

# Baggie Cladistics

## Instructions

Materials: Baggie Cladistic handout: side one has a series of union Venn Diagram regions (they look like a bunch of boxes inside one another) [page 4 or 7].  
side two has the questions and extra pics of the cards [page 5].

Eight different organism cards [page 3].

One organism name strip [there are three strips on page 6].

Clear plastic bags; seven sandwich-size will do.

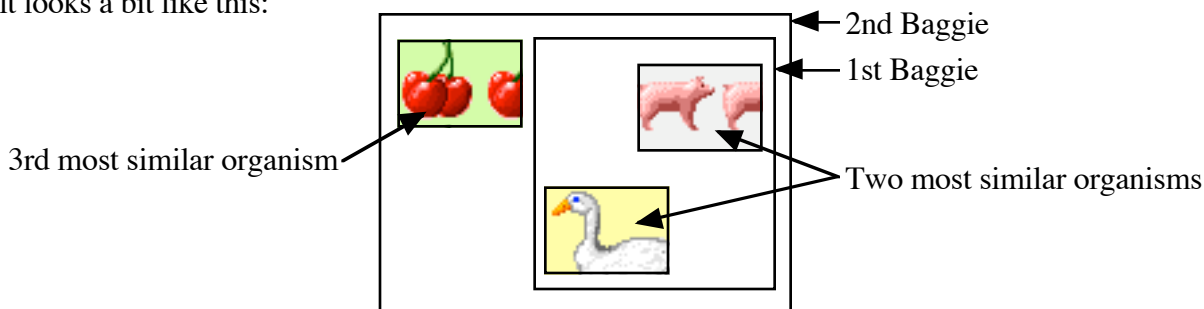
A piece of blank paper (unlined is nice, but lined filler paper is OK), scissors and tape/glue.

1. Cut apart the eight organism cards [page 3].
2. Examine the organisms on the cards. Pay attention to the description of the organisms.
3. Select the two *most* similar organisms and put their cards together in one baggie.
4. Then select the organism which is most like the ones you chose in step #3.

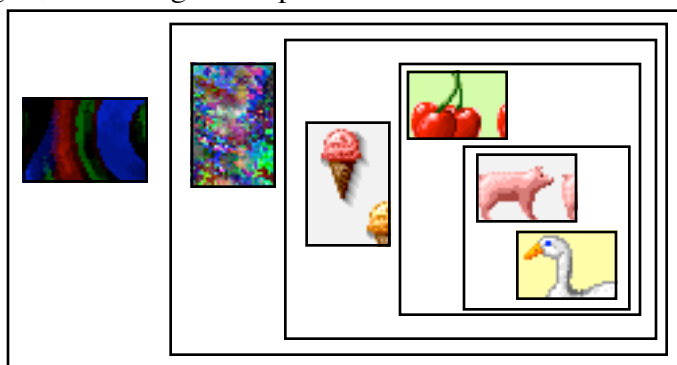
Place that organism card in a second baggie.

Place the first baggie, with its two organisms into the second baggie.

The result looks a bit like this:



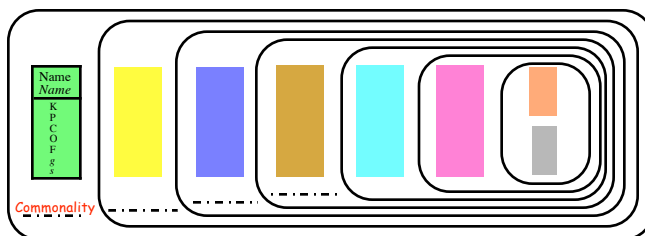
5. Continue the process. Select the next most similar organism. Place its card in a fresh baggie. Then add the baggie of baggies, containing all the previous cards. Continue until all the cards are in the bags.



This illustration should give you the idea of what to do.

