

Cladistics Is a Zip...Baggie (draft)

John Banister-Marx Evolution & Nature of Science Institutes (ENSI) presented at NABT Ft.Worth 1999

Purpose: These notes are meant as a supplement to many good labs that already exist, which attempt to explain and utilize cladistic analysis (<http://www.indiana.edu/~ensiweb>). By using nested zip lock baggies as a three-dimensional representation of a Venn diagram, students are much more likely to see the hierarchical groupings that nature falls into because of proximity of divergence of a shared common ancestor. This can be done as a teacher initiated demonstration or as a student extension. By merely changing the names of the creatures and characteristics to be studied you can use this same lab set up.

Materials (per team of 2 students):

10 sheets of 1.5" x 2" PostIt sticky notes	clear adhesive tape
1 set of (7) organism cards (with names of creatures to be studied)	1 permanent marker
1 set of (7) nested zip lock baggies (2x3, 3x5, 4x6, 5x8, 6x9, 8x10, 9x12)	1 scissors

Special Preparation for the teacher:

Gather together a set of nested zip lock baggies for each student lab group, the number of baggies in each set being equivalent to the number of organisms in the group to be studied. Best source for bulk baggie purchase is Rio Grande 1-800-545-6566.

Procedure: (for students)

1. Cut the organism cards into 7 separate pieces. Or, cut up 3x5 cards into 1x3 pieces, add names.
2. On **separate** 1.5" x 2" "Post It" style sticky notes, write the set number and characteristics for **each** of the character sets from the data table. For example in this particular lab, **set #1**: Dorsal Nerve Cord, Notocord; **set #2**: paired appendages, vertebral column, etc. In this particular lab you should have 7 Post-It notes with writing on them. Write small and neatly.
3. Spread out the set of zip baggies on the lab table from largest to smallest. Label the baggies with the letters A, B, C, D, E, F, and G from largest to smallest. Write in the upper left hand corner, **above** the zip seam.
4. Place the sticky note with characteristics common to the **greatest** number of organisms on the upper right hand corner of the largest baggie, just below the zip seam.
5. Place the organism name cards that fit the described characteristics on the sticky note (that is outside of this large baggie) on the **inside** of the baggie. Note which organisms are in the baggie and which organisms have the characteristics described on the Post-It note; they should be the same.
6. Place the sticky note with characteristics common to the **next** greatest number of organisms on the second largest baggie, in the upper right hand corner just below the zip seam.
7. From the biggest baggie, withdraw the organisms that **also** have the characteristics of the 2nd largest baggie and place them in the second largest baggie (bag "B"), leaving behind in the large baggie any creature that does not **also** have the characteristics of the next set in bag "B". Tape this organism (called an "outlier") to the **inside** of the baggie where it "stayed behind" in the upper left hand corner just below the zip seam.
8. Repeat this process until organism cards and sticky notes are appropriately placed.

Teacher Notes:

This activity was demonstrated in Reno (1998 NABT Convention) using nested cans. These work fine, too, especially as a demonstration. You might try these before, or after students do the lesson with bags. Nested sets of cans for everyone are a little harder to collect and store!

Be sure to see the UCMP site for more extensive coverage of phylogeny, cladistics and systematics:
<http://www.ucmp.berkeley.edu/exhibit/phylogeny.html>