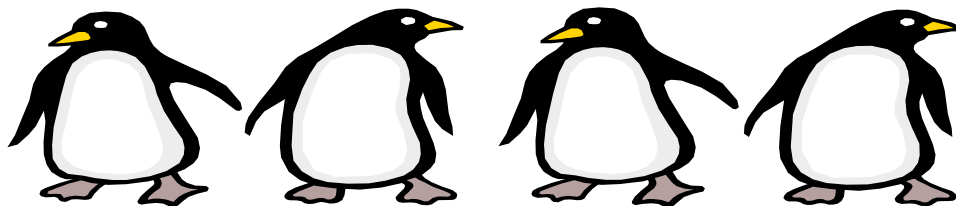


# Biology 2

## lab Packet

for

## Practical 4



**CLASSIFICATION:****Domain: Eukarya Kingdom: Animalia****Phylum: Chordata – Chordates**

Class: Aves – Birds

Order: Struthioniformes - Ostriches

Order: Rheiformes – Rheas

Order: Casuariiformes – Cassowaries

Order: Apterygiformes – Kiwis

Order: Sphenisciformes - Penguins

Order: Gaviiformes - Loons

Order: Podicipediformes – Grebes

Order: Procellariiformes – Tube noses

Order: Pelicaniformes – Pelicans

Order: Ciconiiformes – Herons/Egrets

Order: Phoenicopteriformes - Flamingos

Order: Anseriformes – Ducks

Order: Falconiformes – Raptors

Order: Galliformes - Quail

Order: Gruiformes – Coots

Order: Charadriiformes – Gulls and Allies

Order: Columbiformes – Pigeons

Order: Psittaciformes – Parrots

Order: Cuculiformes – Roadrunners

Order: Strigiformes - Owls

Order: Caprimulgiformes – Nighthawks

Order: Apodiformes – Hummingbirds

Order: Trogoniformes – Trogons

Order: Coraciiformes – Kingfishers

Order: Piciformes – Woodpeckers

Order: Passeriformes - Songbirds

**Introduction – Birds**

Although chordates vary widely in appearance, they are distinguished as a phylum by the presence of four anatomical features that appear sometime during their life time. They exhibit deuterostome development and bilateral symmetry. Chordates only comprise 5% of the animal species but may be the most commonly known phylum. Birds are endothermic homeotherms which have adapted to many different ecosystems in the world.

**Station 1 – Class: Aves**

1. What three adaptations do birds have for flight?
2. What other characteristics are seen in birds?

**Station 2 – *Archaeopteryx***

1. What characteristics are seen in *Archaeopteryx* that are bird-like?
2. What characteristics are seen in *Archaeopteryx* that are reptile-like?

### Station 3 – Feathers

1. What are feathers made of?
2. Be able to recognize the six types of feathers and know their functions. Also be able to recognize the feathers in the display.

**Contour Feather**



**Flight Feather**



**Downy Feather**



**Filoplume**



**Semiplume**



**Bristle Feather**



**Station 4 – Color**

1. What causes the different colors we see in bird's today?
2. Know what produces the following colors in the following birds.

Red in Northern Cardinals:

Pink in Flamingo's:

Blue in Western Scrub-Jays

Yellow in the American Goldfinch

Iridescent colors in the Anna's Hummingbird

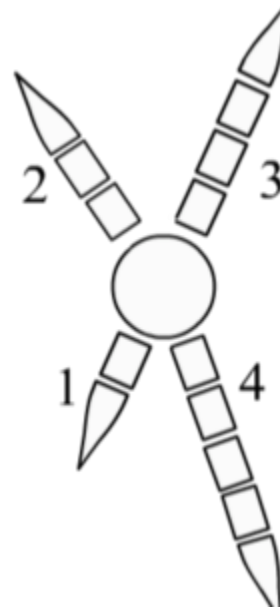
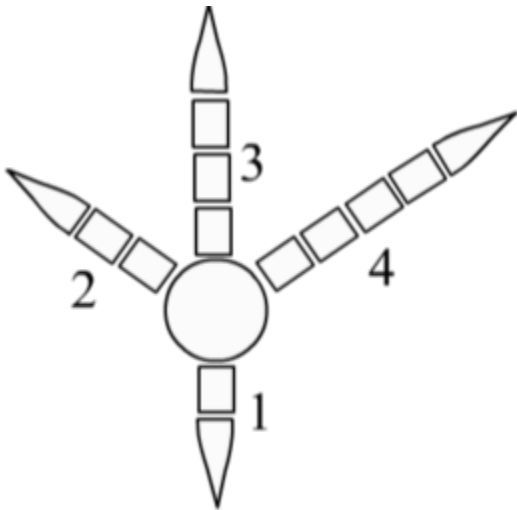
3. What are the different types of plumage mentioned and what is their function?