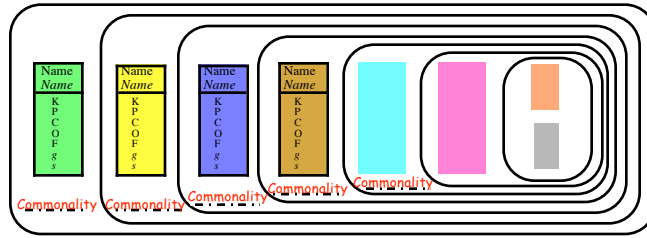
Continue until all 8 cards are in the 7th bag.

6. Now it is time to record your data. Consider what characteristics are present in all the organisms in the bags have in common. Write down that characteristic on the dotted line in the outermost Venn region.
7. Start to disassembling your baggies and note what comes out of the outermost bag. There should be one card in the bag along with a bag full of more bags and the other cards. Record this organism by taking the appropriate name strip and attaching it to the shaded area in the outermost box.



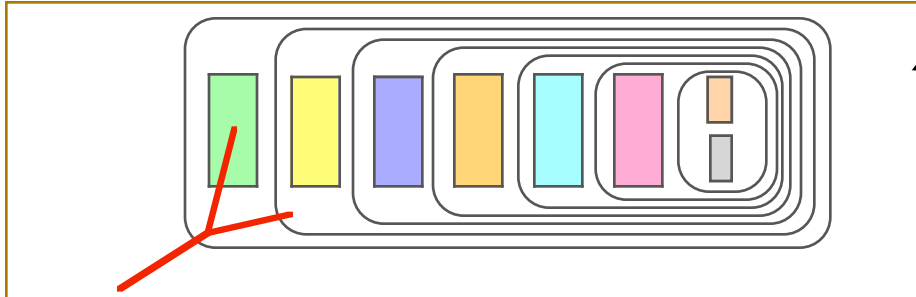
The regions on this Venn diagram represent the baggies.

8. Consider the remaining bags of organism cards. What do all these organisms have in common? Write down that characteristic on the dotted line in the second largest Venn region.
9. Continue to disassemble your bags. Each time a card is released you should paste the organism's name strip in the appropriate region.
10. Repeat steps 8 and 9 until all of the cards are out of the baggies and the 8 name strips have been affixed to the diagram



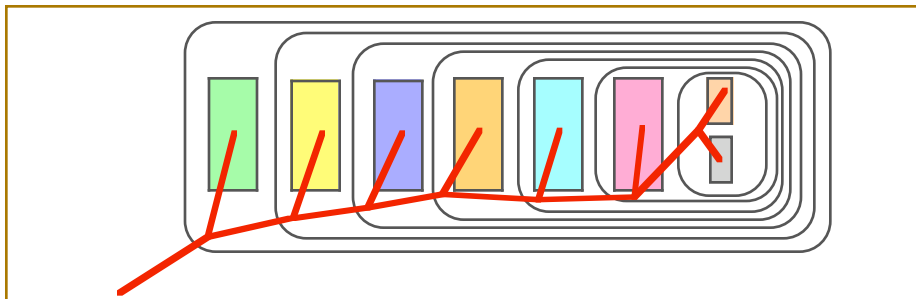
At about half way through your diagram looks like this.

11. Of course this is a Venn diagram, *not* a cladogram (branching tree diagram). But Venn diagrams are a great way to set up your cladogram. Take a piece of blank paper. Unlined paper is great, but notebook paper will do just fine. Place the paper over your Venn diagram. Your diagram will guide your drawings  
**Draw a line from outside all of the Venn regions into the largest Venn region.**  
 As soon as you enter the largest Venn region, divide your line into two branches. One branch goes to the outermost organism. The other branch leads to the next Venn region.

