

## WVMN Class Description

<b>Title:</b>	<b>Geology</b>
<b>Objectives:</b>	Introduce the student to rocks, minerals, and fossils, especially those most likely to be encountered in West Virginia, and their interpretation in the light of geological history
<b>Class type:</b>	Core curriculum
<b>Time:</b>	3 hours
<b>Optimal season:</b>	Spring, summer, fall
<b>Materials:</b>	Rock and mineral samples, dilute hydrochloric (muriatic) acid, hand lens.
<b>Expected outcomes:</b>	The student will gain a basic understanding of <ol style="list-style-type: none"><li>1. the geological history of West Virginia</li><li>2. the three major rock types and some common minerals.</li><li>3. using clues such as particle size, shape, and color and fossils to determine the environment in which sedimentary rocks were deposited.</li><li>4. how specific rock layers are named.</li><li>5. how erosion occurs and how it shapes landscapes.</li><li>6. some common West Virginia fossils and how they were formed.</li></ol>

### WVMN Class Outline

1. Observations of deposits in today's environments is the key to deciphering the state's ancient geologic history
2. Effect of plate tectonics on West Virginia (use West Virginia shaded relief map)
  - a. North America part of Pangaea, with West Virginia near equator for millions of years
  - b. Collision of North America and Africa caused folding of rock layers
    - Anticlines
    - Synclines
    - Joints and faults
  - c. Stream erosion created the Mountain State
    - Erosion of flat-lying rock layers
    - Erosion of folds
3. Minerals make up rocks (use mineral samples)
  - a. Two common minerals compared
    - Calcite: rhombohedral crystal, hardness 3, fizzes with weak hydrochloric acid, in limestone
    - Quartz: hexagonal crystal, hardness 7, does not react with hydrochloric acid, in sandstone, shale and conglomerates
4. Sedimentary rocks
  - a. 99% of WV rocks are sedimentary
  - b. Sediment (particles) are compressed or naturally cemented together
  - c. Mostly deposited by water in layers, oldest on bottom
  - d. Rocks are named for their particle size and shape
    - Shale: mud-sized
    - Sandstone: sand-sized
    - Conglomerate: mix of mud- to gravel-sized, gravel particles rounded in shape
    - Limestone: calcite precipitated in seas or lakes, or animal or plant parts
    - Coal: from compressed plant materials
5. Clues to environment of deposition (where sediments were originally deposited)
  - a. Particle size indicates speed of water
    - Shale: quiet water where tiny particles can settle out

- Sandstone: moderately fast-moving water
    - Conglomerate: very fast-moving water
  - b. Particle shape
    - Rounded: corners knocked off by abrasion in moving water
    - Angular: gravity (landslide) deposit without water flow
  - c. Color
    - Red, pink, brown, tan: rusted (oxidized) iron
    - Green: iron not exposed to air
    - Purple: manganese exposed to air
    - Black: carbon-rich (organic)
  - d. Limestone: lake or ocean, thick limestones are tropical ocean reef deposits
  - e. Coal: tropical swamp with rapid plant growth, no tree rings
  - f. Fossils: most definitive clue, evidence of plants or animals, each of which lived in a specific environment
    - Shells
    - Bones
    - Plants
    - Trace fossils (traces of an organism's activity: burrows, trails, tracks, borings)
- 6. Interpreting ancient environments
  - a. 300-million-year-old landscape (birds-eye view)
  - b. From the Piedmont to the deep ocean (horizontal view) Sea level rise or fall
- 7. Erosion
  - a. Resistance to erosion
    - Cement: silica is strongest, iron oxide next, calcite weakest (soluble)
    - Thickness of layers (beds): thicker layers harder to erode
    - Rock type
      - Sandstone and conglomerate resist erosion, form cliffs
      - Shale easily eroded, makes slopes and valleys
      - Limestone slowly dissolves in naturally acidic rainwater, makes valleys
- 8. Naming rock layers (named after the place where they were first studied)
  - a. Period: geologic period, see geologic column and time chart
  - b. Series: 2 or more Groups
  - c. Group: 2 or more Formations
  - d. Formation: can include more than one rock type, has distinctive easily identifiable features like color or fossils, thick enough to be mapped on 7.5 minute topographic map