**Station 5 – Bones and Muscles**

1. What are the three regions in birds where bones are fused together and what are each of them called?
2. What is the muscle in birds which lifts their wings? What is the muscle that is used to lower the wings?
3. How much of a bird's body mass is accounted for by the flight muscles?

**Station 6 – Feet**

1. The part of a bird’s leg that looks like a “backwards” knee is actually what part?
2. What is the name of the type of foot seen on the left below?
3. What is the name of the type of foot seen on the right?



**Station 7 – Reproductive Behavior – Monogamy**

1. What is meant by Socially Monogamous?
2. What are Extra-pair copulations?
3. How many species of birds are considered Socially Monogamous?

**Station 8 – Reproductive Behavior – Red-winged Blackbirds**

1. What is polygyny?
2. What conditions favor this condition?

**Station 9 – Reproductive Behavior – Sage Grouse**

4. What is Lekking? What is the name of the area used for display?
5. What are the benefits of Lekking?

**Station 10 – Reproductive Behavior – Northern Jacana**

1. What is polyandry?
2. Using this type of reproductive behavior, what happens to the sexual roles in these birds?
3. What is the evolutionary reason for polyandry?

**Station 11 – Reproductive Behavior – Acorn Woodpecker**

1. What is polygyandry?
2. Why do Acorn woodpeckers primarily live in groups?
3. What is special about the way they nest?

**Station 12 – Reproductive Behavior – Brown-headed Cowbirds**

1. What is brood parasitism?
2. How many species do they parasitize?
3. What is the cost to the host species?

**Station 13 – Reproductive Behavior – Phainopepla**

1. What is this birds typical diet?
2. What is unique about this birds nesting behavior?
3. How do they behave in the desert environment?
4. How do they behave in the woodland area?

**Station 14 – Reproductive Behavior - Eggs**

1. Other vertebrates lay eggs, but bird egg laying is unique among vertebrates. Why?
2. What is the largest egg?
3. What is the smallest egg?

**Station 15 – Feeding Behavior – Adaptations**

<b>Bird Skull</b>	<b>Adaptation</b>	<b>Picture</b>
<b>Ostrich</b>		
<b>Brown Kiwi</b>		
<b>Indian Yellow-nosed Albatross</b>		
<b>Great Blue Heron</b>		
<b>Scarlet Ibis</b>		
<b>Roseate Spoonbill</b>		
<b>Caribbean Flamingo</b>		
<b>Duck</b>		
<b>Harpy Eagle</b>		
<b>Peregrine Falcon</b>		
<b>Turkey Vulture</b>		



<b>California Condor</b>		
<b>Common Snipe</b>		
<b>King Penguin</b>		
<b>Black Hornbill</b>		
<b>Toco Toucan</b>		
<b>Scarlet Macaw</b>		
<b>Owl</b>		
<b>Pileated Woodpecker</b>		
<b>Wren</b>		

**Station 16 – Resource Partitioning**

1. What is resource portioning?
2. How does an American Avocet's bill differ from a Black legged Stilt?

**Station 17 – Ducks (Dabblers vs. Divers)**

1. What is a dabbler? What is a diver?
2. How do the legs differ between these two different types of duck?
3. Know the Northern Pintail and Northern Shoveler which are dabblers and the Hooded Merganser is a diving duck.

**Station 18 – Loggerhead Shrikes**

1. Why are they considered a bird of prey?
2. How do they kill their food?
3. What is their nickname?

**Station 19 – Hawks and Falcons**

1. What is the common diet for a Red-tailed Hawk?
2. What is the Peregrine Falcon known for? What do they eat?
3. What is a Kestrel? What do they eat? What is “unique” about their flight pattern?