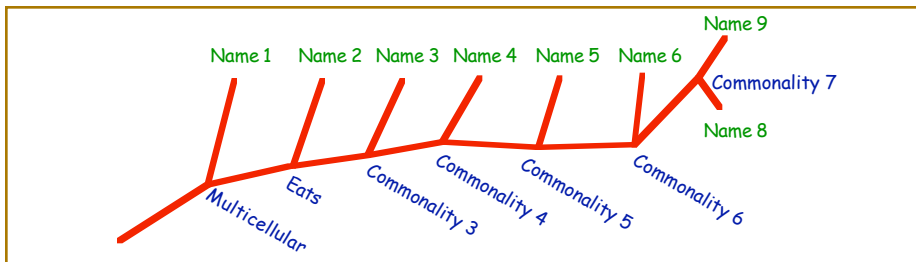


← Paper (drawing not to scale)

12. Continue your line, branching each time you enter a new Venn region. One line extends to the organism listed in that region, the other reaches into the next Venn region.



13. When you are done, You will have a branching tree diagram that looks a bit like a bonsai tree.
14. Label the tips of the branches with the names of the organisms.
15. Label the nodes (the branch points) with the reason for the branching (the shared characteristic).



Note the organism “name 6” has characteristics 1, 2, 3, 4, 5, and 6 but does *not* have characteristic 7.

16. Voila! You have made a cladogram. Answer the questions on side one of your handout.

Note: Published cladograms are often “prettified” by straightening out the branches. You need not do this.

Name: **Date Palm**

*Phoenix dactylifera*

Energy Source: Autotroph

Vertebrae (backbones): n/a

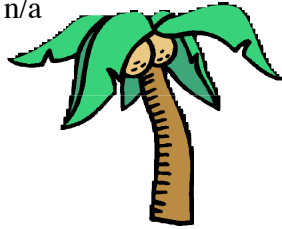
Body Temperature: n/a

Limbs: n/a

Eyes: n/a

Retractable Claws: n/a

Other: Does not move.



Name: **Sea Lion**

*Zalophus californianus*

Energy Source: Heterotroph

Vertebrae (backbones): yes

Body Temperature:

constantly warm

Limbs: 4 flippers with claws

Teeth: Pointed teeth

Eyes: eyeballs on side of head

Retractable Claws: no



Name: **Honey Bee**

*Apis mellifera*

Energy Source: Heterotroph

Vertebrae (backbones): no

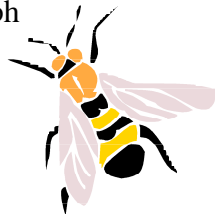
Body Temperature: varies with environment

Limbs: 6 legs

Eyes: on side of head

Retractable Claws: n/a

Other: Compound eyes.



Name: **House Cat**

*Felis silvestris*

Energy Source: Heterotroph

Vertebrae (backbones): yes

Body Temperature: constantly warm

Limbs: 4 legs with clawed feet

Teeth: Pointed teeth

Eyes: front of head

Retractable Claws: yes

Other: Purrs, but cannot roar.



Name: **Leopard Frog**

*Rana pipiens*

Energy Source: Heterotroph

Vertebrae (backbones): yes

Body Temperature: varies with environment

Limbs: 4 legs

Eyes: eyeballs on top/side of head

Retractable Claws: n/a

Other: Tongue attached to front of jaw.



Name: **African Lion**

*Panthera leo*

Energy Source: Heterotroph

Vertebrae (backbones): yes

Body Temperature: constantly warm

Limbs: 4 legs with clawed feet

Teeth: Pointed teeth

Eyes: front of head

Retractable Claws: no

Other: Roars, social animal, males have manes.



