The Evolution of Barbellus

Introduction

Fossils are the remains of organisms that lived a very long time ago. They allow us to learn about living things that no longer exist for us to study while they are alive. We can use the fossil record to see what organisms lived during different periods of geologic (ancient) time.

If fossils exist for groups of very similar organisms, scientists can figure out when and where the different organisms lived. We can compare the fossils and arrange them in an evolutionary tree. This tree shows how the organisms are related to each other. It can also show when the different species lived.

Fossils give us clues about the physical appearance of the organisms. We can make hypotheses about how these organisms lived. That helps us figure out what kind of environment the organisms were adapted to.

Fossils are usually found in layers of rock called strata. Older layers under underneath newer layers, so older fossils are found buried beneath fossils of organisms that lived more recently.

Purpose

You will be examining fossils of a group of organisms. Scientists have determined that these organisms are closely related to each other, and have grouped them all in the genus Barbellus.

You have information about the rock strata in which each fossil was found, and a picture of what each organism looked like. You will use this information to construct an evolutionary tree of the genus Barbellus.

Materials

- Diagram of an eroded stream bank showing the rock strata with the location of each fossil Barbellus species
- Pictures of each Barbellus species
- Evolutionary tree template
- Scissors
- colored pencils
- glue or tape
- post-it notes

Procedure

1. Color the eroded stream bank in Figure 1 using realistic colors. Do not color over the names of the fossils. Different strata (A-F) should be slightly different colors.

2. Cut out the pictures of the Barbellus organisms. Make sure to keepthe name with each picture.

3. Arrange the pictures in a way that illustrates their evolutionary story. Keep their location in the rock layers (A-F) in mind as you build your evolutionary tree.

4. As you build your evolutionary tree, keep the following points in mind:
    - Fossils evolve from previous species and become modified versions of their ancestors.
    - You need to show how one organism descended from the one beneath it in your tree.
    - Some fossils may be missing from the fossil record.

5. Use postit notes to draw what you think the "missing links" would look like and add them to your evolutionary tree.

6. When you have arranged the fossils logically based on the evidence, check with your teacher. When your arrangement is approved, glue or tape each picture into position on the Barbellus family tree.

7. Color the pictures in a logical and consistent manner.

6. Answer the following questions thoughtfully and thoroughly

Analysis Questions:

1) Contrast between the meanings of ancestor and descendant.

2) How is it possible that all organisms have an ancestor, but not all organisms have descendants?

3) Which is the oldest layer of rock? Which is the youngest?

4) Which species of Barbellus represents the common ancestor for all the others? Why?

5) Which species on the tree are youngest (most recent)?

6) How do you explain B. opticus showing up in layer F and again in layer A?

7) How do you explain the presence of B. subterraneous in layer A but not in earlier layers?

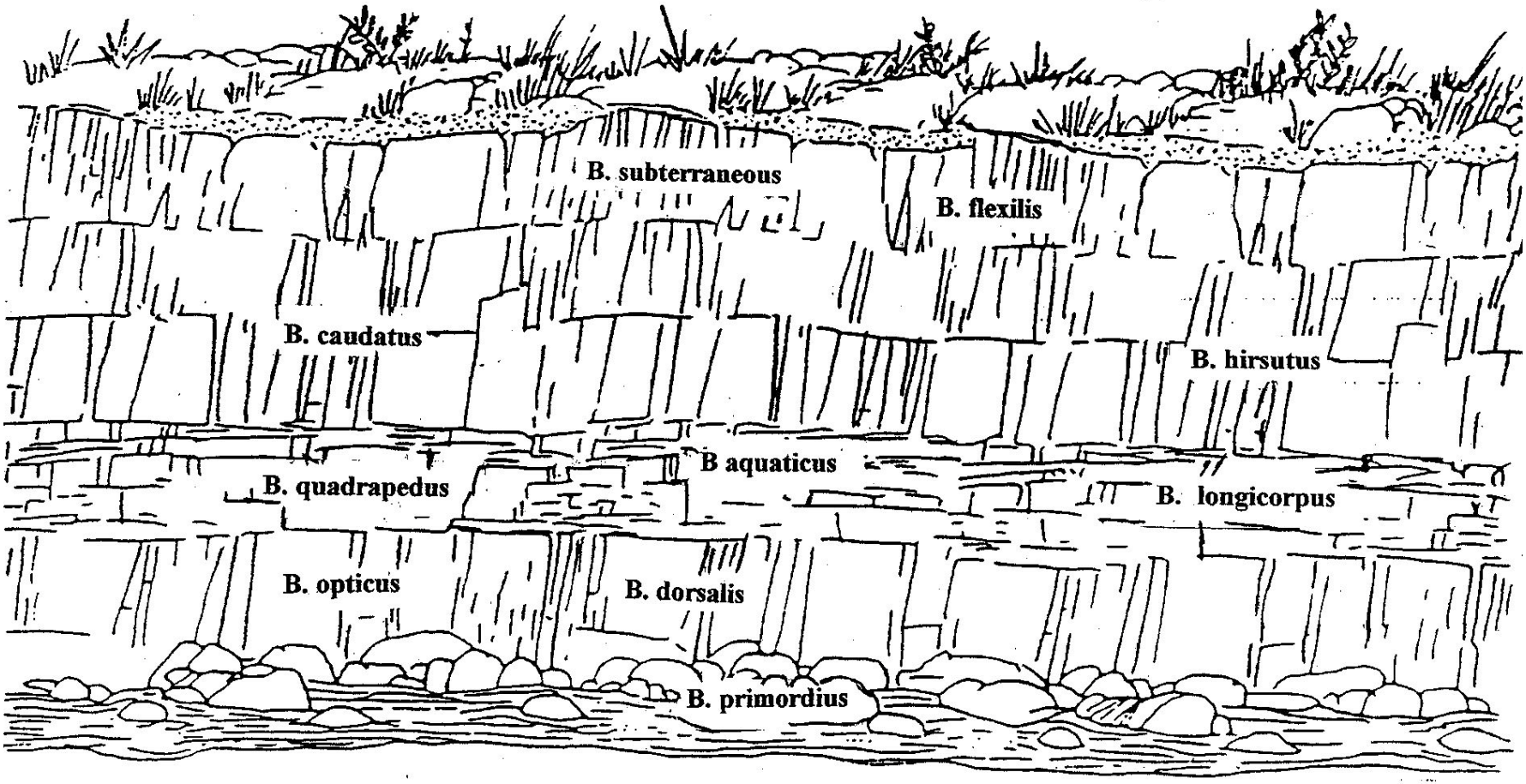
8) How would you explain why some creatures disappeared from the fossil records?

