Teaching Evolutionary Pathways with Imaginary Animals

Richard W. Miller

Department of Biology
Butler University
Indianapolis, IN 46208
(317)940-9328 miller@butler.edu

The best visual icon for teaching evolution is the tree diagram. The branching tree, starting with a single common ancestor, illustrates both the diversity of living things and their fundamental unity. The goal of this exercise is to better understand the meaning of evolutionary trees and the problems biologists have in constructing them. We use imaginary animals developed by Joseph H. Camin according to rules of relationship known only to him. The pictures of 29 "caminalcules" are copied and cut out so that each pair of students has 29 organisms to work with on separate small pieces of paper. Students are instructed to put the "caminalcules" into an evolutionary tree, assuming that each one represents a different species and that none are extinct. The work is done on a large sheet of paper so that the branches of the tree can be drawn in to connect all the organisms.

Students must discuss their choices with each other and the instructor and are encouraged to compare their trees to others in the class. The papers can be taped to the walls for class discussion. The exercise easily generates many questions because no one, not even the instructor, knows the right way to build the trees. Students see that in order to classify and relate the different organisms, they must make choices about which characteristics are most important. Not everyone chooses the same characters, so the trees are different. Students come to understand the uncertainty in deciding phylogenetic relationships with limited information, which leads to discussion about what more they would like to know about these creatures.

This exercise can easily be followed by a similar one using an assortment of real organisms. Put specimens around the room and give the students small pieces of paper with the names written on them to arrange in a tree. This is a good way to introduce a number of concepts in biological classification, including the dispute about the number of kingdoms.

Pictures of the "caminalcules" and the results of research into their classification are available in the papers cited below. In fact, there are 48 "fossil" species, in addition to the 29 extant species, and their classification and phylogeny has been estimated with cladistic methods.

References

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