Name: **Bactrian Camel**

*Camelus bactrianus*

Energy Source: Heterotroph

Vertebrae (backbones): yes

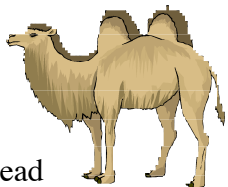
Body Temperature: constantly warm

Limbs: 4 legs with hooves

Teeth: Square, flat teeth

Eyes: eyeballs on side of head

Retractable Claws: n/a



Name: **Siberian Tiger**

*Panthera tigris*

Energy Source: Heterotroph

Vertebrae (backbones): yes

Body Temperature: constantly warm

Limbs: 4 legs with clawed feet

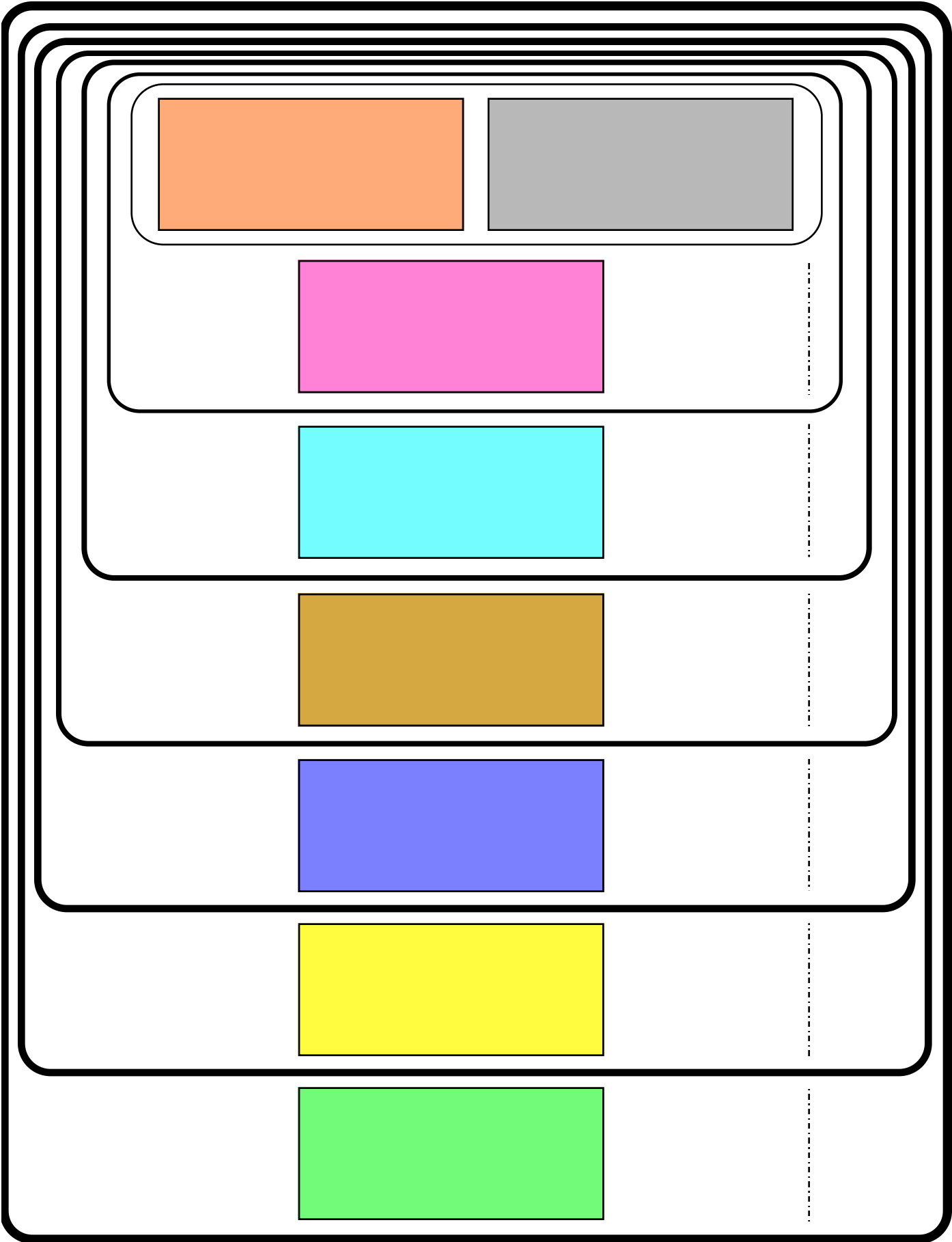
Teeth: Pointed teeth

Eyes: front of head

Retractable Claws: no

Other: Roars, stripes, solitary animal.













