks have been more tightly folded with the influence of the fault.
8. Find isolated beds of quartzite. Quartztite is thicker "bedded" than the phyllite and more resistant to erosion.
9. There are small quartz veins also found here.
10. Notice how some of the tree roots anchor themselves into the bedrock and are accelerators in weathering of the rock.

STOP 2. Stoney Brook Diabase Dike
Diabase and Conestoga Formation limestone

1. Diabase is an intrusive igneous rock giving the rock a coarse-grained appearance.
2. All diabase in Pennsylvania is Jurassic in age.
3. A dike is a narrow intrusion of magma in this case only measuring about 20 feet wide, but is about 35 miles in length
4. This magma was believed to be about 1100º C. and baked the surrounding rock into a metamorphic rock named as a hornfels.
5. Larger intrusions have formed mineral resources in southeastern Pennsylvania such as the Cornwall Iron Mines, Lebanon County and Dillsburg magnetite deposit, York County.
6. The magma intruded the Conestoga Formation composed of limestone.
7. Ripple marks have been found in this thinly-bedded limestone.
8. What is the direction and angle of dip of the limestone?
9. The Conestoga Formation is one of several limestone/dolomite units in the York Valley, all forming on a continental shelf off the coast of ancient North America known as Laurentia.
10. This limestone is now considered Cambro-Ordovician in age.

STOP 3. Accomac Metabasalt
Catoctin Formation

1. Formed as a result of rifting of the supercontinent Rodinia about 620 mya.
2. Basalt forms on an oceanic crust (i.e. mid-oceanic ridge)
3. Look for quartz pods (filled-in gas bubbles) sometimes showing a trace of copper
4. Grass-green mineral is epidote and darker green mineral is chlorite
5. Notice crystal size – extrusive meaning it cooled quickly and is fine-grained
6. Fractures in the rock are known as joints (fractures where no movement has taken place) Geologists can take measurements of joints and calculate direction of pressures
7. Notice one area where bedrock is missing with a small drainage ditch – a possible fault?
8. Across the road notice the erosion taking place as the stream crosses over the bedrock
9. The rock has gone at least one period of heat and pressure – metamorphism (meta)
10. Potholes are well developed in the metabasalt

STOP 4. Rocky Ridge County Park
Chickies Formation – Hellam Member

1. Rock containing rounded pebbles is known as a conglomerate
2. Rock fragments of mostly quartz with occasionally darker fragment of metarhyolite
3. Can you detect any bedding?
4. Notice how the fragments are more resistant to erosion – standing higher than rock
5. Any theories on how this rock formed (include a continental shelf, Iapetus Ocean and other bodies of water in your thinking)
6. York, Lancaster, Lebanon and Berks counties can be seen from the overlook
7. Can you recognize any familiar landmarks?
8. Harder rocks underlie ridges and softer rocks underlie the valleys, i.e. sandstone and quartzite ridges; limestone and shales in the valleys)
9. We are at an elevation of about 940 feet above sea level
10. We can see a distance of 52 miles to the northeast on a clear day

STOP 5. Sheep Bridge Road
Gettysburg Formation shale and sandstone

1. Sandstone has thick bedding and shale has thin bedding. Grain size also varies.
2. Which of the two rocks is more resistant to erosion?
3. These rocks were laid down in an “Everglades” environment as Pangaea was rifting apart
4. Fossils in the area include petrified wood, ferns, dinosaur footprints and reptilian remains
5. The thickness of the New Oxford and Gettysburg formations are at least 25,000 feet thick
6. Can you detect the angle of dip and direction?
7. These rocks are undeformed and positioned nearly the same as when they were deposited

8. The red color of the rock was created when the sediment was above water level and exposed to the atmosphere
9. Clam shrimp found in this formation in Dauphin County indicates fresh water environment
10. Which layer in this road cut is the oldest?

STOP 6. Pinchot State Park Toboggan Run Area
Diabase Exposure

1. This is one of the best exposures of diabase in York County
2. Compare this diabase with that seen at Stoney Brook
3. This diabase formed in a sill (a lenticular body of magma) formed at least one mile beneath the surface
4. In a sill, the magma closest to the outside will cool quicker than the middle
5. This event was the last stage of the rifting of Pangaea
6. Igneous rocks weather in a characteristic rounded shape boulders (spheroidal weathering)
7. Notice the cracks on the rocks – these are believed to be cooling cracks as the magma cooled now magnified by weathering
8. One could have fun here recreating how the boulders were all connected at one time
9. The rock develops a reddish-brown weathering rind
10. How do you think this rock would be for having a good groundwater supply?

STOP 7. Rossville Road Cut
Diabase and Gettysburg Formation hornfels

1. Check the diabase at the lower road cut for grain size – positioned in the middle or on the edge of the sill?
2. White veins in the diabase of composed of a mineral group known as zeolites. Heulandite and stilbite are present here in crystals
3. In the upper road cut, this rock was originally rocks similar to what we saw at Sheep Rock Road but these have been heated by the magma now known as hornfels
4. Can you detect the direction of the bedding?
5. A chemical reaction here formed a small amount of native copper to form in the rock
6. Upon weathering of the rock, native copper will adjust to the new conditions forming azurite (blue and malachite (green)
7. This rock has no economic value and only occurs on the joint surfaces
8. Other minerals formed in this method include garnets and opal
9. Gold is found in area streams, mostly washing out of the diabase
10. Collect your pieces of samples for the coffee table!