Quarry Stomping Guide through the Great Valley and South Mountain Region Franklin County, Pennsylvania

A Look at Current and Past Mineral Resources

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INTRODUCTION

Welcome to this year's Spring trip. I thought for a change we would do some collecting of specimens that the majority of people would term "cool." I never met anyone who wasn't fascinated with collecting minerals and fossils (rockhounds). Our first three stops will examine present and past mineral resources in the area. Our first stop at Valley Quarries – New Franklin plant will also provide you a chance to collect minerals (mostly calcite) to take home. When you are visiting an active quarry, you never know what may or may not be found, since rock is being removed all of the time. Stops 2 and 4 are located on Michaux State forest lands, so collecting specimens will not be permitted. However, I will provide examples of the iron ore and rhyolite to all participants found elsewhere. Stop 3 at the Valley Quarries Mt. Cydonia Sand Plant #2 will provide you with a great view of sandstone and a unique fossil worm tube known as *Scolithus linearis*.

We will be visiting two distinct areas on our field trip. Our first stop will be in the Great Valley, a part of a physiographic province known as the Ridge and Valley. Low topographic relief underlain with limestone, dolomite and shale characterizes the bedrock. These rocks are generally considered Ordovician in age. It is believed that these rocks were formed on a continental shelf off of an ancient continent known as Rodinia (ancient North America).

The rest of our day will be within the South Mountain Section of the Valley and Ridge. As we drive north from Waynesboro and go from Stop #1 to Stop #2, South Mountain will be noticeable to our east. Take note on the rapid increase in topographical relief – the mountain just seems to raise right out of the ground. Driving from Stop #2 to Stop #3 we will climb over 200 feet in elevation. As we drive the Michaux State Forest roads to Stop #4, we will be at an elevation of 1622 feet; nearly 850 feet above the New Franklin plant of Valley Quarries.

The rocks within South Mountain are older than those in the Great Valley. Volcanic rocks have been dated to at least 600 million years old, overlain with sedimentary and metamorphic rocks belonging to the Cambrian Period. If these rocks could talk, they would tell a story about the breakup of Rodinia ands the building of the early continental shelf.

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.

Road Log and Stop Descriptions

Mileage	Total	
0.0		Turn left onto Rte. 16 West
1.7	1.7	Turn right onto Rte. 316 West (North Grant Street) – Follow Rte. 316
11.67	13.37	Traffic light in New Franklin. Turn left onto New Franklin Road
0.9	14.27	Turn right onto Stone Quarry Road
0.5	14.77	Turn left into gate at scale house

STOP 1. VALLEY QUARRIES – NEW FRANKLIN PLANT (9:30 – 10:45)
Formation(s) Involved: Stonehenge and Rockdale Run

1. Quarry is about 4000 feet long, 1469 feet wide and 200 feet deep (4 levels or lifts)
2. Rock being mined here is limestone with a small amount of dolomite and shale
3. Approximately 1 million tons of stone is quarried annually.
4. Stone is used for mostly aggregate, concrete and asphalt (plant on site).
5. Two geologic formations exposed here: Stonehenge – gray, crystalline limestone and dark gray laminated limestone about 500 feet thick; Rockdale Run – very light gray, finely laminated, fine-grained limestone with pink to brown lenses of chert with few dolomite beds with a thickness of ~3,000 feet.
6. Both formations are Lower Ordovician in age.
7. Ripple marks have been seen in the Stonehenge formation rocks.
8. As with much of the Great Valley, area has been transported by tectonic movement. Numerous faults are seen in the quarry (cracks or straight walls).
9. The Rockdale Run rocks fold much easier than the more massive bedded Stonehenge limestones.
10. Look for folding and evidence of movement around suspected areas.
11. It is believed we are sitting in a syncline at this location.
12. Many of the cracks in the rocks (fractures) are filled with minerals, generally calcite.
13. Minerals identified here include: calcite, dolomite, fluorite, pyrite, quartz, hematite, goethite, barite and strontianite, none of economic value.
14. Quarries have various state and federal regulations to follow, i.e., a level wall cannot exceed 50-feet in height. Quarry cannot go any deeper unless they widen the entire quarry.
15. Quarries must have a reclamation plan to demonstrate what will happen to the quarry after closing. The life span here is about 25 years.

1.4	16.77	Retrace route to traffic light in New Franklin - Straight ahead on Dufield Road.
3.3	19.47	Duffield. At stop sign, turn right. Second stop sign continue straight on Duffield Road.
2.0	21.47	Intersection with Pa. Rte. 997. Turn left onto Pa. Rte. 997 north.
0.4	21.87	Turn right into Pond Bank Day Use Area.

