Evolution Stations: An Introduction to Evolution

Objective:
Discover evidence for the Theory of Evolution by competing all 8 stations. Each station has 3 parts. Each student must complete;

1. **the hands-on station activity (except for stations 2, 3, 4, & 7)**
2. **a record of the station's content in their notebook**
3. **clean-up of the station before moving to the next station.**

Students keep track of progress by getting a teacher stamp for each station on the provided Student Stations Accountability Sheet.

Name: **Period: _____**

Student Stations Accountability Sheet

Station #	Station Activity	Station Notebook	Clean-up
1			
2	XXXXXXXXXXXXXX XXXXXXXXXXXXXX		
3	XXXXXXXXXXXXXX XXXXXXXXXXXXXX		
4	XXXXXXXXXXXXXX XXXXXXXXXXXXXX		
5			
6			
7	XXXXXXXXXXXXXX XXXXXXXXXXXXXX		
8			

Name: **Period: _____**

Student Stations Accountability Sheet

Station #	Station Activity	Station Notebook	Clean-up
1			
2	XXXXXXXXXXXXXX XXXXXXXXXXXXXX		
3	XXXXXXXXXXXXXX XXXXXXXXXXXXXX		
4	XXXXXXXXXXXXXX XXXXXXXXXXXXXX		
5			
6			
7	XXXXXXXXXXXXXX XXXXXXXXXXXXXX		
8			

Station 1: Instructions

1. **Match the 5 principles from the envelope with the picture that it best represents. Read the caption to each picture carefully before making your decision.**

2. **Ask your teacher to check your work.**

Materials: 5 pictures, 5 principles (in the envelope)

Station 1: Notebook Instructions

Each station needs to be on a separate paper in your notebook.

3. **Title this page Station 1: _____ (Leave a space to write in the actual title at a later date.)**

4. **Write the principles in order (1-5) in your notebook. Leave enough room for the picture.**

5. **Cut and paste each picture to its corresponding principle.**

Materials: your notebook, Station 1 Student Sheet, glue stick, scissors

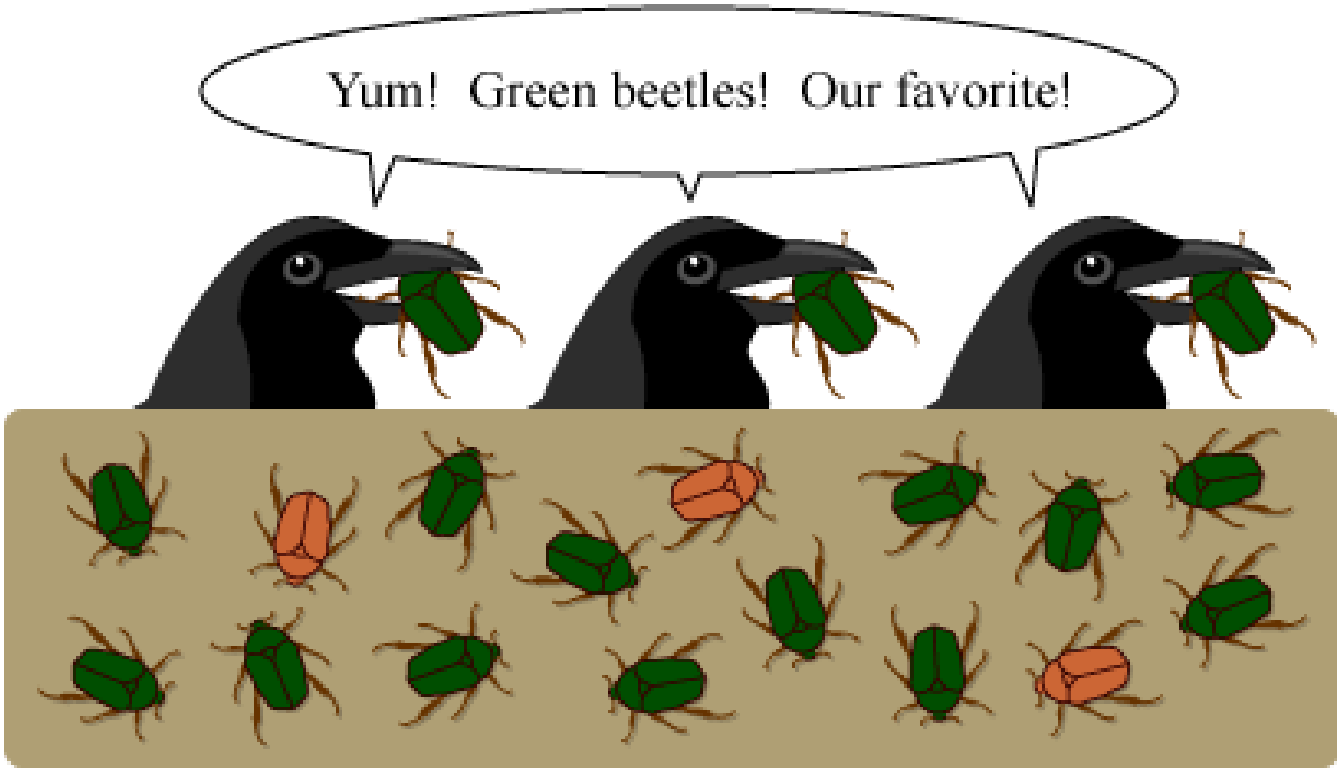
Station 1: Clean up!

6. **Make the station ready for the next group of students.**

7. **Ask your teacher to check your work and cleanup before moving to the next station.**

Turtle eggs and turtle hatchlings. Many turtle eggs are laid and not all of the baby turtles will even make it to the water.

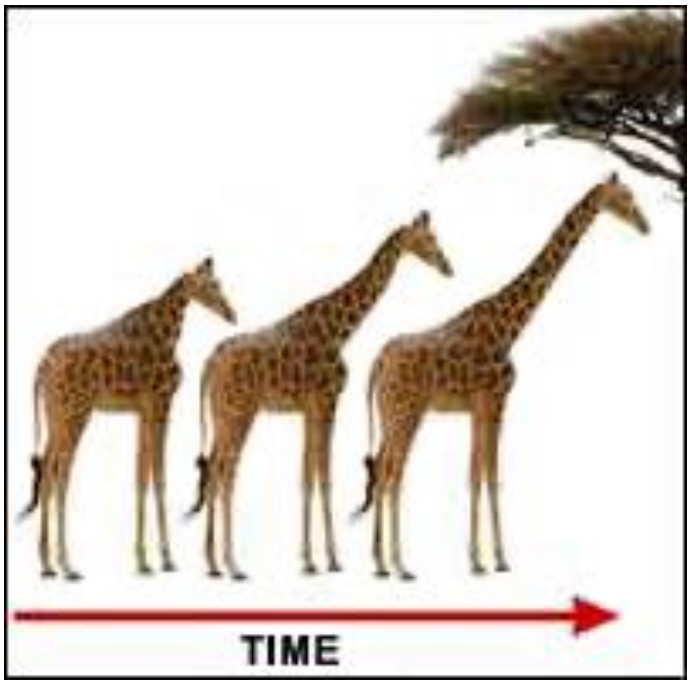
Green Beetles vs. Brown Beetles. Brown beetles are more difficult for predators see in this environment so more brown beetles will survive and reproduce. Eventually, the population will have more brown beetles than green beetles!