**Station 20- Bird Migration**

1. What are the four groups birds can be placed in?
2. Why do birds migrate?
3. What are the four “flyways” in North America?

**Station 21 – Communication**

1. How do birds communicate?
2. What do songs consist of? How does a song of a cardinal differ from that of a mockingbird?
3. How do birds produce these sounds? Why do mourning doves making only cooing noises?
4. What is a call? How do bushtits use these?
5. How do you recognize the call of a Wrentit?
6. What separates the Western Meadowlark species from the Eastern Meadowlark?

**Station 22 – Bird Songs**

Be able to recognize the songs from the following birds.

1. Barn Owl
2. Great Horned Owl
3. California Quail
4. Red-Shouldered Hawk
5. Red-Tailed Hawk
6. Cactus Wren
7. Bushtit
8. Wren Tit
9. Mocking Bird
10. Mourning Dove
11. Acorn Woodpecker
12. Belted Kingfisher

**Station 23 – Desert Adaptations – Roadrunners**

1. What is torpor? Why do roadrunners do this?
2. What adaptation do Roadrunners have to help them use less energy “waking up” from torpor?

**Station 24 – Desert Adaptations - Cactus Wrens**

1. How did these birds get their name?
2. Why do these birds make multiple nests?

**Station 25 – Desert Adaptations – Gambel’s Quail**

1. What is their typical body temperature? What can they do to this temperature to reduce water loss?
2. How much body weight can they lose in water?

**Station 26 – Owls**

1. Why are owls thought to be nocturnal?
2. How far can Owl’s turn their head? Why can they do this? Why is it necessary?
3. Which species of Owl is diurnal? How do the young protect themselves in the nest?
4. Know the difference between the Barn Owl and the Great Horned Owl.

**Station 27 – Introduced Species**

1. Why were Starling introduced to the United States? What problems are they causing?
2. What is one of the more common introduced species in our area? What was their original name?

**Station 28 – Other Behaviors- Killdeer**

1. Where do these birds lay their eggs?
2. How do the adults protect their young?

**Station 29 – Other Behaviors – Penguins and Alcids**

1. Where are penguins found? Where are Murrelets and Auklets found?
2. What do they have in common? How are they different?

**Station 30 – Hummingbirds and Swallows**

1. What does the order these birds are in mean?
2. What do hummingbirds eat?
3. Be able to identify the hummingbirds at this station.
4. What do swallows eat?
5. What types of nest do they make?

**Station 31 – Other Behaviors – Common Birds**

Be able to recognize the following birds in your neighborhoods

American Robin

Brewer's Blackbird

Black Phoebe

Northern Oriole

California Thrasher

California Towhee

Crow

House Finch

Plain Titmouse

Spotted Towhee

Western Gnatcatcher

Western Kingbird

Western Bluebird

Yellow-rumped Warbler

**Station 32– Bird Orders**

Be able to identify the examples of each of the bird orders.

<b>Order</b>	<b>Description</b>	<b>Characteristics</b>
Order: Pelicaniformes	Pelicans – Four webbed toes, long beak with throat pouch	
Order: Coraciiformes	Kingfishers – Strong prominent bill, colorful feathers	
Order: Apodiformes	Hummingbirds – Small birds with short legs, small feet, with long, slender beaks	
Order: Columbiformes	Pigeons, Doves – Slender bill with soft skin at base, short neck	
Order: Falconiformes	Raptors – Birds of Prey	
Order: Anseriformes	Ducks – Broadened bills, short legs with webbed feet	
Order: Galliformes	Quail – Hen-like birds with short beaks	
Order: Gruiformes	Coots – Smaller birds with short beaks	
Order: Charadriiformes	Shorebirds	
Order: Psittaciformes	Narrow hooked beak with brilliant plumage	
Order: Cuculiformes	Greater Roadrunner – Varied, local bird with long legs and tail	
Order: Strigiformes	Owls - Nocturnal birds of Prey	
Order: Piciformes	Woodpeckers – Thick bill for drilling holes	
Order: Casuariiformes	Cassowaries - Flightless Walking Bird (3 toes)	
Order: Struthioniformes	Ostriches - Flightless Walking Bird (2 toes)	
Order: Rheiformes	Rheas - Flightless Walking Bird (3 toes)	
Order: Apterygiformes	Kiwis - Small flightless bird	
Order: Tinamiformes	Tinamous - Poor flying birds	
Order: Sphenisciformes	Penguins – Web footed, short winged, marine birds	
Order: Trogoniformes	Trogon – Brightly colored, long tailed tropical birds	
Order: Gaviiformes	Loons – Heavy bodied, diving birds	
Order: Podicipediformes	Grebes – Short legged divers with lobed feet	
Order: Procellariiformes	Tubenoses – Marine birds with tubular nostrils on beak	
Order: Ciconiiformes	Waders – Long-necked, long legged waders	
Order: Caprimulgiformes	Nighthawks – Night fliers	
Order: Passeriformes	Songbirds – very variable	



