

# The Evolution of Barbellus

- from "Biology." Laboratory Manual. MacMillan.

To observe changes in organisms that take place only over long periods of time, scientists often use fossils. "Family trees" may then be constructed to illustrate the relationships of these organisms. Besides the physical appearance of the fossils, the scientist may also be able to draw upon other information. Some fossils, for example, may be laid down in rock layers, or strata, above or below other strata. This provides a clue as to the relative ages of the organisms being studied. In this investigation, assume that all of the fossils of the imaginary genus, *Barbellus*, came from rock layers exposed along a stream bank, as shown in Figure 1. Sometimes, the fossil record may seem to be incomplete. That is, proposed transition forms between existing fossils are not found. This does not mean, however, that they did not exist. Their existence can be presumed in much the same way that you interpolate when using graphed data.

## Purpose:

To demonstrate one technique for hypothesizing about the evolutionary relationships among fossil organisms.

## Materials:

Scissors      tape or glue    paper    pencil

## Procedure:

1. Cut out the pictures in Figure 2, making sure to include each creature's name.
2. Arrange the cut-outs on a piece of paper to show the sequence of changes that you think might have taken place in the genus *Barbellus*. Refer to Figure 1 to decide on the relative ages of the species. Remember, as you arrange your "tree", that there can be branches.
3. When you are satisfied with your arrangement, fasten each "fossil" to the page with tape/glue, and draw the connection "branches" of the evolutionary tree with arrows.

Figure 1: rock layers containing fossils of *Barbellus*.

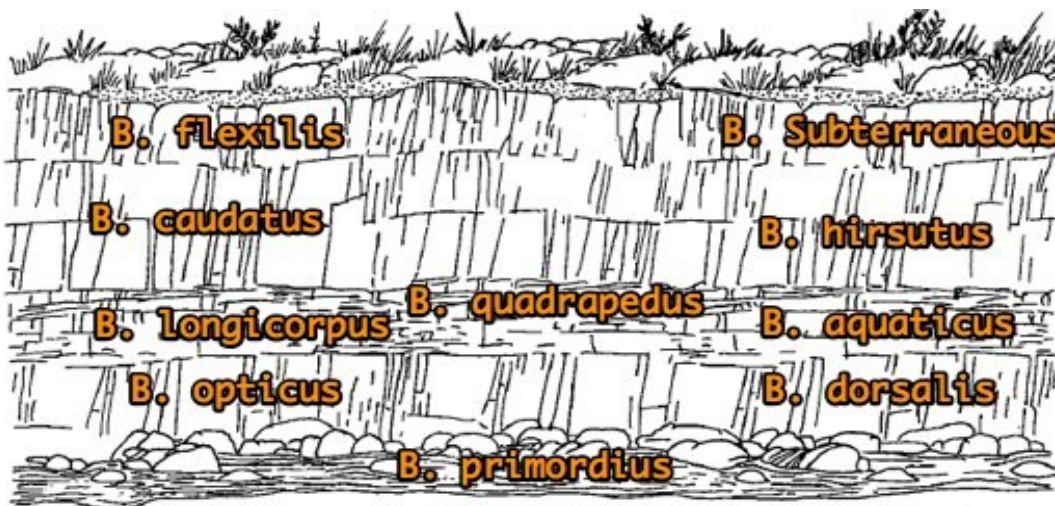


Fig.1. Rock layers containing fossils of *Barbellus*.

## Discussion Questions:

1. Relative Age of Fossils.
  - a. Which fossils are the oldest?
  - b. Which fossils are the youngest?
  - c. Outline the evidence that you used to to answer (a) and (b).
2. Describe the selection pressures (causes) that lead to the evolution of the 2 main lines of Barbellus (land vs. water).
3. Describe any “missing links” that could be included in your family tree. (What might they have looked like?)
4. Describe the relationship between the age of the fossils and their complexity. Are the older ones more complicated looking?
5. Are there any examples where a more evolved fossil appears to have a **simpler** body than its ancestor? How can you explain this? Can you think of any real life examples?

Figure 2: Species of Barbellus (there are 10!)



Barbellus quadrupes



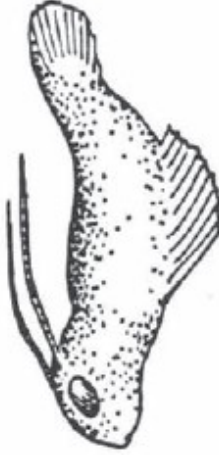
Barbellus opticus



Barbellus caudatus



Barbellus aquaticus



Barbellus dorsalis



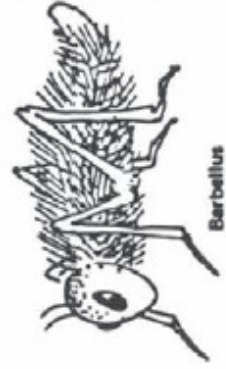
Barbellus flexilis



Barbellus longicarpus



Barbellus peimorcius



Barbellus hirsutus



Barbellus subterraneus