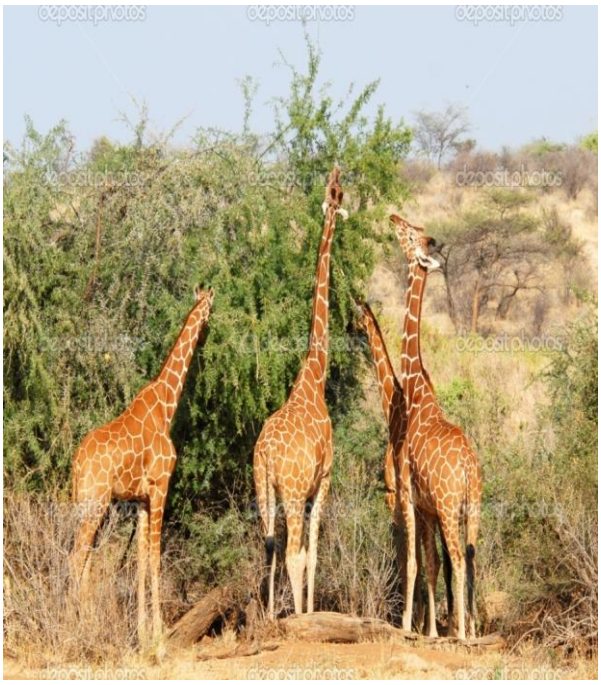


Each image is an individual thorn bug. Can you see differences in each bug?

The peppered moth is camouflaged. Since it is dark colored to match the environment, it is less likely seen and eaten! One of the light colored peppered moths would be more likely to be seen and eaten in this dark environment.

The ancestors of modern giraffes had shorter necks. Today, all giraffes have long necks.





Principle 1: Differences that can be inherited (variations) exist in every population.

Principle 2: Variations may increase or decrease the chances an organism will survive.

Principle 3: Individuals tend to produce more offspring than can survive.

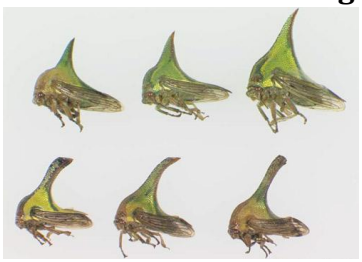
Principle 4: Individuals that survive tend to pass helpful traits on to their offspring.

Principle 5: Over time, the population as a whole becomes better fit for its environment.

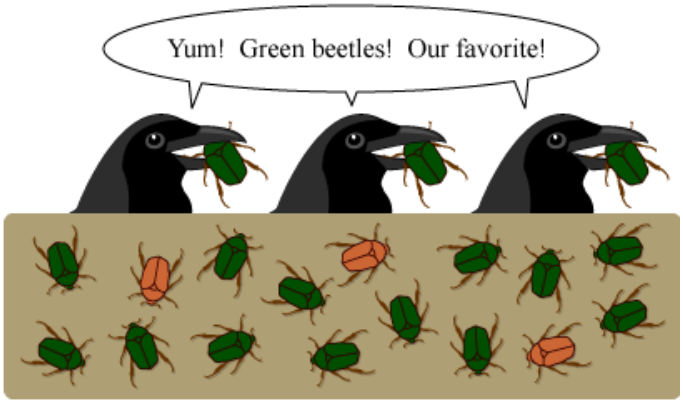
Station 1 Student Sheet: Pictures for each student.

Turtle eggs and turtle hatchlings. Many turtle eggs are laid and not all of the baby turtles will make it to the water.

Each image is an individual thorn bug. Can you see differences in each bug?

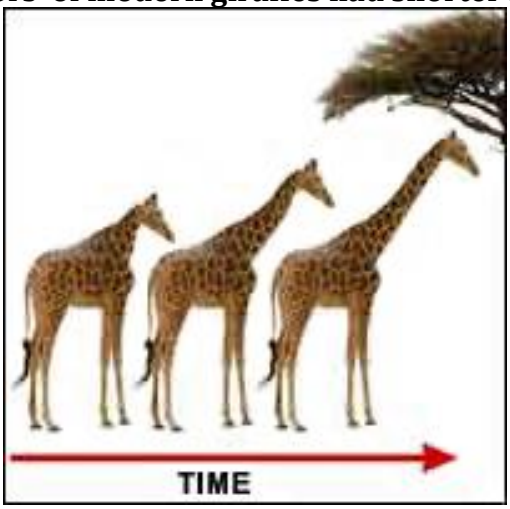


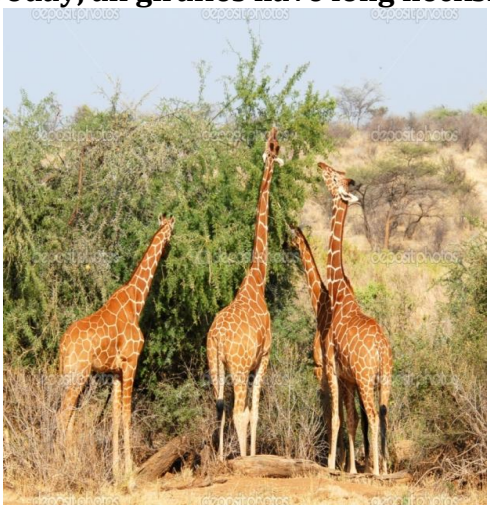
Green Beetles vs. Brown Beetles. Brown beetles are more difficult for predators see in this environment so more brown beetles will survive and reproduce. Eventually, the population will have more brown beetles than green beetles!



The peppered moth is dark colored to match the environment, it is less likely to be seen and eaten! One of the light colored peppered moths would be more likely to see and eaten.

The ancestors of modern giraffes had shorter necks. Today, all giraffes have long necks.





Station 2: Instructions & Notebook Instructions

1. **Open Folder One. Follow the instructions.**
2. **Open Folder Two. Follow the instructions.**
3. **Open Folder Three. Follow the instructions.**
4. **Open Folder Four. Follow the instructions.**

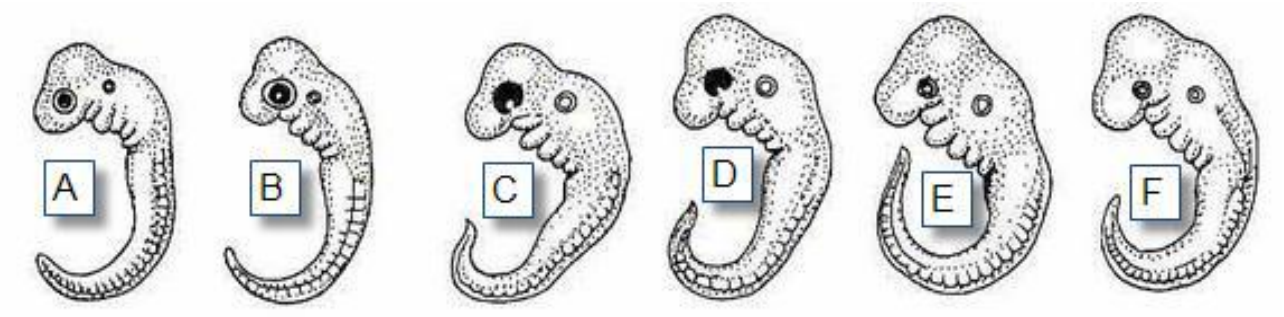
Materials: your notebook, 4 folders, scissors, glue stick

Station 2: Clean up!

5. **Make the station ready for the next group of students.**
6. **Ask your teacher to check your work and cleanup before moving to the next station.**

Folder 1:

1. Study the embryos below.



2. In your notebook, title this page Station 2: _____
   (Leave a space to write in the actual title at a later date.)
   Each station needs to be on a separate paper in your notebook.