**Station 33 – CLASS: AVES – EXTERNAL FEATURES (P 205, Figs. 8.40-8.41)**

1. Note the skeleton and the preserved specimen of the pigeon. Note the pectoral girdle. What three pairs of bone make up this structure? What is the function of the large sternum (keel)?
  
2. Do birds have teeth? Why or why not?

**Station 34 – CLASS: AVES – INTERNAL FEATURES (P 206, Figs. 8.42 – 8.43)**

<b>System</b>	<b>Structure</b>	<b>Function</b>
<b>Digestive System</b>	<b>Esophagus</b> <b>Crop</b> <b>Proventriculus</b> <b>Gizzard</b> <b>Intestine</b> <b>Liver</b> <b>Pancreas</b> <b>Cloaca</b>	
<b>Excretory System</b>	<b>Kidneys</b>	
<b>Circulatory System</b>	<b>Atria (2)</b> <b>Ventricle (2)</b> Double Circuit system (whole system) Compare to Mammal (Why the difference is size?)	
<b>Respiratory System</b>	<b>Lungs</b> <b>Air Sacs</b>	
<b>Reproductive System</b>	Ovaries or Testes	

**Station 35 – VERTEBRATE HEART SERIES**

Be able to recognize the listed structures.

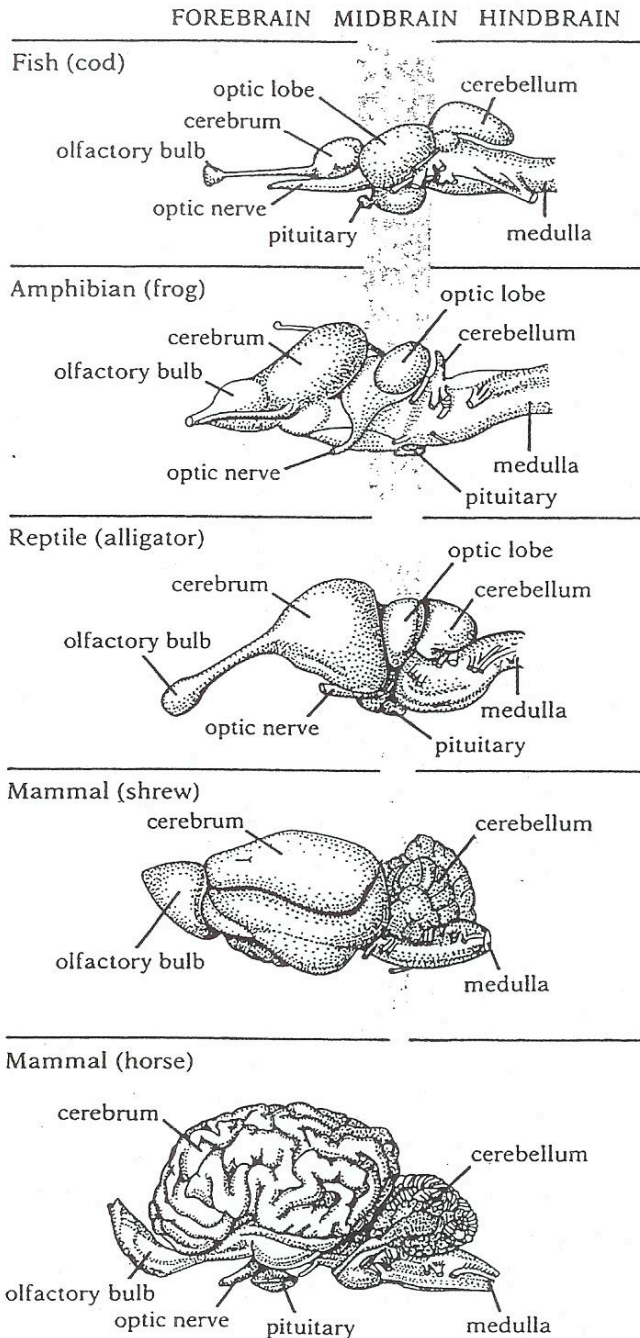
- a) Fish Heart (sinus venosus, atrium, ventricle, bulbus arteriosus, truncus arteriosus)
- b) Amphibian Heart (sinus venosus, right atrium, left atrium, ventricle, conus arteriosus, truncus arteriosus, pulmo-cutaneous artery, aorta)
- c) Turtle Heart (sinus venosus, right and left superior vena cava, inferior vena cava, right atrium, left atrium, ventricle, pulmonary veins, aorta)
- d) Crocodile Heart (right and left superior vena cava, inferior vena cava, right atrium, left atrium, right ventricle, left ventricle, pulmonary veins, aorta)
- e) Bird Heart (right and left superior vena cava, inferior vena cava, right atrium, left atrium, right ventricle, pulmonary arteries, aorta)
- f) Mammal Heart (superior vena cava, inferior vena cava, right atrium, left atrium, right ventricle, left ventricle, pulmonary arteries, aorta)

