Penguin Cladogram

Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

If you have seen the movies, “**March of the Penguins**”, “**Happy Feet**”, or “**Surf’s Up!**” you are probably familiar with at least a few species of penguins. (There are actually about 18 species, although there are a few additional subspecies.) All penguins are birds and they evolved from the same ancestral bird population as all other birds.

1. What are some of the “bird-y” traits that the penguins share with all birds?
2. The 18 penguin species are all descended from the same ancestral penguin and share traits that they presumably inherited from the same “penguin-y” ancestor. What are some of the traits that penguin species seem to share? (Think beyond purely physical traits to their behavior and lifestyle as well.)
3. Talk with your lab partners and try to think of the type of birds that are most closely related to the penguins. If you don’t actually know of a particular species or type of bird, perhaps you could predict its traits/behavior/lifestyle.

**Making a Cladogram of the Penguin Species:**

Your group will receive an envelope with pictures of the 18 penguin species. Open it and spread the pictures out on your lab table. Some species will look similar to each other. We assume that these species have similar traits because they came from the same ancestral species. A cladogram shows which species share more common ancestry and which ones are more distantly related.

1. Start by putting similar species into groups of species that seem closely related. You may want to look at the plumage and color patterns, body shape/size, beak shape, etc. These groups do not have to have the same number of species in them. Some species may not seem to fit well within a group – they may be left on their own for now.
2. Take the largest group and try to break it into smaller groups until there are no more than two species in a group. You may begin arranging the species into the tree-like form of the cladogram. With four species, your cladogram could take one of the two forms below:

1 2 3 4 1 2 3 4

 A B

In arrangement **A**, species 1 and 2 seem more like each other than 3 and 4, and species 3 and 4 seem more like each other than they do 1 and 2.

In arrangement **B**, 2, 3, and 4 seem more like each other and 1 seems to be the odd man out. Then, looking at 2, 3, and 4, species 3 and 4 seem more similar to each other than to species 2.

If you had five species, the cladogram has more possible connections. Do your best to group them in a way that seems to make the most sense.

1. Now that you have divided up your separate groups, you can start grouping the groups into larger groups. Again, there do not need to be equal numbers of groups or species in the larger groups. Just put those groups that seem to be more closely related next to each other.
2. When you have all of the species grouped, you can draw the lines to make the whole cladogram. Please put all of the species at the same level on top of the cladogram and draw the connecting lines below.
3. Compare your cladogram to other groups’ cladograms. If you and another group have differences, see if you can convince them that they are right. If you feel your cladogram is incorrect, you may rearrange it.