3. Leave a space to glue in the above picture into your notebook later.

4. Copy the following chart into your notebook.

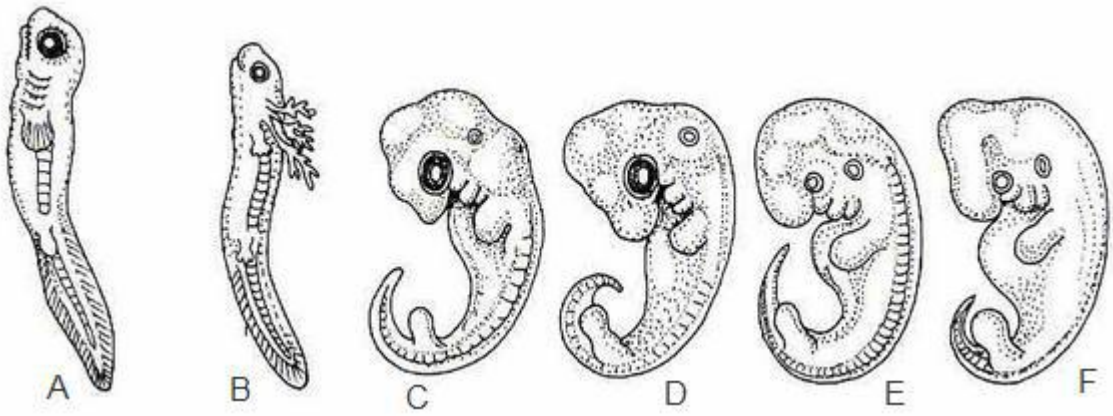
Species	Embryo		
Human			
Chicken			
Rabbit			
Tortoise			
Salamander			
Fish			

5. Take a guess! Match the letter of the embryo to the species in the second column. Don't ask your teacher to check this, just do your best.

6. Beneath this chart in your notebook, write two complete sentences describing two characteristics all the embryos have in common.

Folder 2:

1. These are older, more developed embryos of the same organisms.



2. Continuing on the same page in your notebook, leave a space to glue in the above picture into your notebook later.

3. On the chart you already made, label the third column "More Developed Embryo".

Species	Embryo	**More Developed Embryo**	
Human			
Chicken			
Rabbit			
Tortoise			
Salamander			
Fish			

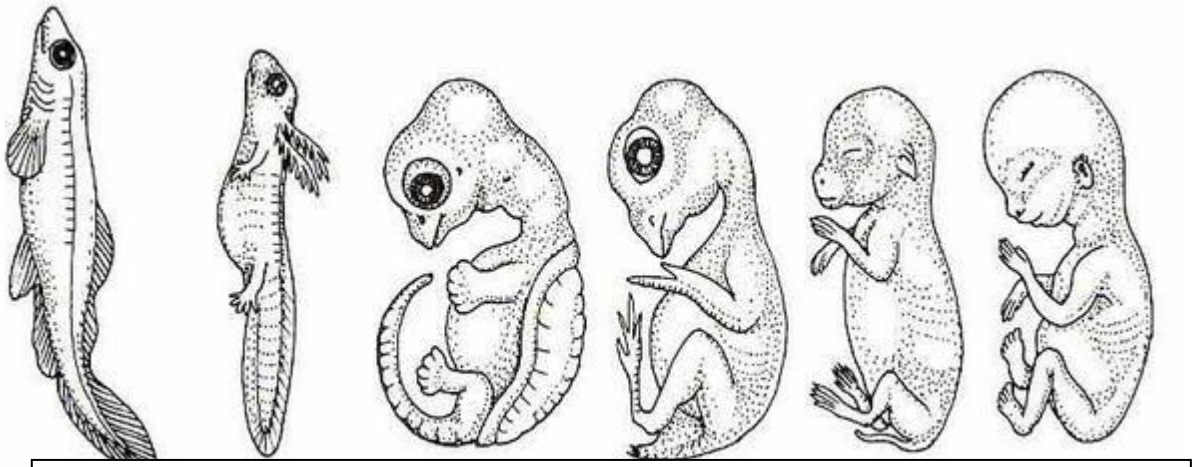
4. Again, take a guess! Match the letter of the embryo to the species in the third column. Don't ask your teacher to check this, just do your best.

5. Write another two complete sentences in your notebook describing two characteristics all these more developed embryos have in common.

6. Did you change any of your answers from column 1 to column 2? Why or why not? (Write your answer with complete sentences in your notebook.)

Folder 3:

1. These are even older, more developed embryos of the same organisms.



A B C D E F

2. Continuing on the same page in your notebook, leave a space to glue in the above picture into your notebook later.

3. On the chart you already made, label the third column "Even More Developed Embryo".

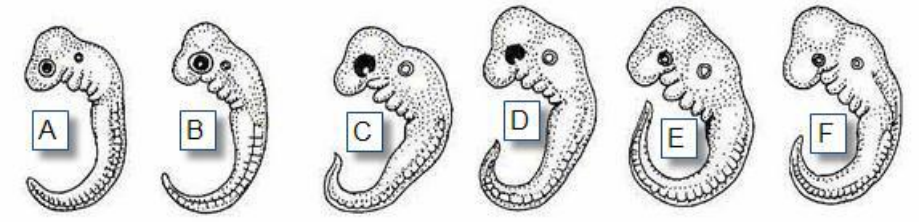
Species	Embryo	More Developed Embryo	Even More Developed Embryo
Human			
Chicken			
Rabbit			
Tortoise			
Salamander			
Fish			

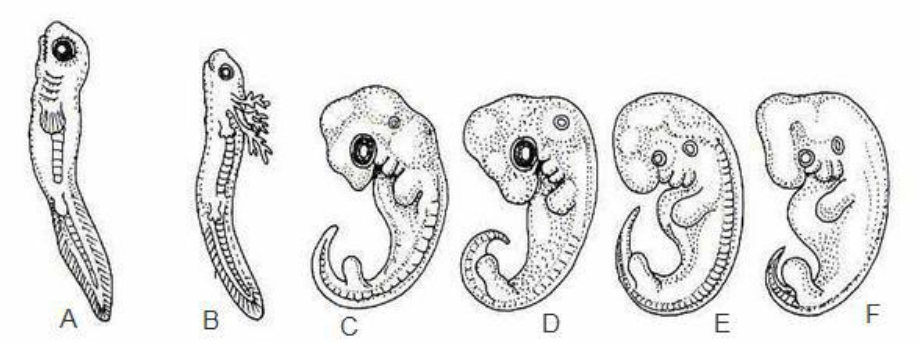
4. Bet you can figure out each species now. Match the letter of the embryo to the species in the fourth column.

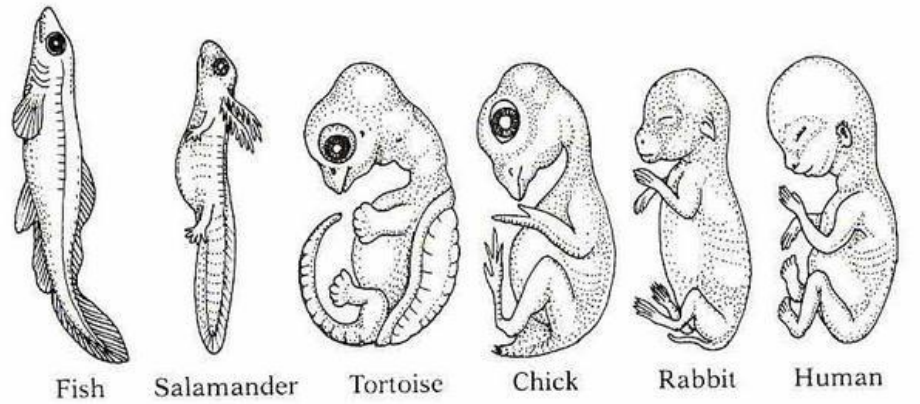
5. Write another two complete sentences in your notebook describing two characteristics all these even more developed embryos have in common.