**Station 36 – VERTEBRATE BRAIN SERIES**

Be able to recognize the listed structures and their functions

Name	Function
Medulla Oblongata	
Pons	
Mesencephalon (midbrain)	
Cerebellum	
Optic Lobe	
Olfactory Lobe	
Cerebrum	

THE BRAIN 455



**10.49 Evolutionary change in relative size of midbrain and forebrain in vertebrates**

In this evolutionary sequence the relative size of the midbrain shows a marked decrease, and that of the forebrain a very considerable increase. [Modified from A. S. Romer, *The vertebrate body*, Saunders, 1962; and G. G. Simpson, C. S. Pittendrigh, and L. H. Tiffany, *Life: An introduction to biology*, copyright, © 1957, by Harcourt Brace Jovanovich, Inc., used by permission of the publishers.]

## Introduction – Mammals

Like all chordates, mammals have the presence of four anatomical features both as juveniles and adults although in adults they are highly modified. They exhibit deuterostome development and bilateral symmetry. Mammals are endothermic, homeotherms which have adapted to survive in many different ecosystems in the world. They have hair and mammary glands to feed their young which make them unique among the animals in this kingdom.

Class: Mammalia - Mammals

Order: Monotremata – Monotremes

Duck-billed Platypus

Echidna

Order: Marsupialia: Marsupials

Kangaroo

Koala

Bush-tailed Possum

Virginia Opossum

Sugar Gliders

Order: Proboscidea – Elephants

Order: Hyracoidea: Hyraxes

Order: Tubulidentata – Armadillos

Order: Sirenia – Manatees

Order: Xenarthra – Anteaters, Sloths, Armadillos

Order: Artiodactyla – Even-toed Ungulates

Pig family

Warthog

Wild Boar

Peccary family

Peccary

Hippopotamus family

Hippopotamus

Camel Family

Camel

Llamas

Alpaca

Deer Family

Sika Deer

Fallow Deer

Chital (Axis) Deer

Rusa Deer

Red Deer

Elk

White-tailed Deer

Mule Deer

Moose

Caribou

Giraffe Family

Giraffe

Okapi

Bovidae Family - Pronghorn

Pronghorn

Bovidae Family - Cattle

American Bison

Water Buffalo

Banteng

Dwarf Buffalo

Asiatic Buffalo

Cape Buffalo

Bovidae Family – Small Antelope

Harvey's Red Duiker

Bovidae Family – Spiral-horned Antelope

Chobe Bushbuck

Livingston Eland

East African Eland

Common Eland

Southern Greater Kudu

East African Greater Kudu

Lesser Kudu

Bovidae Family – Grazing Antelope (Open Woods)

