Purpose: In this lab you will learn (i) how to identify fossils in rocks, (ii) how to describe sedimentary rocks, and (iii) about lateral and vertical relationships seen within different units or beds of rock.

Requirements: You must draw two stratigraphic columns neatly and answer the questions at the end of this lab. This lab will be due at the beginning of lab next week.

Environmental Interpretations:

Paleontologists use many "lines" of evidence to interpret the environment in which the sedimentary units were deposited in. First, the types of fossils and the abundance of those fossils can give some idea of the environment in which they formed. Most of the time paleontologists compare past fossil assemblages against modern communities. At times, it's difficult to make environmental interpretations on fossils alone. Paleontologists will also use the types of sedimentary rocks to help them make an interpretation. If you have sedimentary rocks in high energy environments (within the wave base), then large sized particles will dominate the sediments. If you are in low energy environments, then smaller sized particles will dominate the sediments. This can occur when you are in deep water where the sediments are below the influence of waves. BUT, this can also happen in situations where the sediments are in areas protected from crashing waves - behind a reef or barrier island. In this lab, we will gather some data about the rocks and the fossils and try to make an interpretation. The TA will aid in the interpretation by trying to point out some characteristics of these units that are consistent with one (or two) environmental interpretation(s).

Drawing Stratigraphic Columns:

In this lab, you are required to draw two stratigraphic columns from the Hydraulics Annex Quarry Area. Since there are various backgrounds in this class, the TA will a) show you what the fossils look like in the rocks and give you their names and b) give you guidance on how to describe the rocks. The stratigraphic columns you create should use the symbols that are given in Figure 1. An example of stratigraphic columns are provided in Figure 2. A composite section for rock in the Iowa City area is given in Figure 3. Use the separate pages to take rough notes and sketches, but the final stratigraphic columns should be drawn neatly (i.e. Use a ruler!).

Fossils: You are expected to identify as many of the fossils in the units as possible. There are very few fossils here (perhaps 6 "species"), so this should not be a difficult task. There are variations in the amount of fossils between units and within units. This variation can be vertical
as well as lateral (side to side). By drawing two stratigraphic columns you should be able to capture this variation.

**Sedimentary Rocks**: Basically, there are two types of carbonate rocks that you will need to identify. One type which is composed of coarse-grained particles is called **calcarenite** and should be rough to the touch. The other type of carbonate rock, **calcilutite** (or lime mudstone), has smaller sized particles and should be smooth to the touch. A group of rock layers or "**beds**" that have similar characteristics are called **units**. These units and beds (like the fossils) vary vertically as well as laterally and hopefully you will be able to capture this variation.

**Expectations**: You are expected to be able to use your observations skills to come up with "down to earth" descriptions of the rocks and fossils.

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Figure 1: Lithologic symbols commonly used in stratigraphic columns (Witzke et al., 1988, p.225)
Figure 2: Example of stratigraphic column constructed for rocks exposed near Winterset, Iowa, showing interpreted changes in depositional environments (Heckel, 1987, p.122).
Figure 3. Composite section of the Devonian strata of the Coralville Lake area. See inside back cover for Key to symbols.

(Witzke and Bunker, 1994)
In the stratigraphic columns you should:

- use symbols to note the fossils that you saw in the beds,
- give good estimates of the thickness of the units,
- draw good estimates of the thickness of the beds (note: you don't have to draw individual beds, but should indicate relative changes in the thickness in the beds),
- label units (such as unit 1, unit 2, etc.),
- and draw major irregularities in the contacts between units or beds.

Along side the stratigraphic columns that you draw you should describe any variations in the fossils and rocks that you see. For the fossils this might include:

- relative abundance of the taxa (terms such as high, low, or scattered),
- how well the fossils are preserved,
- and are they sitting right side up ("life position") or have they been turned over.

For the rocks this should include any minor irregularities in the rocks such as:

- sediment filling cracks in the original rock,
- changes in the thickness of the beds that are difficult to draw,
- and changes in the "character" of the rock that you can see (e.g. color, linear features, cracks, type of carbonate rock, etc.).

Overall, your stratigraphic columns will be graded on relative completeness and neatness. **You are not expected to be experts!**

**Lab Questions**

Please do the following exercise and write (or type) answers on a separate sheet of paper. **Note all the questions need to be answered here.**

1. How did the fossils vary laterally and vertically within each unit? How did the fossils differ between your units? Which fossil taxa were most abundant and which units did they occur in?
2. How did the beds vary laterally and vertically within each unit? How did the beds differ between your units?
3. What types of physical mechanisms could cause fossils to become turned upside down?
4. Write a paragraph to answer the following question: What kind of modern environments do you think are represented by these units and why? This is an open-ended question, but the TA will give you hints to the answer to this question. Focus on changes in depth, salinity, and temperature and use information about the types of fossils, the abundances of those fossils, and the types of carbonate rocks.