Folder 4:

Take the sheet in this folder and cut apart the three sets of pictures. Attach each picture into spaces you were instructed to leave in your notebook.







Station 3: Instructions

1. **Study Image 1.**
2. **Study Image 2.**

Materials: Image 1, Image 2

Station 3: Notebook Instructions

Each station needs to be on a separate paper in your notebook.

3. **Complete the Station 3 sheet.**
4. **Place Station 3 sheet in your notebook.**

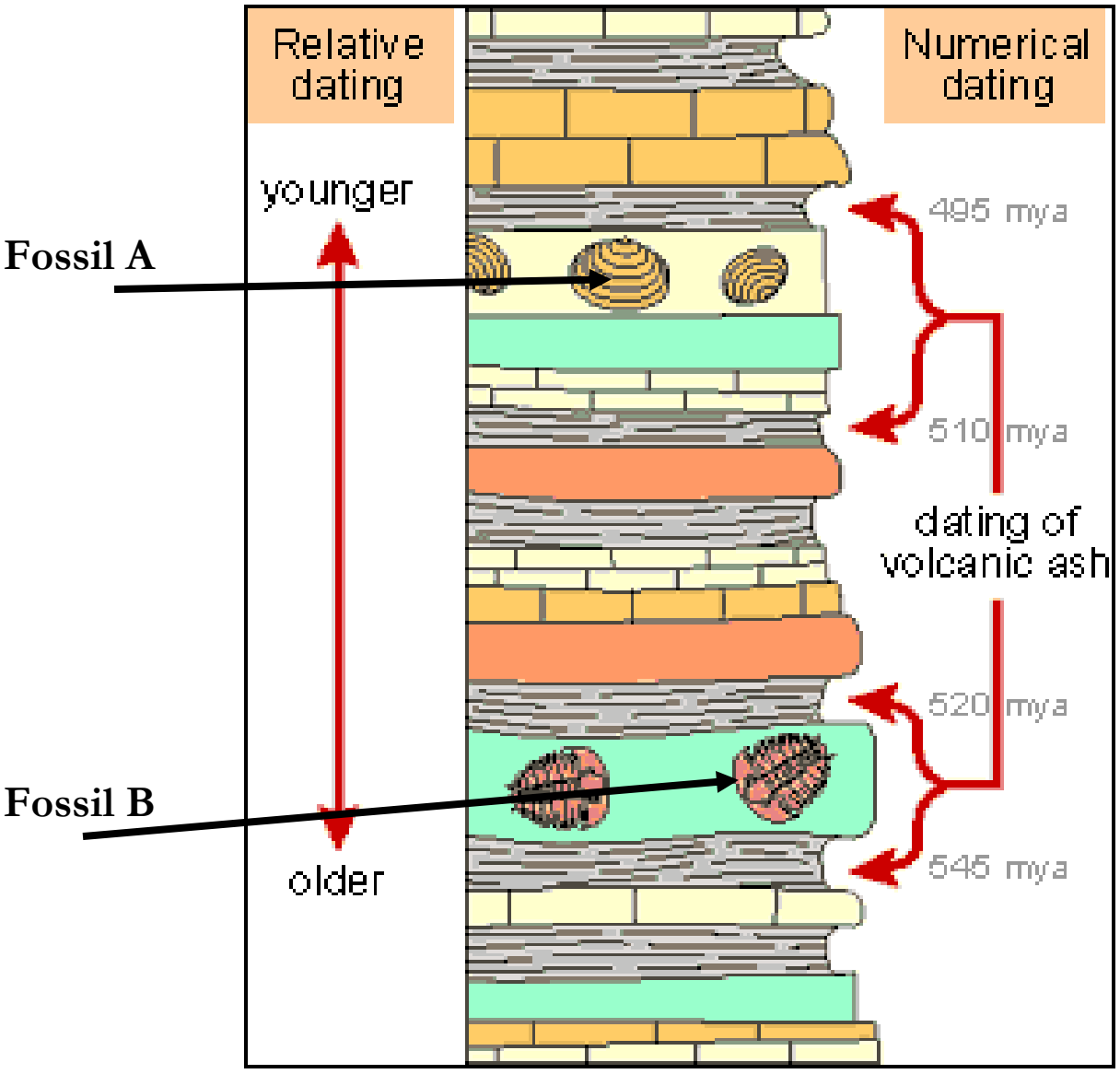
Materials: your notebook, Station 3 sheet

Station 3: Clean up!

5. **Make the station ready for the next group of students.**
6. **Ask your teacher to check your work and cleanup before moving to the next station.**

STATION 3

Image 1



STATION 3

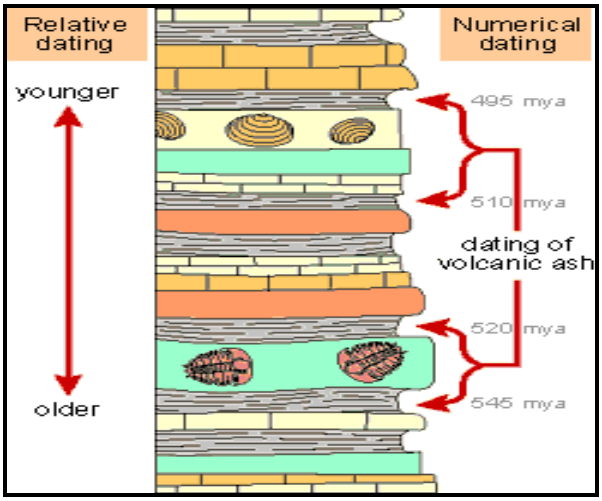
Image 2

This is a series of skulls and front leg fossils of organisms that are the ancestors of the modern-day horse.

				
				
Equus (modern horse)	Merychippus	Pilohippus	Mesohippus	Eohippus (dawn horse)

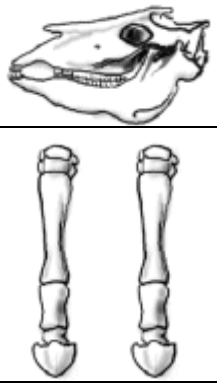
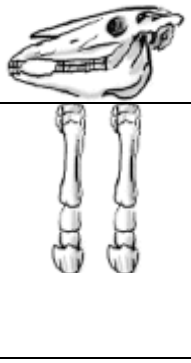
Station 3: _____ (Leave a space to write in the actual title at a later date.)

Image One



1. Fossil B is _____ (younger/older) than Fossil A.
2. Fossil A is approximately _____ million years old.
3. Fossil B is approximately _____ million years old.

Image 2:

				
Equus (modern horse)	Merychippus	Pilohippus	Mesohippus	Eohippus (dawn horse)

Write complete sentences.

1. Give two similarities between each of the skulls that might lead to the conclusion that these are all related species.

2. What is one difference in skull anatomy that occurred from the dawn horse to the modern horse?

3. What is one difference in leg anatomy that occurred from the dawn horse to the modern horse?

Station 4: Instructions

1. **Study Image 1.**

Materials: Image 1

Station 4: Notebook Instructions

Each station needs to be on a separate paper in your notebook.