Southern Impala

East African Impala

White Blsebok

Common Blesbok

Black Wildebeest

Nyasa Wildebeest

Cookson's Wildebeest

Blue Wildebeest

Coke Hartebeest

Cape Hartebeest

Lelwel Hartebeest

Lichtenstein Hartebeest

Bovidae Family – Grazing Antelope (Wetlands)

Western Kob

Mountain Reedbuck

Common Reedbuck

Crawshay Defassa Waterbuck

Kafue Flats Lechwe

East African Deffasa Waterbuck

Common Waterbuck

Bovidae Family – Grazing Antelope (Horse-like)

Kalahari Gemsbok

Fringe-eared Oryx

Southern Roan

Sable Antelope

Arabian Oryx

Bovidae Family – Gazelles

White Springbok

Cape Springbok

Black Springbok

Southern Grant Gazelle

Southern Gerenuk

Bovidae Family – Dwarf Antelopes

Kirk's Dik-Dik

Bovidae Family – Goat Antelopes

Musk Ox

Mountain Goat

Big Horn Sheep

Chamois

Himalayan Tahr

Spanish Ibex

European Mouflan

Class: Mammalia – Mammals (cont.)

Order: Cetacea

Pygmy Sperm Whale  
 Minke Whale  
 Blue Whale  
 Sperm Whale  
 Beluga Whale  
 Bottle-nosed Dolphin  
 White-sided Dolphin  
 Humpback Whal  
 Orca Killer Whale.

Order: Perissodactyla -Odd toed Ungulates

Equine Family  
     Horses  
     Zebra  
 Tapir Family  
 Rhinoceros Family  
     White Rhino  
     Black Rhino

Order: Carnivora – Carnivores

Feline Family  
     Mountain Lion  
     Bobcat  
     African Lion  
     Bengal Tiger  
     Leopard

Canid Family

Coyote  
 Gray Wolf  
 Silver Fox  
 Red Fox  
 Kit Fox  
 Arctic Fox

Bear Family

Alaskan Brown Bear  
 Polar Bear  
 Grizzly Bear  
 American Black Bear  
 European Brown Bear  
 Giant Panda

Raccoon Family

Raccoon  
 Coati  
 Red Panda  
 Ringtail

Weasel Family

Long-tailed Weasel  
 Pine Martin  
 Mink  
 Wolverine  
 Badger  
 Skunks  
 Sea Otter  
 River Otter

Mongoose Family

Meerkats

Hyena Family

Hyenas

Pinneped Family

Walrus

California Sea Lion

Weddel Seal

Crabeater Seal

Leopard Seal

Order: Chiroptera – Bats

Vampire Bat

Pallid Bat

Western Pipistrelle

Order: Insectivora – Insect Eaters

Mole

Shrew

Order: Pholidata – Scaly Anteaters

Order: Rodentia – Rodents

Naked Mole Rats

Beaver

Ground Squirrel

Gray Squirrel

Kangaroo Rat

Capybara

Gopher

Deer Mouse

Norway Rat

Antelope Ground Squirrel

Chipmunk

Order: Lagomorpha – Rabbits

Jack Rabbit

Cottontail

Order: Dermoptera – Flying Lemurs

Order: Scandentia – Tree Shrews

Order: Primates – Primates

Old World Monkeys

Olive Baboon

New World Monkeys

Great Apes

Gorilla

Orangutan

African Chimp

Bonobos

*Sahelanthropus*

*Australopithicus afarenis*

*Australopithicus africanus*

*Parathropus bosei*

*Homo erectus*

*Homo neanderthalensis*

Cro-magnon

*Homo sapiens*

## **Museum Questions**

### **Station 1 – Class: Mammalia**

1. What are the characteristics listed for mammals?

### **Station 2 – Mammal Classification**

1. What are the three major types of mammals and their characteristics?

### **Station 3 – Order: Monotremata – Be Able to recognize the two animals from this station**

1. What makes them different than other mammals? How is milk delivery different than other mammals?
  
2. Monotremes are one of two groups of venomous mammals. What structure delivers the venom in male Duck-billed Platypus? How is this structure used in echidnas?

