Introduction

Knowing how to read, use, and work with geologic maps is one way to help reconstruct the earth's history. In this lab we will learn about geologic maps and stratigraphic columns.

Geologic maps show the distribution of rock types which are exposed at the surface of the earth. Each geological formation is represented by a distinctive color or pattern. The amount of information on a geologic map can sometimes be overwhelming, so take some time to familiarize yourself with all the data being displayed.

Geologic maps always contain a legend which gives the name and symbol for each formation, as well as, the age of each formation and its rock type.

The legend is arranged with the youngest formations listed at the top and the oldest at the bottom and contains only those formations that show up on that particular geologic map. A map's legend is a valuable resource when reading a map.

Symbols for the formations generally consist of two or three letters: the first is capitalized, and us usually the age symbol, and the others are initials for the formation (or if the map is covering a larger area- the "group") name. For example, a Silurian age bed called the "Trojan Horse Formation" may have the symbol "Sth".

Geologic maps also have symbols (p. 17) indicating the strike and dip of tilted beds, anticlines, synclines, basins, domes, faults, and other structures of geologic interest. Depending upon who has made the geologic map, the symbols may look slightly different. Also, because different parts of the country may contain different geologic features (this about how different the topography is in different parts of the United States), maps may contain a different assortment of geologic symbols.

Always look over the legend! It will often define unknown symbols and help you determine what you are looking at!
Map Symbols and Cross-Sections

We will construct cross-sections from real geologic maps in much the same way we interpreted the cross-sections on the block diagrams from laboratory two.

From these cross-sections we can give a sequence of events and answer some questions related to the geology of the area, such as the relative dating of events (Lab 3).

**Drawing cross-sections from a geologic map**

1. Fold a piece of paper in half-lengthwise. One side of the paper will be for your cross-section with the fold in the paper as your land surface and the other side of the fold will be used for a legend containing stratigraphic column, scale, and title.
2. Lay the folded paper on the map and make a small mark at each endpoint. Make sure you are using the folded side of the paper (we label the endpoints the same letter - A & A').
3. Draw a rectangle showing where your interpreted area will be. The top should be along the fold. This rectangle provides a defined area to interpret the subsurface.
4. Make a small, light mark at each contact and label with formation symbols between the contacts.
5. Label any large obvious surface features (town, river, fault, etc.) above the top line (the fold in the paper).
6. Treat water and alluvium as "transparent". Water and alluvium (modern sediment) are topographic features and do not extend into the subsurface. Be sure to show which beds are beneath any water or alluvium.
7. Interpret and complete your cross-section by extending your contact boundaries in the direction of dip. **Remember: older dips TOWARDS younger.** *(See illus. below)*
Notice the Formations Mp and Dd do not cross the line from A to A' and therefore are not included in the interpreted cross-section.

Once the cross-section is drawn, we can also make a stratigraphic column for the area. A stratigraphic column is a diagram that shows the sequence of formations from a map or locality with the oldest rocks at the bottom and youngest at the top. Ours will only contain formations that exist in the cross-section.

The column is a stack of blocks, each block representing a formation, with unconformities depicted as wavy lines. Stratigraphic columns should include: formation symbols, formation names, lithologic symbols, unconformities, and the name of the area.
Read directions thoroughly. Answer all questions and turn in these pages (19 & 20) along with your cross-sections and stratigraphic columns.

Geologic Map #8  The map areas are located within the drainage basin of the Susquehanna River in Pennsylvania. This area lies within the Appalachian Mountains, in a topographic province known as the Valley and Ridge. As you can see it is characterized by a series of long, parallel ridges separated by long, narrow valleys. A wide range of rock types are present in the map area. The hardness and resistance to weathering of the different formations determines local relief. Valleys are underlain by relatively soft rock - limestone and shale. Areas of intermediate elevation are underlain by tougher rocks - siltstone, shale, and sandstone. The highest areas are composed of extremely hard sandstones and conglomerates.

1. Complete cross-section C - C'. What kind of structure is this?

2. Complete cross-section A - A'. What kind of structure is this?

3. If the contour interval is 20 feet, what is the highest point on Knob Mountain? Knob Mountain is composed of what type of rock?

4. Give a possible explanation for the long, almost uninterrupted, constant elevation of Knob Mountain. Would your answer apply to other Appalachian mountains in the Valley and Ridge province? Explain why or why not.

5. The map patterns indicate a structure consisting of broad open folds. List some observations that support this claim. Are the folds symmetrical or asymmetrical? Why or why not?

7. Are stream locations affected by bedrock geology? Explain citing specific examples.