2. **Complete the Station 4 sheet .**

3. **Place Station 4 sheet in your notebook.**

4. **Copy this table into your notebook and leave enough space to fill it in with complete sentences.**

Animal	Comparison of Human Arm in Structure	Comparison of Human Arm in Function
Whale	Whales have much longer metacarpals.	Whales use limb for swimming.
Crocodile	Crocodiles have shorter humerus, radius and ulna.	Crocodiles use limb for walking and swimming.
Cat		
Bird		
Bat		

Materials: your notebook, Station 4 sheet, colored pencils

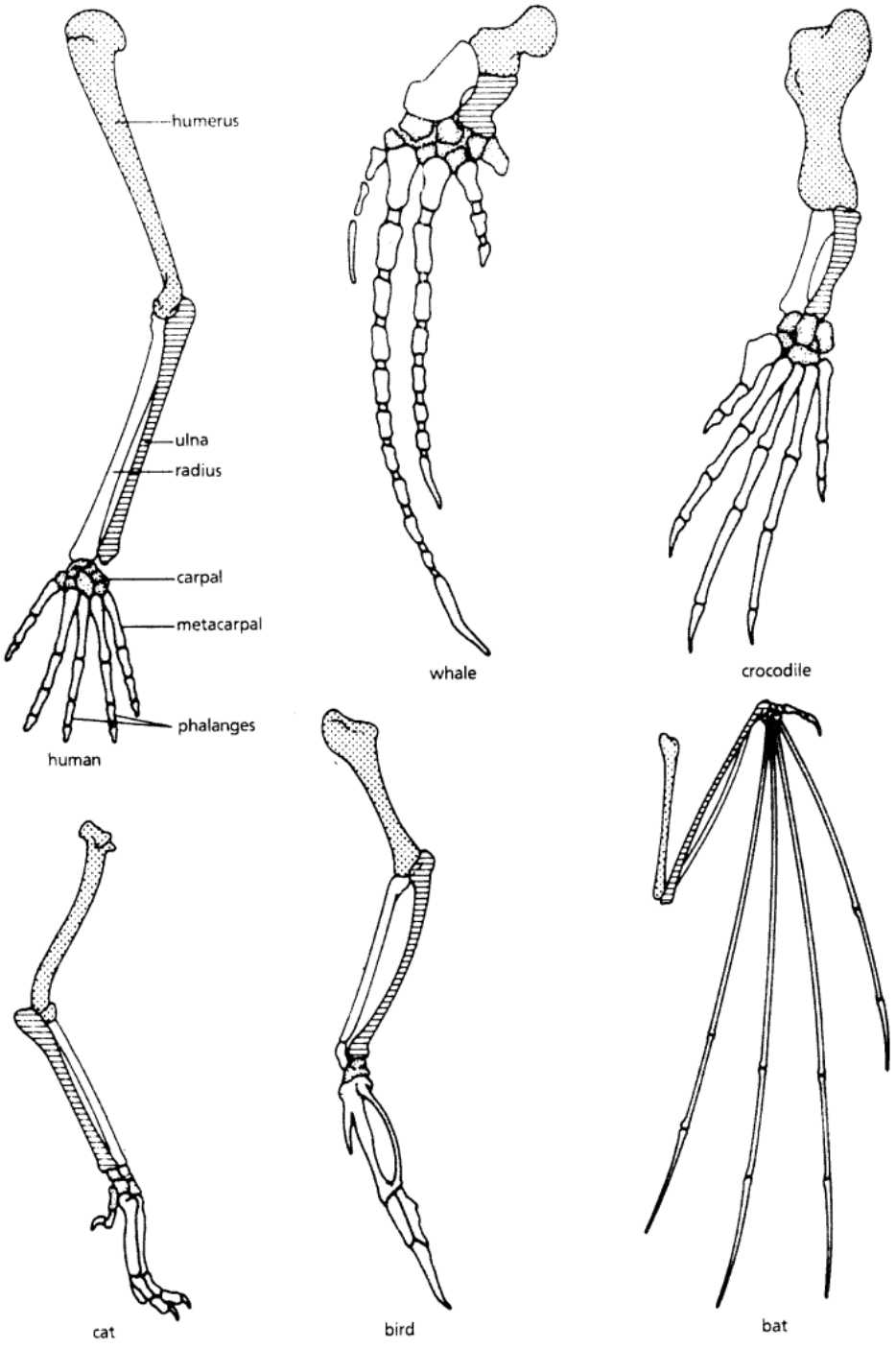
Station 4: Clean up!

5. **Make the station ready for the next group of students.**

6. **Ask your teacher to check your work and cleanup before moving to the next station.**

STATION 4
Image 1

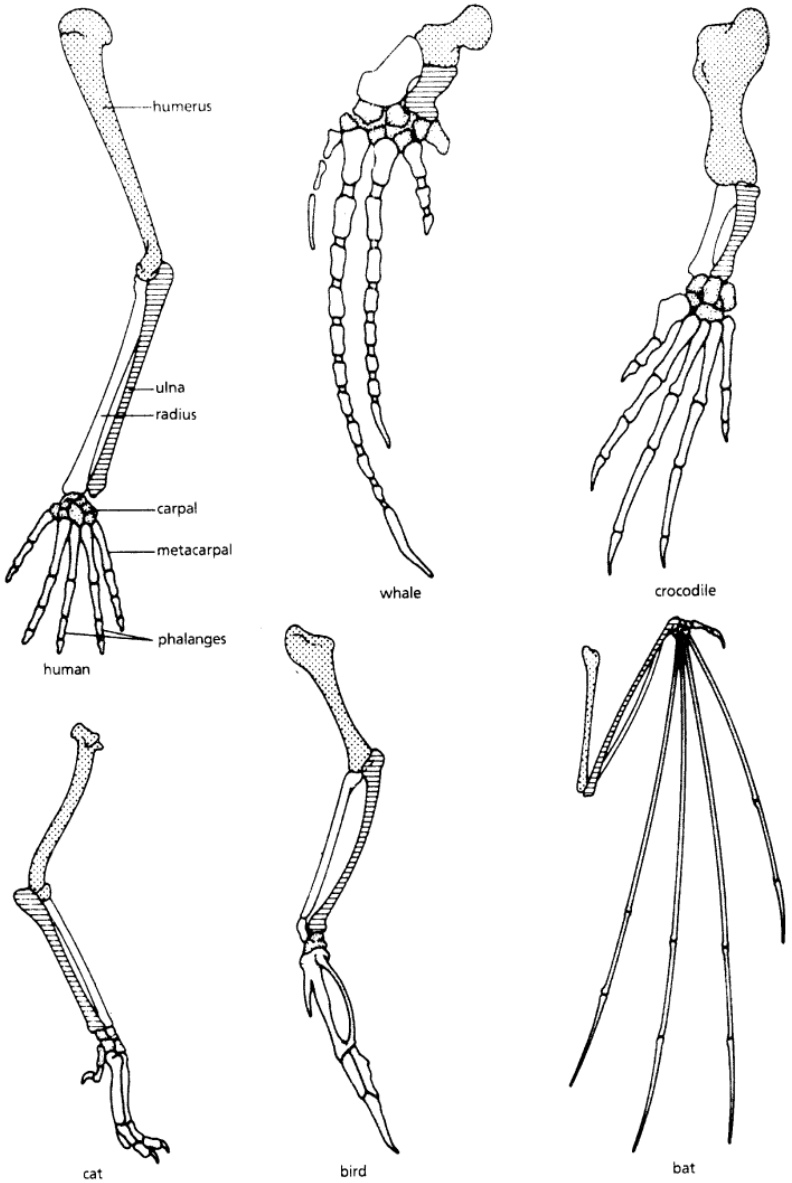
Shown below are images of the skeletal structure of the front limbs of 6 animals; human, crocodile, whale, cat, bird and bat. Each animal has a similar set of bones.