**Station 4 – Order: Marsupialia**

1. What makes marsupials different from placental mammals?
2. What is unique about their penis and vagina?
3. Be able to recognize the following animals.
  - a. Kangaroo
  - b. Koala
  - c. Brush-tailed Possum
  - d. Sugar Gliders
  - e. Virginia Opossum
4. Be able to recognize the following skulls: Kangaroo and Opossum.
5. What is the only marsupial found in this area (Southern California)?
6. What type of tail do they have? What do they have on their back feet which are similar to those in primates?
7. Their immune system is robust. What are they immune to? Why are they not carriers of rabies?
8. What do they do when confronted by a predator?
9. How many teeth do opossums have? What do they eat?

**Station 5 – Ungulates**

1. What is an ungulate? How are ungulates usually divided into groups?
  
2. What are their general characteristics?
  
3. What changes have occurred to their feet?

**Station 6 – Order: Proboscidea**

1. What is the trunk on an elephant?
  
2. How much does the skull comprise of an elephant’s body weight? What other changes have occurred to their skull to accommodate their large size?
  
3. What adaptations are seen in an elephant’s foot?
  
4. What is the difference between African and Asian Elephants?

	<b>African Elephant</b>	<b>Asian Elephant</b>
<b>Ears</b>		
<b>Tusks</b>		
<b>Nails on back feet</b>		



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**Station 7 – Order: Hyracoidea**

1. What does the word hyrax mean?
2. What primitive features do these animals retain?
3. What are their closest living relatives?

**Station 8 – Order: Tubulidentata**

1. What do Aardvarks eat?
2. How does their dentition differ from others who eat this diet?
3. Aardvarks do not chew their food. How do they accomplish this?

**Station 9 – Order: Sirenia**

1. What is the common name of these animals? What do they eat?
2. What modification do they have for their aquatic way of life?
3. What are their two closest relatives?

**Station 10 – Order: Xenarthra**

1. What does Xenarthra mean? Why do these animals have this name?
2. Be able to recognize the examples: Armadillos (specimen and skull), Anteaters (picture and skull), and Sloths (picture and skull).

**Station 11 – Order: Artiodactyla**

1. How is this order commonly known?
2. What animals are included in this order?

**Station 12 – Peccaries**

1. How do Peccaries differ from true pigs?
2. Where are Peccary found and why?
3. What are the two forms of anti-predator behavior seen in Peccaries?

**Station 13 – Hippopotamuses**

1. What does their name actually mean?
2. Where are they found?
3. What do they eat?

4. What are they most closely related to? When did they split off?

#### **Station 14 – Camel family**

1. How do camels differ from other hoofed animals?
2. What other adaptations to their environment do they have?
3. How long can they go without drinking? How much can they drink at one time? How much water (%) can they lose?
4. What are the two different species of camel and how do you tell them apart?
5. What two well known members of this family live in South America and what are they used for?

#### **Station 15 – Deer Family**

1. What animals are included in the deer family?
2. What do they all have (except one group)? What are they made of? What are they used for? What happens to them when they are done?

#### **Station 16 – Giraffe family**

1. How many cervical vertebrae do giraffes have?
2. Why did the long neck evolve?
3. How are their teeth adapted for eating leaves off acacia trees?

4. What do Okapi have in common with giraffe? Where are they found?

### **Station 17 – Pronghorns**

1. What are pronghorns known for?
2. What is unusual about Pronghorns compared to other Northern latitude ungulates?

### **Station 18 – Big Horn Sheep**

1. What size can the horn be and what are they used for?
2. What is a ruminant?
3. What are their limitations in the desert in regards to water? How much can they lose?

### **Station 19 – Order: Cetacea**

1. What are the two main types of Whales?
2. How do you tell them apart?
3. Be able to identify the following examples: Blue Whale, Minke Whale, Pigmy Sperm Whale, Sperm Whale, Beluga Whale, Bottle-nosed Dolphin, White-sided Dolphin, Humpback Whale and Orca Killer Whale.

**Station 20 – Order: Perrisodactyla**

1. What does Perrisodactyla mean?
2. What animals are included in this order?
3. How are their horns different from artiodactyla?