STOP 2. POND BANK IRON OPERATION (11:00 – 11:45)
Formation(s) Involved: Antietam and Tomstown

1. Within South Mountain, iron ore in the form of goethite (aka limonite) has formed along the contact between the Antietam formation (sandstone and quartzite) and the Tomstown formation (limestone). The ore is formed in the soils overlying this area or found in a fault between the two rock formations.
2. With weathering and erosion, much rock has been transported off of South Mountain making what we call a residual deposit in which the iron was found.
3. Here was an 19th century operation known as Pond Bank. In those days, mines were known as banks.
4. This operation was worked in the mid 1800's for a short period (ore was only 36-53% metallic iron and not usually thick).
5. Bank covers about 2.25 acres with a depth at the north end of 35 feet. A dump of non-useable materials is found to the east of the pond. Little quality goethite is found lying on the dumps.
6. No machinery was available at this time. All of the work was conducted with a pick and shovel.
7. Ore was removed from the pit by horse and cart.
8. A railroad (later known as the Pennsylvania) ran went by the bank for transportation uses.
9. Dynamite was not used commercially until 1890. Black powder was used to blast the rock loose.
10. Small amount of pyrite was found here during mining.
11. In areas of iron mines were furnaces to produce the products. In South Mountain, four furnaces are found; Pine Grove, Maria, Mount Alto and Caledonia.
12. Three elements were needed to operate a furnace: iron ore, limestone (flux), and wood (charcoal).
13. Much wood was used to make the charcoal. Approximately 4 aces of woodlands were needed per week. Charcoal terraces are common throughout South Mountain.
14. Examine the small stream flowing on the north side of the pond. Notice the reddish color caused by iron residual lying on the bottom of the stream. The pH of the water is under a 4.
15. Workers in the banks were paid ~$0.25 - $1.25/week

Exit and turn right onto Pa. Rte. 997 North.

2.3	24.17	Turn left onto U.S. Rte. 30 East
0.1	24.18	Turn left onto Pa. Rte. 997 North
0.4	24.58	Turn left into Valley Quarries – Mt. Cydonia Plant #2 – LUNCH STOP
0.4	24.98	Retrace route back to U.S. Rte. 30 – turn left (east)

0.2	25.18	Turn right onto Mt. Cydonia Road
0.5	25.68	Bear to the right on "Y" intersection
0.3	25.98	Entrance to Mt. Cydonia Sand Plant #1. (Permission must be granted to enter actual workings)

STOP 3. VALLEY QUARRIES – MT. CYDONIA SAND PLANT #1 (12:40 – 1:40)
Formation(s) Involved: Antietam

1. Sandstone exposed here is the Antietam formation of Lower Cambrian age or Late Proterozoic age
2. Thickness is ~800 feet.
3. These two pits combined are ~one mile long.
4. Notice the bedding. In what direction are the rocks tilting into the earth?
5. The strike of the rock is a line perpendicular to the direction of dip.
6. Giant ripple marks were discovered here in 1981. These ripple marks were about one-footin height and three-feet between the ripple peaks (mega ripples).
7. A fossil found here are worm tubes known as *Scolithus linearis.* Although the actual worm has never been seen, their burrows are well preserved. This fossil is known as an index fossil since this species only lived for a short span (several millions of years).
8. This fossil was identified by Charles Darwin after receiving a *Scolithus* specimen from a naturalist in Lancaster County, Pa.
9. Combining #4 and #5 plus what you might know about marine worms today, what do you think this area looked like ~600 million years ago?
10. In which direction is the *Scolithus* running compared to the bedding in the rock?
11. Is this rock (sandstone) harder or softer than limestone from Stop #1?
12. Why would you not find *Scolithus* in the limestones of the Great Valley (Stop #1)?
13. What two agents are working on the rock here to generate the sand?
14. What is the reclamation plan for this quarry after ceasing operation?
15. What are some uses for sand?

1.1	27.08	Retrace route back to U.S. Rte. 30. Turn right onto U.S. Rte 30 East.
1.7	28.78	Turn right at light onto Rocky Mountain Road – Pa. Rte. 233.
1.7	20.48	Turn left onto District Road (dirt road)
1.9	32.38	Spruce Road turns to the right – continue straight
2.1	34.48	Turn right into parking area. Stop 4 is about 0.5 mile back trail across the road.

STOP 4. CARBAUGH RUN PREHISTORIC QUARRY SITE (1:55 – 3:20)
Formation(s) Involved: Catoctin

1. The rock exposed here is metarhyolite. Rhyolite is a volcanic rock but because the rock was introduced to metamorphism, "meta" has been added to the rock's name.