Station 4: _____ (Leave a space to write in the actual title at a later date.)

Shown below are images of the skeletal structure of the front limbs of 6 animals; human, crocodile, whale, cat, bird and bat. Each animal has a similar set of bones. Color each type of bone for each animal the same color according as follows.

Humerus = red	Radius = orange	Metacarpals = green
Ulna = blue	Carpals = brown	Phalanges = yellow



Station 5: Instructions

1. **Study the pictures of the pheasant and duck.**

2. **Place the 12 traits found in the envelope on the Venn Diagram in the appropriate place.**

3. **Ask your teacher to check your work.**

Materials: Venn Diagram, 12 traits (found in envelope)

Station 5: Notebook Instructions

Each station needs to be on a separate paper in your notebook.

4. **Title this page Station 5: _____**
   (Leave a space to write in the actual title at a later date.)

5. **Copy the Venn Diagram with the corresponding traits into your notebook.**

Materials: your notebook

Station 5: Clean up!

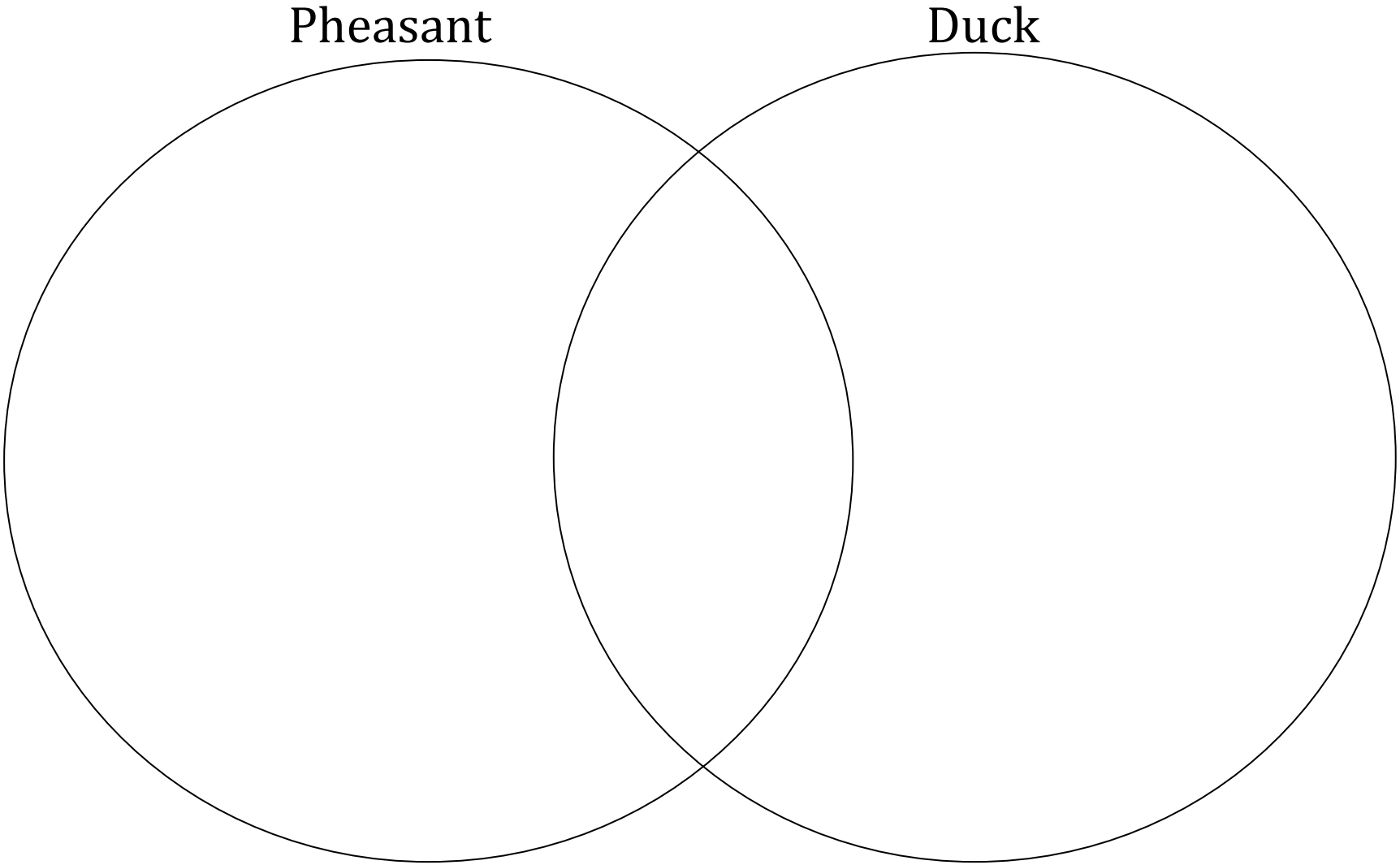
6. **Make the station ready for the next group of students.**

7. **Ask your teacher to check your work and cleanup before moving to the next station.**

STATION 5
Image 1

STATION 5
Image 2

STATION 5
Venn Diagram



tail	wings	beak shape for eating small fish	dull colored female
pointed end of beak	curved end of beak	webbed feet	eyes on side of head
beak shape for eating grain	clawed feet	brightly colored male	feathers

tail	wings	beak shape for eating small fish	dull colored female
pointed end of beak	curved end of beak	webbed feet	eyes on side of head
beak shape for eating grain	clawed feet	brightly colored male	feathers

Station 6: Instructions

1. **Study Image 1.**

2. **Place a functional or not functional card by the appendix and pelvic girdle of each of the six species shown. These cards are found in the envelope.**

3. **Ask your teacher to check your work.**

Materials: Image 1, function or not functional cards (found in envelope)

Station 6: Notebook Instructions

Each station needs to be on a separate paper in your notebook.

4. **Title this page Station 6: _____**
   (Leave a space to write in the actual title at a later date.)

5. **Complete the Station 6 sheet .**

6. **Place Station 6 sheet in your notebook.**

Materials: your notebook, Station 6 sheet

Station 6: Clean up!

7. **Make the station ready for the next group of students.**

8. **Ask your teacher to check your work and cleanup before moving to the next station.**

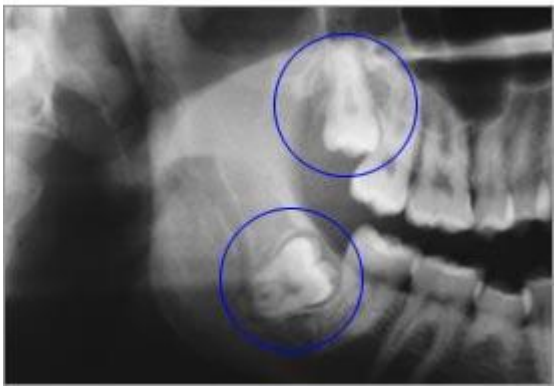
STATION 6: Image 1

Some structures are present in a certain species but not used in that species. Some examples in humans are wisdom teeth and the coccyx bone (tailbone).

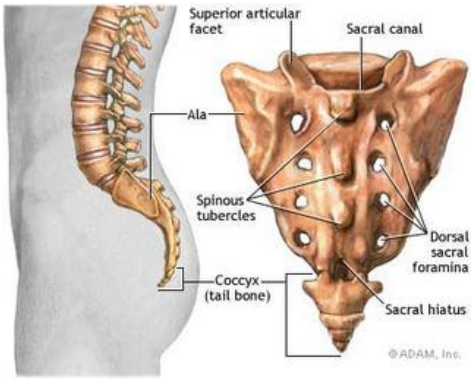
Typically, the non-functional structure is smaller. Notice how the tailbone of the human is much smaller than an animal that has a functional tail.

