

Activity: Create a Cladogram

In the description we talked about how *Puijila* is not a direct ancestor of modern-day seals. How do researchers know this? They most likely created a cladogram! For this activity you will create a cladogram to show the evolutionary relationship between organisms.

Below we have provided an example of the steps involved in determining these animals' lineages. After you read through the example, you will get to pick your own 4 animals, research them, and fill out the blank charts.

Step 1. Pick 4 animals you would like to use. In the example we will use a rhino, frog, owl, and goldfish

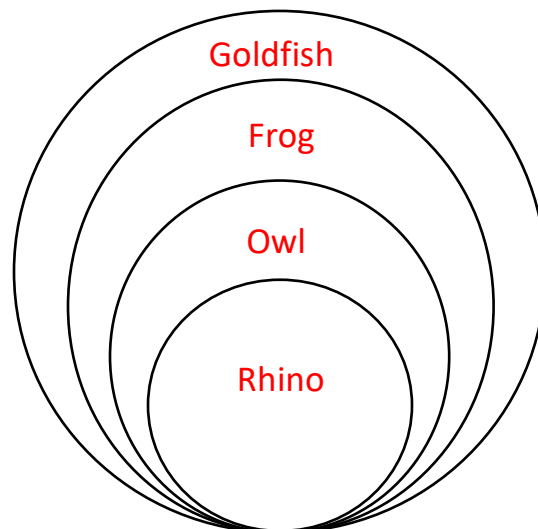
Step 2. Identify common traits. For your own cladogram, you will have to do your own research on the animals you choose to determine the common traits.

	Rhino	Frog	Owl	Goldfish
Type of birth	Live birth	Eggs in water	Eggs with a hard shell	Eggs in water
Number of legs	4 legs	4 legs	2 legs/2 wings	Fins
How does it breath?	Lungs	Gills as a tadpole Lungs as an adult	Lungs	Gills
What covers its body?	Hair	Skin	Feathers	Scales
Does it have a backbone?	Backbone	Backbone	Backbone	Backbone

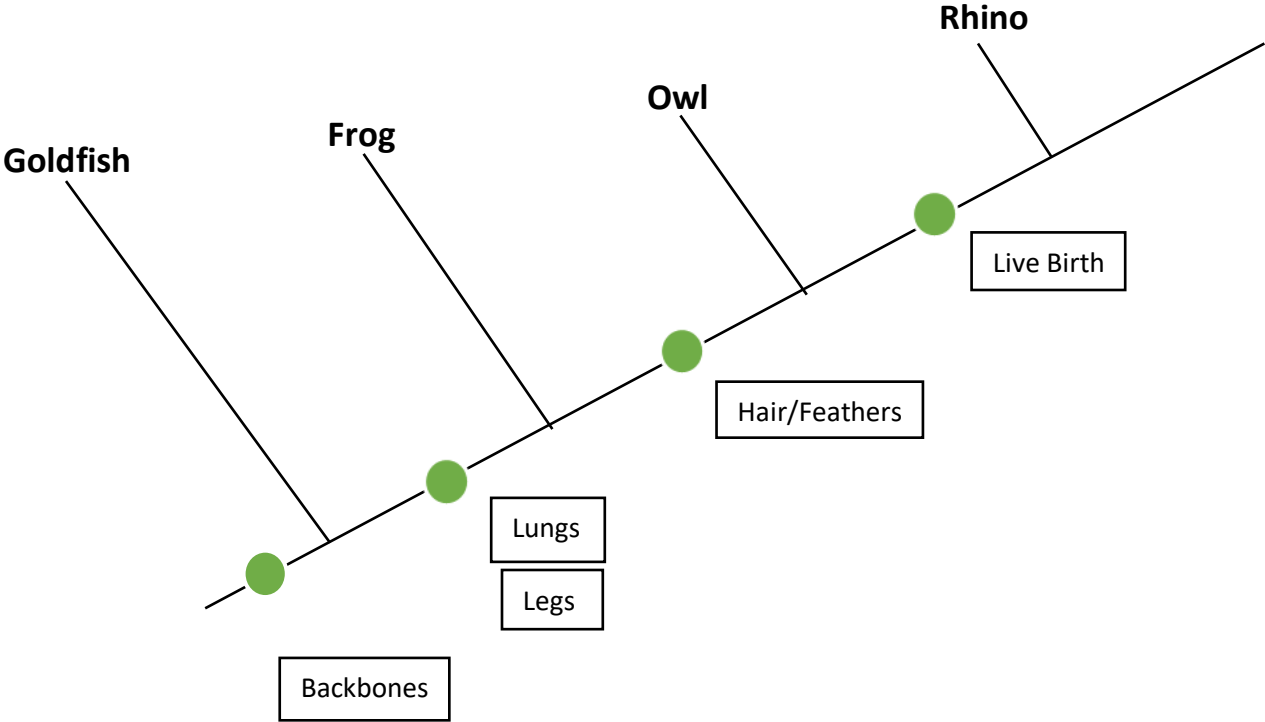
Step 3. Create a chart and use an X if it has it and a 0 if it does not

Animal	Hair/feathers	Legs	Lungs	Live Birth	Backbone	Totals
Rhino	X	X	X	X	X	4
Frog	0	X	X	0	X	3
Owl	X	X	X	0	X	2
Fish	0	0	0	0	X	1
Totals	2	3	3	1	4	

Step 4. Make a Concentric circle diagram. The smallest circle will be the animal with the most traits, in this case it's the rhino. The largest circle will be the animal with the least, the goldfish.