2. Compared to an igneous rock formed underground, what are the differences?
3. Rhyolite is a relative to an igneous rock that forms inside the earth containing primarily quartz and feldspar. What is that rock?
4. Thin wavy lines in the rock represent single lava flows.
5. Rhyolite forms from lava as a result of continental rifting. In this case, this rock formed when the supercontinent Rodinia began to break apart ~ 600-700 million years ago/
6. Prehistoric people recognized that this rock was great for manufacturing stone tools (the first geologists)
7. Research conducted here by the Pennsylvania Historic and Museum Commission concluded that prehistoric people dating back at least 8,000 years quarried the rock here.
8. From here manageable pieces of metarhyolite were transported down the hill to Carbaugh Run where the flintknappers produced the tools.
9. Modern-day flintknappers have learned that a rock kept wet will flintknapp better.
10. Because of the fine-grained makeup of this rock, the metarhyolite works very well.
11. How can you tell a natural flake from a man-made flake? A manmade flake will have a bulb of percussion and usually a platform, whereas a natural flake does not.
12. A flake that has been worked on the edge will look like a serrated knife blade (bifacial) or only worked on one side (look for small flake scars).
13. Artifacts made of metarhyolite have been seen in archaeological sites all over Pennsylvania and parts of surrounding states. What are the possibilities how the material got to those sites?
14. Several other quarry sites are known in this part of South Mountain. The best material for producing tools is only found on top of this ridge.
15. Remember no collecting of material here – you may have a Ranger waiting for you.

3.8	38.28	Retrace route to Pa. Rte. 233. Turn left (south) onto Pa. Rte. 233.
7.01	45.29	Mount Alto – Turn left onto Pa. Rte. 997 South
6.74	52.03	Waynesboro – Intersection with Pa. Rte. 16. The End

FOR FURTHER READIING

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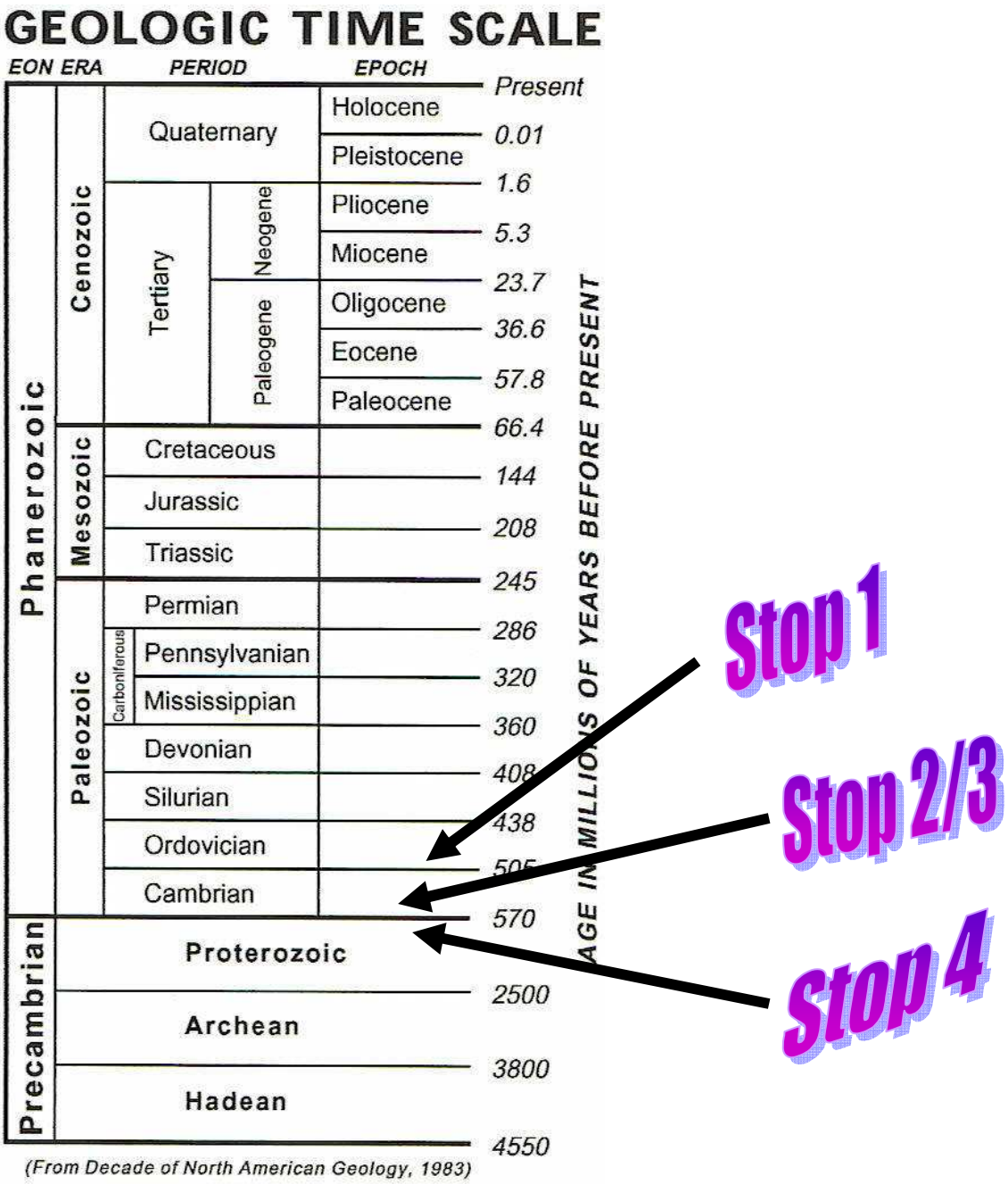

(From Decade of North American Geology, 1983)