Name \_\_\_\_\_  
 Period \_\_\_\_\_  
 Date \_\_\_\_\_

## Baggie Cladistics

1. Why do organisms resemble one another?
2. What does it mean when two organisms are very similar?
3. List and describe at least two ways that similarity between organisms can be determined.
4. Compare and contrast a cladogram (branching tree diagram) with a pedigree (family tree).

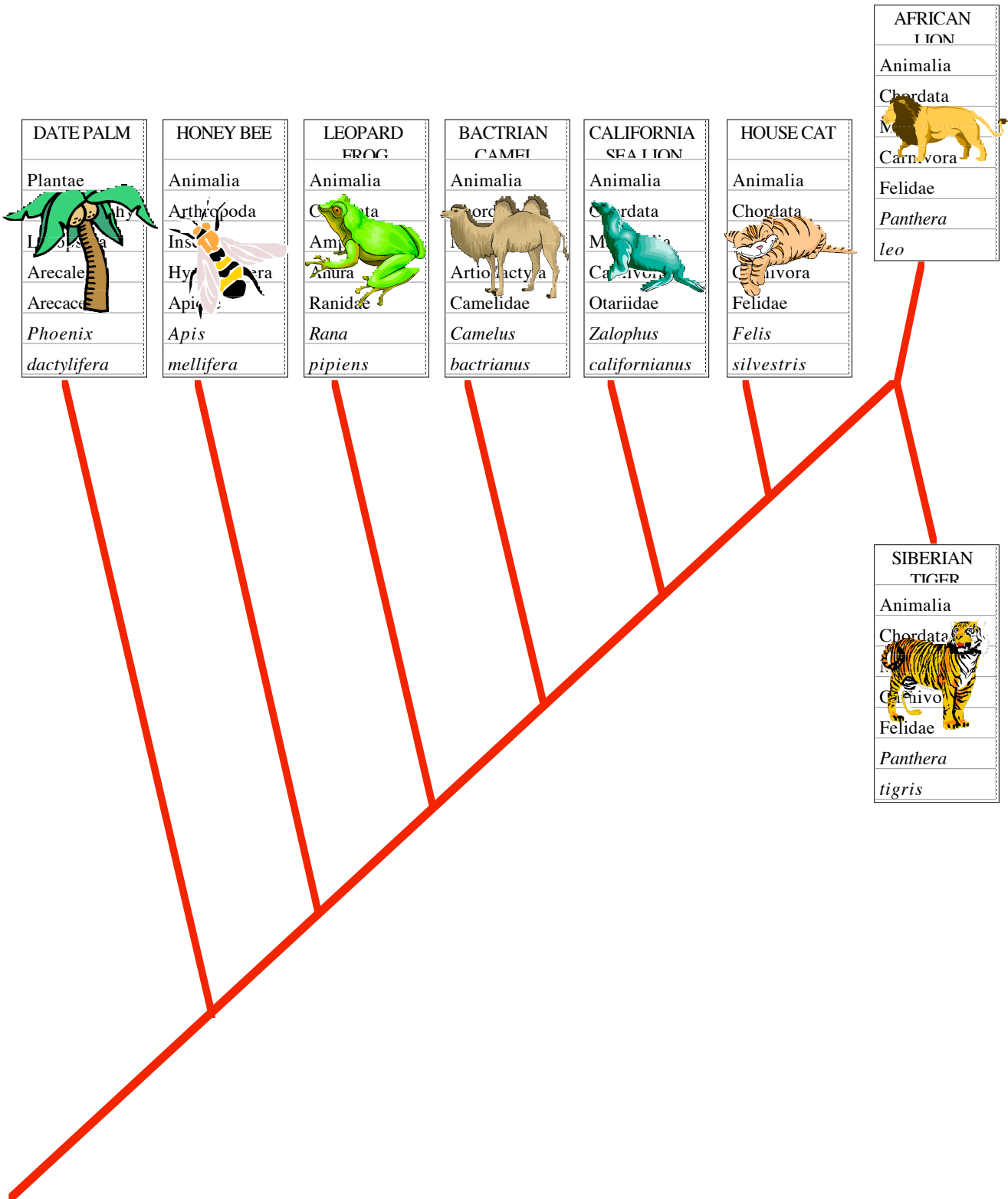
<p>Name: <b>African Lion</b>  <i>Panthera leo</i>            Energy Source: Heterotroph            Vertebrae (backbones): yes            Body Temperature: constantly warm            Limbs: 4 legs with clawed feet            Teeth: Pointed teeth            Eyes: front of head            Retractable Claws: no            Other: Roars, social animal, males have manes.</p> 
<p>Name: <b>Bactrian Camel</b>  <i>Camelus bactrianus</i>            Energy Source: Heterotroph            Vertebrae (backbones): yes            Body Temperature: constantly warm            Limbs: 4 legs with hooves            Teeth: Square, flat teeth            Eyes: eyeballs on side of head            Retractable Claws: n/a</p> 
<p>Name: <b>Date Palm</b>  <i>Phoenix dactylifera</i>            Energy Source: Autotroph            Vertebrae (backbones): n/a            Body Temperature: n/a            Limbs: n/a            Eyes: n/a            Retractable Claws: n/a            Other: Does not move.</p> 
<p>Name: <b>Honey Bee</b>  <i>Apis mellifera</i>            Energy Source: Heterotroph            Vertebrae (backbones): no            Body Temperature: varies with environment            Limbs: 6 legs            Eyes: on side of head            Retractable Claws: n/a            Other: Compound eyes</p> 
<p>Name: <b>House Cat</b>  <i>Felis silvestris</i>            Energy Source: Heterotroph            Vertebrae (backbones): yes            Body Temperature: constantly warm            Limbs: 4 legs with clawed feet            Teeth: Pointed teeth            Eyes: front of head            Retractable Claws: yes            Other: Purrs, but cannot roar.</p> 
<p>Name: <b>Leopard Frog</b>  <i>Rana pipiens</i>            Energy Source: Heterotroph            Vertebrae (backbones): yes            Body Temperature: varies with environment            Limbs: 4 legs            Eyes: eyeballs on top/side of head            Retractable Claws: n/a            Other: Tongue attached to front of jaw.</p> 
<p>Name: <b>Sea Lion</b>  <i>Zalophus californianus</i>            Energy Source: Heterotroph            Vertebrae (backbones): yes            Body Temperature: constantly warm            Limbs: 4 flippers with claws            Teeth: Pointed teeth            Eyes: eyeballs on side of head            Retractable Claws: no</p> 
<p>Name: <b>Siberian Tiger</b>  <i>Panthera tigris</i>            Energy Source: Heterotroph            Vertebrae (backbones): yes            Body Temperature: constantly warm            Limbs: 4 legs with clawed feet            Teeth: Pointed teeth            Eyes: front of head            Retractable Claws: no            Other: Roars, stripes.</p> 