Step 5. Create the cladogram! The long line is the continuation of all the traits you identified in the charts. The lines that branch off end in a clade, or a group of organisms with a last common ancestor.



Now it's time for you to create your own cladogram! Use the charts provided.

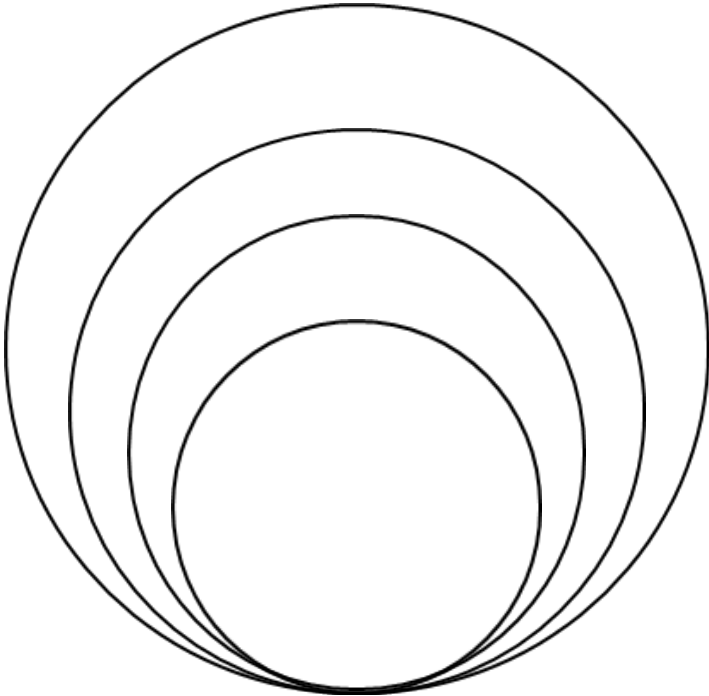
Step 1. Write in your four animals in the boxes along the top, then write in the answer for each row under each animal. See example above if you need any help.

Animal				
What covers this animals body?				
How does this animal move?				
How does this animal breath?				
How does this animal give birth?				
Does this animal have a backbone?				

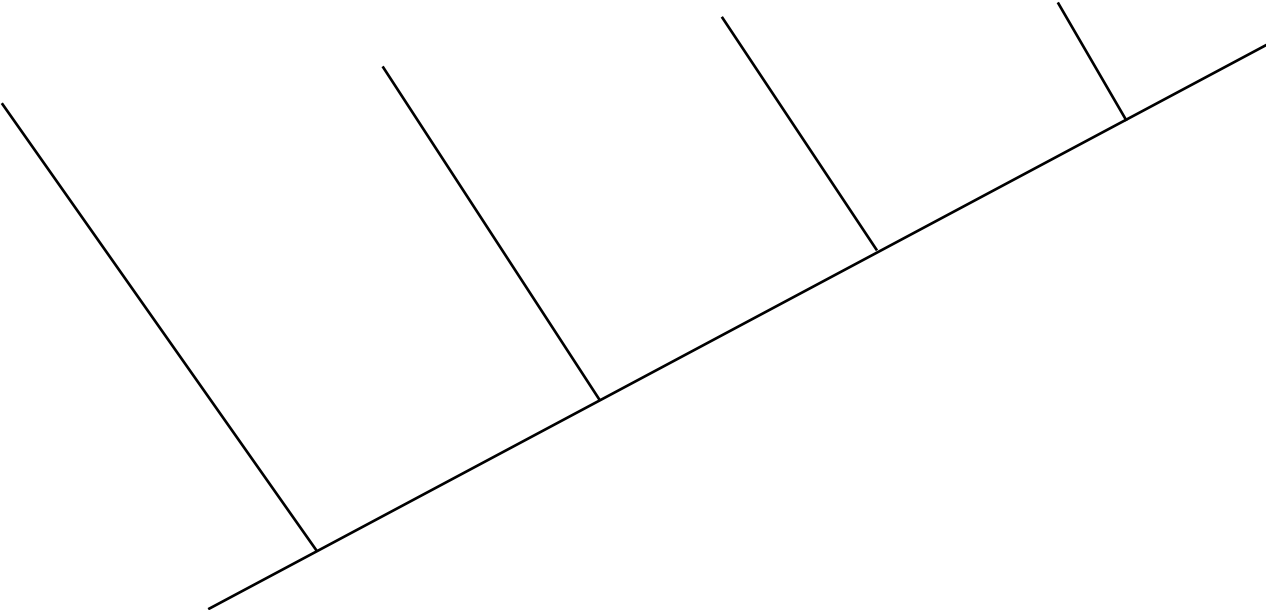
Step 2. Create a chart and use an X if it has it and a 0 if it does not

Animal	Hair/feathers	Legs	Lungs	Live Birth	Backbone	Totals
Totals						

Step 3. Make a Concentric circle diagram. The smallest circle will be the animal with the most traits and the largest circle will be the animal with the least.



Step 4. Place the animals and the traits in the appropriate order. If you get stuck look at the example provided. Remember, the long line is the continuation of all the traits you identified in the charts. The lines that branch off end in a clade, or a group of organisms with a last common ancestor.



Discussion Questions:

1. Explain why you put each species where you did on the cladogram. What evidence did you have?
2. According to the cladogram you have done, what animals are more closely related and share the most common traits?
3. Which animals are far from related?
4. Who is Charles Darwin? What is he most known for?
5. Why do you think it is still being discussed where *Puijila* fits in the pinniped family tree?