Not Functional in Humans:

Wisdom Teeth



Coccyx (Tailbone)

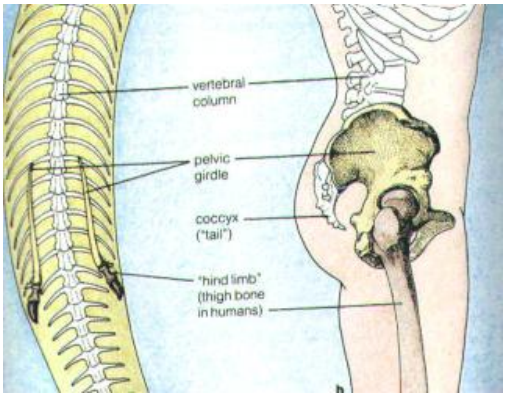


Appendix:

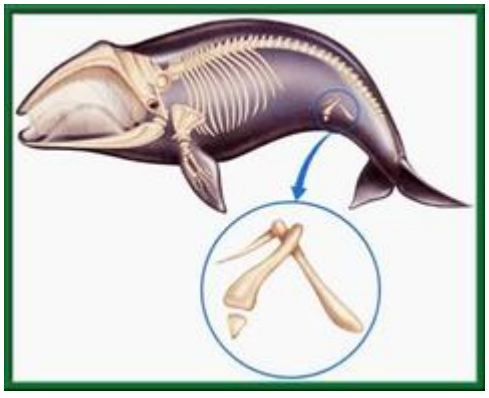
Human Rabbit Zebra

Pelvic Girdle:

Snake Human



Whale



Station 6: _____ (Leave a space to write in the actual title at a later date.)

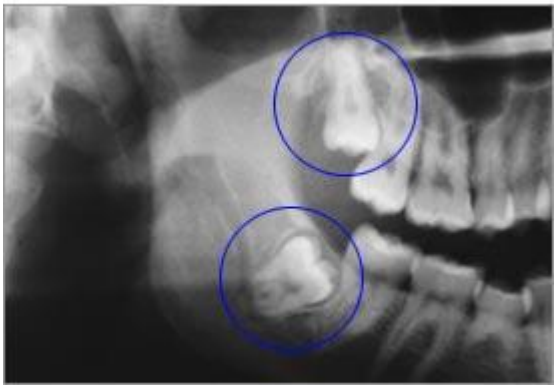
Some structures are present in a certain species but not used in that species. Some examples in humans are wisdom teeth and the coccyx bone (tailbone).

Typically, the non-functional structure is smaller. Notice how the tailbone of the human is much smaller than an animal that has a functional tail.

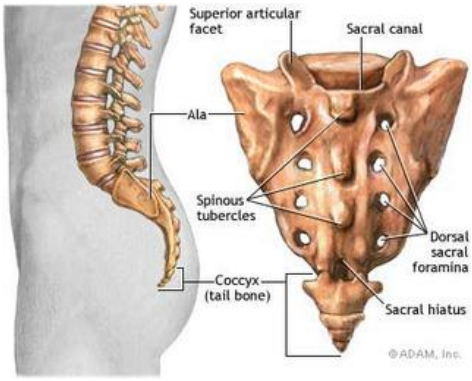
Write functional or not functional by each species appendix and pelvic girdle.

Not Functional in Humans:

Wisdom Teeth



Coccyx (Tailbone)

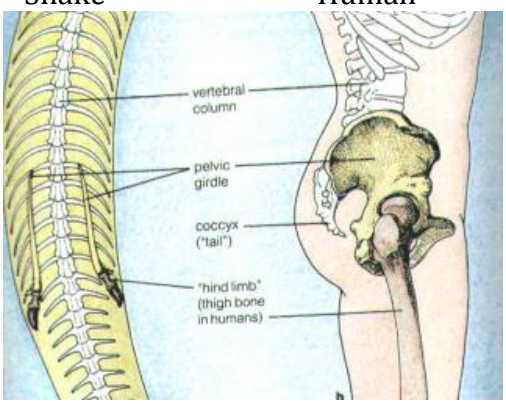


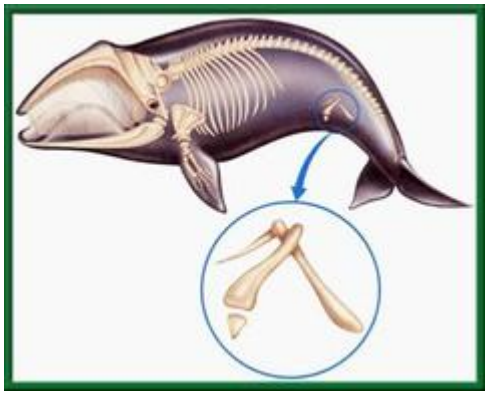
Appendix:

Human Rabbit Zebra

Pelvic Girdle:

Snake Human Whale





functional	not functional
functional	not functional
functional	not functional

functional	not functional
functional	not functional
functional	not functional

functional	not functional
functional	not functional
functional	not functional

functional	not functional
functional	not functional
functional	not functional

Station 7: Instructions & Notebook Instructions

Each station needs to be on a separate paper in your notebook.

1. **Study Image 1.**
2. **Complete the Station 7 sheet.**
3. **Place Station 7 sheet in your notebook.**

Materials: your notebook, Station 7 sheet, highlighter

Station 7: Clean up!

4. **Make the station ready for the next group of students.**
5. **Ask your teacher to check your work and cleanup before moving to the next station.**

STATION 7
Image 1

Cytochrome c is a protein found in mitochondria. Cytochrome c is made of 104 amino acids joined together. Below is a list of amino acids making up part of this protein for 9 animals.

	44	46	47	49	50	53	54	55	56	57	58	60	61
human	P	Y	S	T	A	K	N	K	G	I	I	G	E
chicken	E	F	S	T	D	K	N	K	G	I	T	G	E
horse	P	F	S	T	D	K	N	K	G	I	T	K	E
tuna	E	F	S	T	D	K	S	K	G	I	V	N	N
shark	Q	F	S	T	D	K	S	K	G	I	T	Q	Q
turtle	E	F	S	T	E	K	N	K	G	I	T	G	E
monkey	P	Y	S	T	A	K	N	K	G	I	T	G	E
rabbit	V	F	S	T	D	K	N	K	G	I	T	G	E
frog	A	F	S	T	D	K	N	K	G	I	T	G	E

Station 7: _____ (Leave a space to write in the actual title at a later date.)

For each non-human animal, take a highlighter and mark any amino acids that are different from the human sequence.

Cytochrome c is a protein found in mitochondria. Cytochrome c is made of 104 amino acids joined together. Below is a list of amino acids making up part of this protein for 9 animals.

	44	46	47	49	50	53	54	55	56	57	58	60	61
human	P	Y	S	T	A	K	N	K	G	I	I	G	E
chicken	E	F	S	T	D	K	N	K	G	I	T	G	E
horse	P	F	S	T	D	K	N	K	G	I	T	K	E
tuna	E	F	S	T	D	K	S	K	G	I	V	N	N
shark	Q	F	S	T	D	K	S	K	G	I	T	Q	Q
turtle	E	F	S	T	E	K	N	K	G	I	T	G	E
monkey	P	Y	S	T	A	K	N	K	G	I	T	G	E
rabbit	V	F	S	T	D	K	N	K	G	I	T	G	E
frog	A	F	S	T	D	K	N	K	G	I	T	G	E

Record how many differences you found in the table for each species when compared to humans..