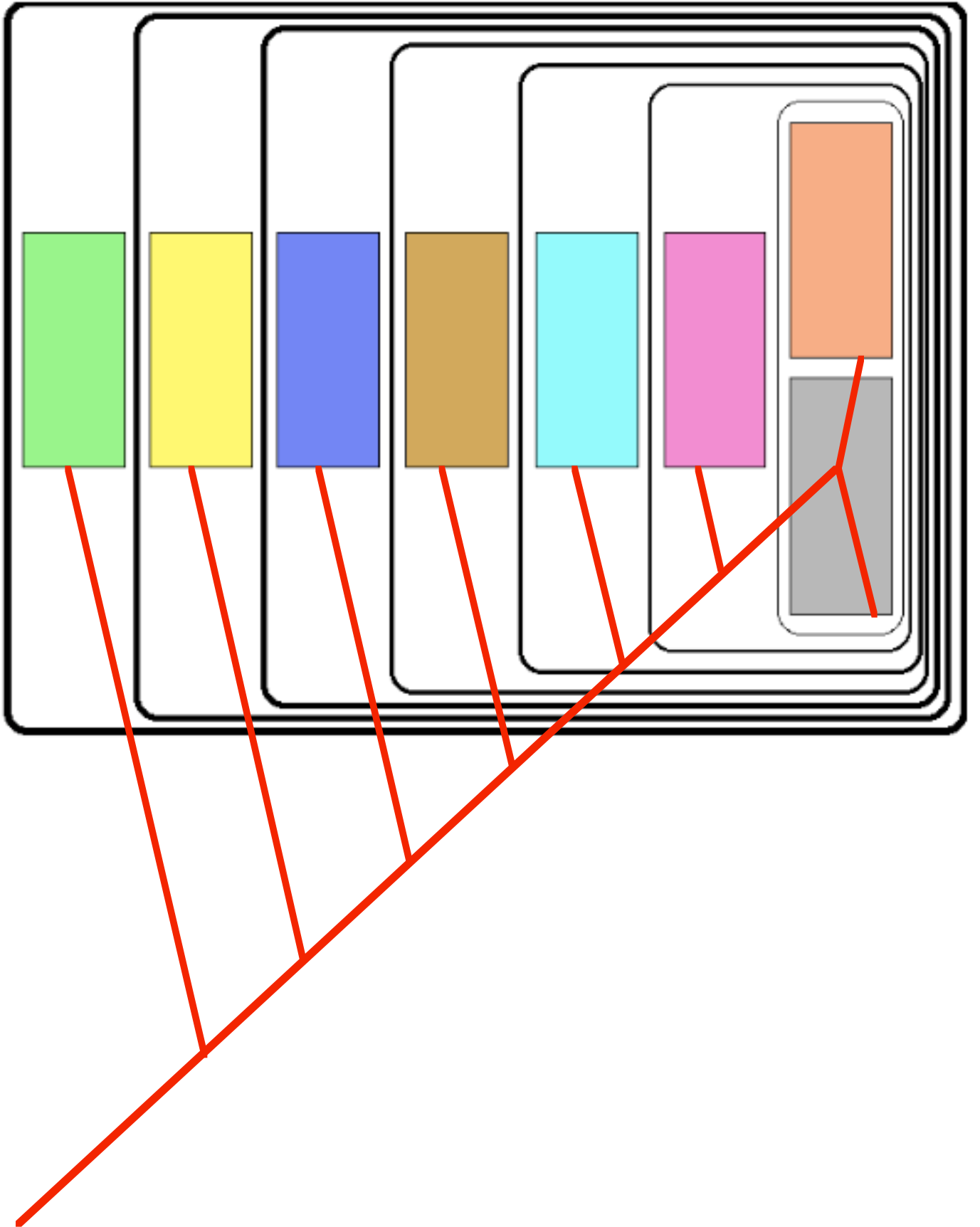
<b>Common Name</b>	DATE PALM	HONEY BEE	LEOPARD FROG	BACTRIAN CAMEL	CALIFORNI A SEA LION	HOUSE CAT	AFRICAN LION	SIBERIAN TIGER
<b>Kingdom</b>	Plantae	Animalia	Animalia	Animalia	Animalia	Animalia	Animalia	Animalia
<b>Phylum</b>	Magnoliophyta	Arthropoda	Chordata	Chordata	Chordata	Chordata	Chordata	Chordata
<b>Class</b>	Liliopsida	Insecta	Amphibia	Mammalia	Mammalia	Mammalia	Mammalia	Mammalia
<b>Order</b>	Arecales	Hymenoptera	Anura	Artiodactyla	Carnivora	Carnivora	Carnivora	Carnivora
<b>Family</b>	Arecaceae	Apidae	Ranidae	Camelidae	Otariidae	Felidae	Felidae	Felidae
<b>Genus</b>	<i>Phoenix</i>	<i>Apis</i>	<i>Rana</i>	<i>Camelus</i>	<i>Zalophus</i>	<i>Felis</i>	<i>Panthera</i>	<i>Panthera</i>
<b>species</b>	<i>dactylifera</i>	<i>mellifera</i>	<i>pipiens</i>	<i>bactrianus</i>	<i>californianus</i>	<i>silvestris</i>	<i>leo</i>	<i>tigris</i>