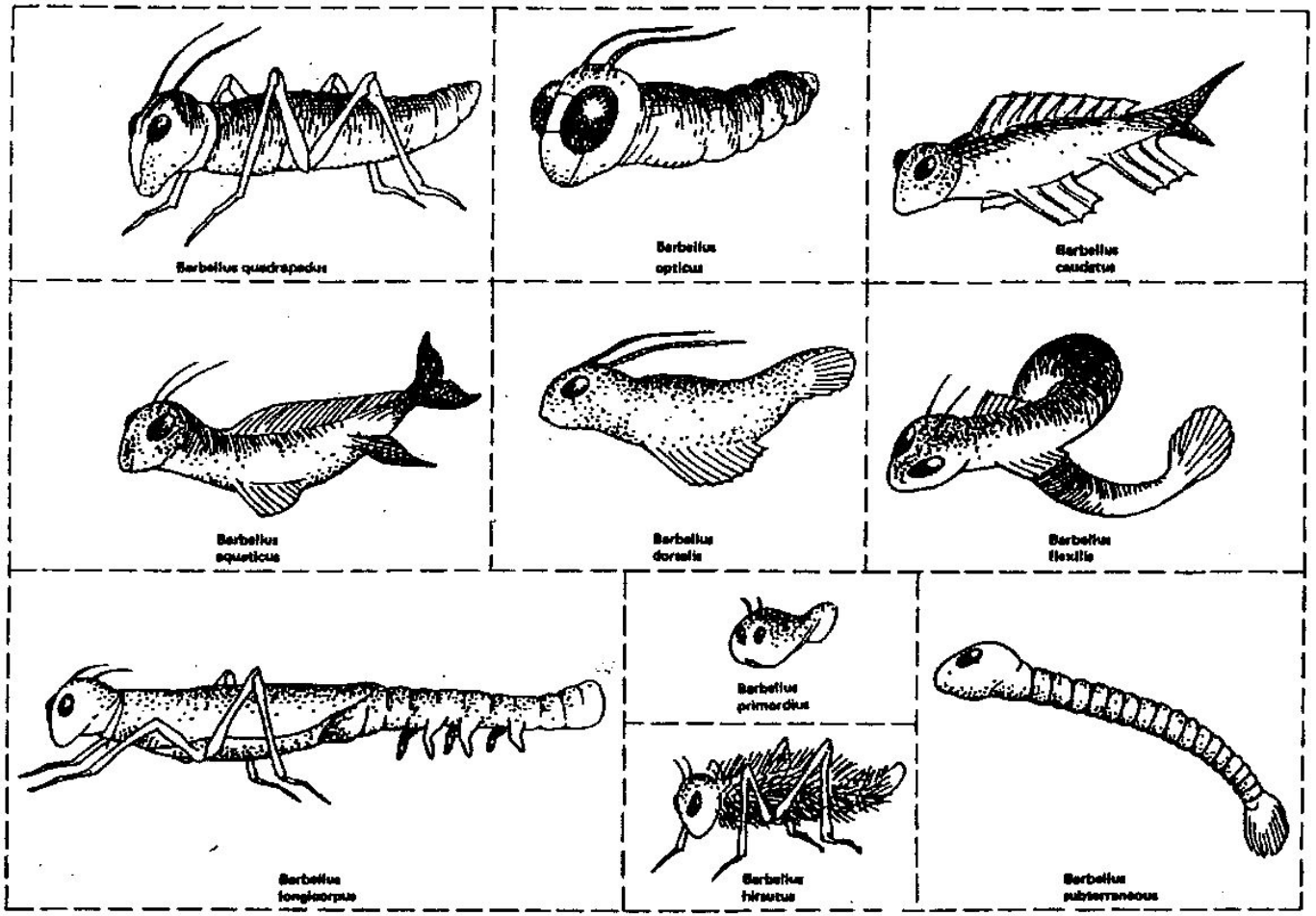
9) Describe what you took into consideration when you drew your intermediate "missing link" fossils.

10) Write a paragraph that describes the changes you observed in the organisms from layer to layer.

11) Write a second paragraph that describes the possible environmental changes that would favor certain adaptations over others and therefore certain species over others.

12) Write a third paragraph that gives reasons for the changes you observe from layer to layer. Include concepts such as mutation, divergent evolution, natural selection, and extinction in your discussion.


B. subterraneous
B. flexilis
B. caudatus
B. hirsutus
B aquaticus
B. quadrapedus
B. longicorpus
B. opticus
B. dorsalis
B. primordius


Barbellus quadrapedus
Barbellus opticus
Barbellus caudatus
Barbellus aquaticus
Barbellus dorsalis
Barbellus flexilis
Barbellus primordius
Barbellus longicorpus
Barbellus hirsutus
Barbellus subterraneous