Animal	Number of Differences	Animal	Number of Differences	Animal	Number of Differences	Animal	Number of Differences
chicken		Tuna		turtle		rabbit	
horse		shark		monkey		frog	

Station 8: Instructions & Notebook Instructions

Each station needs to be on a separate paper in your notebook.

Station 8: Instructions

1. **Study the pictures of bat, bird and fly. Compare and contrast the structure of each species' wing.**

2. **Place the 8 traits from the envelope on the Venn Diagram in the appropriate place.**

3. **Ask your teacher to check your work.**

Materials: Venn Diagram, 8 traits

Station 8: Notebook Instructions

Each station needs to be on a separate paper in your notebook.

4. **Title this page Station 8: _____**
   (Leave a space to write in the actual title at a later date.)

5. **Copy the Venn Diagram with the corresponding traits into your notebook.**

Materials: your notebook

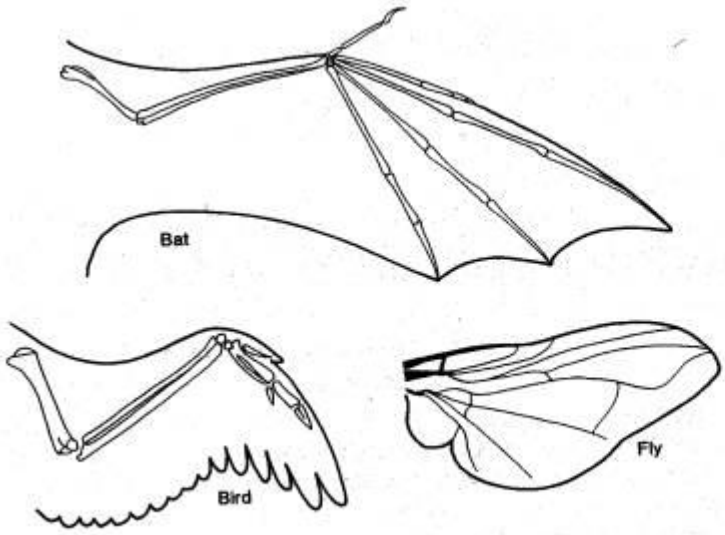
Station 8: Clean up!

6. **Make the station ready for the next group of students.**

7. **Ask your teacher to check your work and cleanup before moving to the next station.**

STATION 8
Image 1

Bat

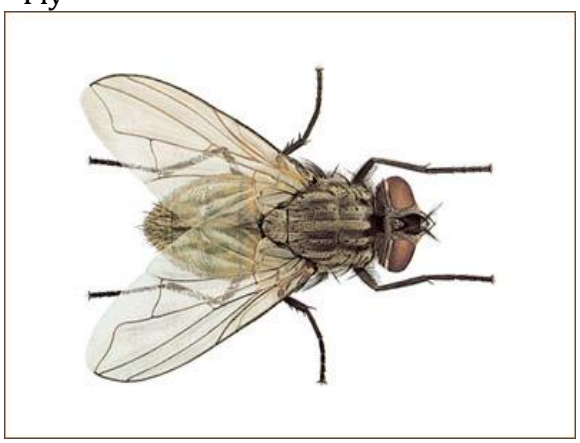


The wings of the bat, bird and fly all have the same function – flight!

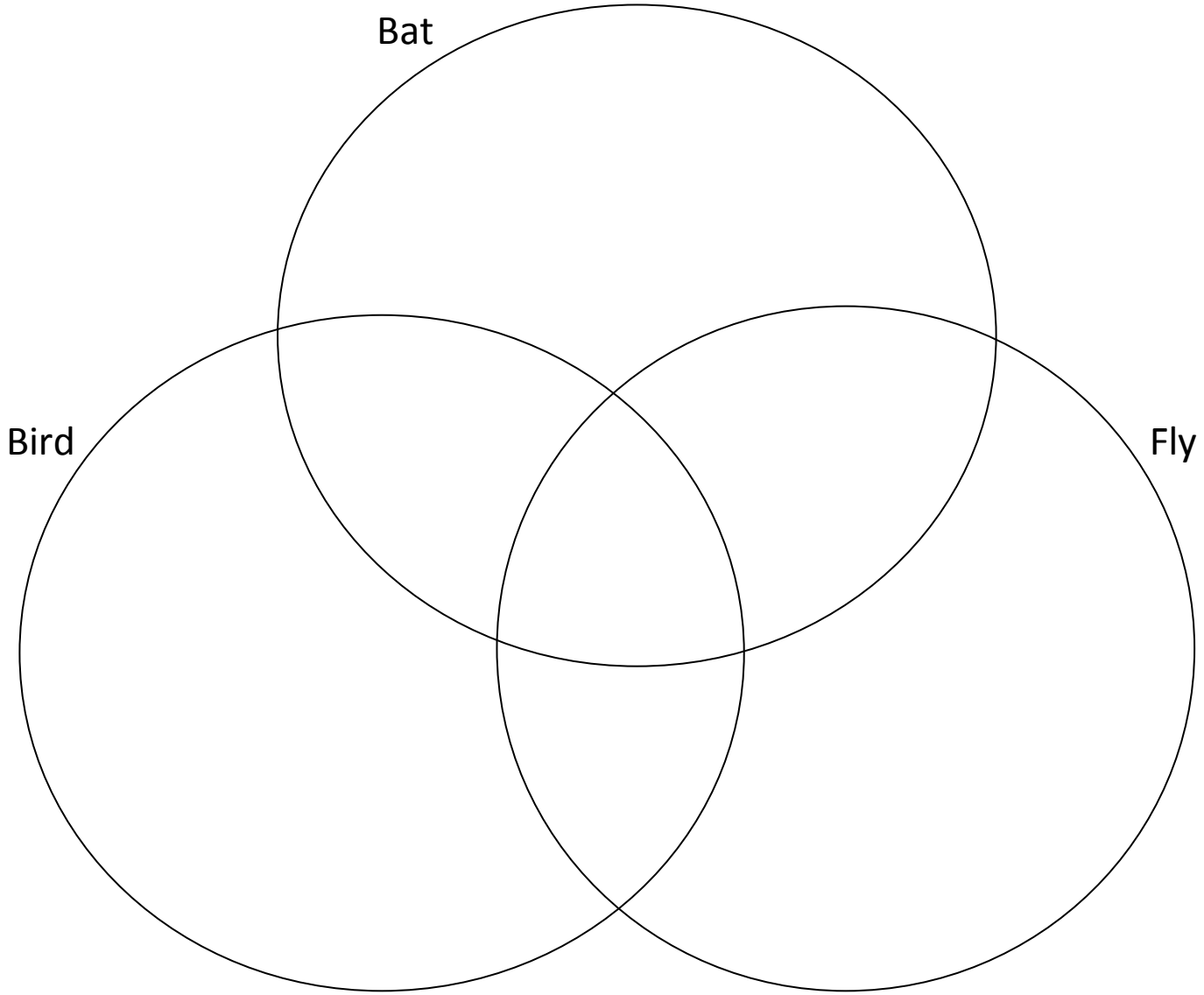
Study each wing's structure. What are the similarities and differences?

Bird

Fly



STATION 8
Image 2: Venn Diagram



transparent	flight	bones	covered in feathers
wings	has a “thumb”	covered in a rubbery skin	veins can be seen

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