<b>Common Name</b>	DATE PALM	HONEY BEE	LEOPARD FROG	BACTRIAN CAMEL	CALIFORNI A SEA LION	HOUSE CAT	AFRICAN LION	SIBERIAN TIGER
<b>Kingdom</b>	Plantae	Animalia	Animalia	Animalia	Animalia	Animalia	Animalia	Animalia
<b>Phylum</b>	Magnoliophyta	Arthropoda	Chordata	Chordata	Chordata	Chordata	Chordata	Chordata
<b>Class</b>	Liliopsida	Insecta	Amphibia	Mammalia	Mammalia	Mammalia	Mammalia	Mammalia
<b>Order</b>	Arecales	Hymenoptera	Anura	Artiodactyla	Carnivora	Carnivora	Carnivora	Carnivora
<b>Family</b>	Arecaceae	Apidae	Ranidae	Camelidae	Otariidae	Felidae	Felidae	Felidae
<b>Genus</b>	<i>Phoenix</i>	<i>Apis</i>	<i>Rana</i>	<i>Camelus</i>	<i>Zalophus</i>	<i>Felis</i>	<i>Panthera</i>	<i>Panthera</i>
<b>species</b>	<i>dactylifera</i>	<i>mellifera</i>	<i>pipiens</i>	<i>bactrianus</i>	<i>californianus</i>	<i>silvestris</i>	<i>leo</i>	<i>tigris</i>

