

Historical Geology – Project

Paleogeographic reconstruction of a Paleozoic outcrop in western Pennsylvania

During project week you should study a regional rock outcrop in groups of 2-4 students and reconstruct the depositional environment based on the sedimentary units and fossil content. Please schedule a time with your instructor or teaching assistant to get a short introduction to your outcrop.

1. Part one is the most important part! Spend at least half a day at the outcrop and describe the sedimentary rocks and their fossil content.

A) Draw a sketch of the outcrop and mark the individual sedimentary units. You can find an example of an outcrop sketch at the end of the handout. The outcrop sketch must include:

- scale
- direction (e.g. East – West)
- clear distinction between sedimentary units
- major sedimentary features. Use easily recognizable symbols. Some examples are given at the end of the handout but you can use your own symbols.
- Fossils. For suggestion of symbols see end of handout.
- Legend!

B) Next, describe the sedimentary units that you distinguished above! A possible description might read like this:

0-0,50 m: Unit 1 is composed of dark grey mudrock interbedded with up to 10 cm thick sandstone layers. Ripple lamination is visible at top of sand layers. The base is covered with talus.

0.50 – 3,00m: Unit 2 is composed of conglomeratic sandstone. Individual beds are 20-30 cm thick and contain crossbeds that dip towards the East. The base is erosive.

C) Describe fossil content. This might read like this: Trace fossils are common in unit 1 and rare in Unit 2. Some imprints of brachiopods in finer grained portion of unit 1 can be found. Unit 2 occasionally shows plant fossils.

2. Write a report. The report should be structured as follows:

A) Introduction

- Location of outcrop (map might be useful)
- Brief overview of regional geography/ geology (e.g. Laurel highlands, Laurel hill anticline, major bed rock geology)
- Stratigraphic position of your outcrop (geologic period, group or formation)

B) Outcrop sketch and description of sediments and fossil content (see point 1).

C) General paleogeography. Give a brief overview of the paleogeography during deposition of the rocks exposed in your outcrop. Include in your description: geography, mountain building phases, position of North America, climate. For instance: During the Mississippian large parts of the North American continent were covered with a shallow epeiric sea. Southwestern PA was located.....

If you want, you can include a paleogeographic map (see www.scotese.com or your book)

D) Paleoenvironmental interpretation of your outcrop (include schematic sketch of plaeoenvironment). Based on the general paleogeography and the sedimentary structures and fossils in your outcrop interpret the paleoenvironment of your outcrop. Use the facies interpretation handout and fossil handout from pervious labs. Mention e.g.: water depth, distance to shoreline, marine, terrestrial (e.g. plant fossils might indicate that you are relatively close to the shoreline or even on land, brachiopods indicate a marine environment, wave ripples indicate a shallow marine environment....)

E) Name a modern locality where you could find similar deposits today (e.g. if you find oolites you could mention the Great Bahamas Bank). Explain your choice briefly.

Figures in your report (must be referenced in text):

Fig. 1. location of outcrop (use toposheets or geologic maps, the geologic map of the Johnstown quadrangle can be found at:

<http://www.dcnr.state.pa.us/topogeo/map61/johnstown.pdf>)

Fig. 2. Outcrop sketch

Fig. 3. General paleogeography

Fig 4. Sketch of paleoenvironment (see example at the end of handout)

In addition you can add photos or sketches of the outcrop, fossils, sedimentary structures....

In the following labs we will visit the outcrops and each group of students will present the outcrop to the other students.