<b>Common Name</b>	DATE PALM	HONEY BEE	LEOPARD FROG	BACTRIAN CAMEL	CALIFORNI A SEA LION	HOUSE CAT	AFRICAN LION	SIBERIAN TIGER
<b>Kingdom</b>	Plantae	Animalia	Animalia	Animalia	Animalia	Animalia	Animalia	Animalia
<b>Phylum</b>	Magnoliophyta	Arthropoda	Chordata	Chordata	Chordata	Chordata	Chordata	Chordata
<b>Class</b>	Liliopsida	Insecta	Amphibia	Mammalia	Mammalia	Mammalia	Mammalia	Mammalia
<b>Order</b>	Arecales	Hymenoptera	Anura	Artiodactyla	Carnivora	Carnivora	Carnivora	Carnivora
<b>Family</b>	Arecaceae	Apidae	Ranidae	Camelidae	Otariidae	Felidae	Felidae	Felidae
<b>Genus</b>	<i>Phoenix</i>	<i>Apis</i>	<i>Rana</i>	<i>Camelus</i>	<i>Zalophus</i>	<i>Felis</i>	<i>Panthera</i>	<i>Panthera</i>
<b>species</b>	<i>dactylifera</i>	<i>mellifera</i>	<i>pipiens</i>	<i>bactrianus</i>	<i>californianus</i>	<i>silvestris</i>	<i>leo</i>	<i>tigris</i>

A template for a document with multiple sections. The document is enclosed in a thick black border. The top section contains two side-by-side gray rectangular boxes. Below this, there are five rows, each consisting of a single centered gray rectangular box. To the right of each of these five rows is a vertical dashed line. The bottom section of the page is empty.





Name \_\_\_\_\_  
Period \_\_\_\_\_  
Date \_\_\_\_\_

## **Baggie Cladistics**

1. Why do organisms resemble one another?

**They are related to each other.**

2. What does it mean when two organisms are very similar?

**The more similar, the closer related they are. The more recent the common ancestor.**

3. List and describe at least two ways that similarity between organisms can be determined.

**Comparing anatomy**

**Comparing DNA**

**Comparing embryology**

**(development before birth)**

4. Compare and contrast a cladogram (branching tree diagram) with a pedigree (family tree).

**Both show relatives & ancestors. Cladograms include more distant relatives over a longer period of time and can thus be used to predict the characteristics of common ancestors.**

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