**Station 21 – Zebras and Horses**

1. How do zebras differ from the other ungulates mentioned in lab?
2. How can they survive on marginal diets?
3. What are the three theories on why the stripes evolved?
4. What is the name of the only true wild horse? Where are they found?

**Station 22 – Tapirs**

1. What are they most closely related to?
2. Where are the normally found? What do they eat?
3. What is their current populations locations (Central and South America and parts of Asia) cited as evidence for?

**Station 23 – Order: Carnivora**

1. What is the one shared characteristic that lump all carnivores together?
2. What does the word carnivore mean?
3. Where are they found in the world?

**Station 24 – Felines**

1. How large are mountain lions? Are they a large or a small cat? How do you tell the difference?
2. How common are bobcats? What size are they? How do they hunt?
3. Be able to recognize the following cat skulls: Mountain Lion, Bobcat, House Cat, Leopard and Cheetah.

**Station 25 – Canids**

1. What are coyotes known for? What is happening to their numbers? How much plant material do they eat?
2. Why do canids howl?
3. What is a Baculum? What is it used for? What other species is it found in?

4. Be able to recognize the following skulls: Wolf, Coyote, Fox, and Dog

**Station 26 – Bears**

1. What are the two largest bears?
2. What is their range in eating habits?
3. Be able to recognize the following bears: Polar Bear, Grizzly Bear, Black Bear, and Panda.
4. Be able to recognize the skulls of the Black bear and the Giant Panda.

**Station 27 – Raccoon Family**

1. What common characteristic do most of them share?
2. What type of feeding habit do they have?
3. How are their front paws modified?
4. Be able to recognize the following: Raccoons, Coatis, Ringtails, Red Panda, and the Kinkajou
5. Be able to recognize the skulls of the following: Raccoon, Red Panda.

**Station 28 – Weasels**

1. What do they all have in common?
2. What do they use to mark their territory?
3. Where are Long-tailed Weasels found? What do they eat? How do they kill their prey?

4. Be able to recognize the following skulls: Sea Otter, Skunk, and Badger.

**Station 29 – Meerkats**

1. How are Meerkats different than other mongooses?
2. What behavior is often seen in Meerkats? What type of behavior is this considered?

**Station 30 – Hyenas**

1. What do most hyenas eat? What adaptations to their digestive systems have been made so they can quickly digest their prey?
2. Why do they have a bear-like gait?
3. What is “unique” about the female sexual structures?

**Station 31 – Order: Pinnepedia**

1. What does the name mean?
2. Where are they found?
3. What are their typical shape?
4. What do their limbs look like?





**Station 32 – Harbor Seals and Sea Lions**

Fill out the following Table

	<b>Seals</b>	<b>Sea Lions</b>
<b>Front Flippers</b>		
<b>Rear Flippers</b>		
<b>Neck</b>		
<b>Ears</b>		
<b>Testicles</b>		

**Station 33 – Elephant Seals**

1. What kind of reproductive strategy do they exhibit?
2. What is sexual dimorphism? How large are the males? How large are the females?

**Station 34 – Other Seals**

1. What do Crabeater Seals Eat? How do they do this?
2. Where do Leopard Seals hunt? What does their loose Jaw allow them to do? How are they similar to Crabeater Seals?
3. What are Weddel Seals known for?

**Station 35 – Walruses**

1. What oceans are they found in?
2. How are they recognized?
3. Where in the ocean are they found?
4. What do they eat?

**Station 36 – Order: Chiroptera**

1. How many mammalian species are bats?
2. How are they unique?
3. How do vampire bats feed?
4. What do pallid bats eat?
5. What are Western Pipistrelle Bats known for?
6. Know the following skulls: Vampire and Fruit Bats

**Station 37 – Order: Insectivora**

1. What do they eat?
2. What characteristics do they have?
3. Know the examples: Moles and Shrews

**Station 38 – Order: Rodentia**

1. What % of mammal species are rodents?
2. Why do they live so closely associated with humans?

**Station 39 – Naked Mole Rats**

1. What makes them unique among mammals?
2. What other animals are they similar to and why?

**Station 40 – Capybaras**

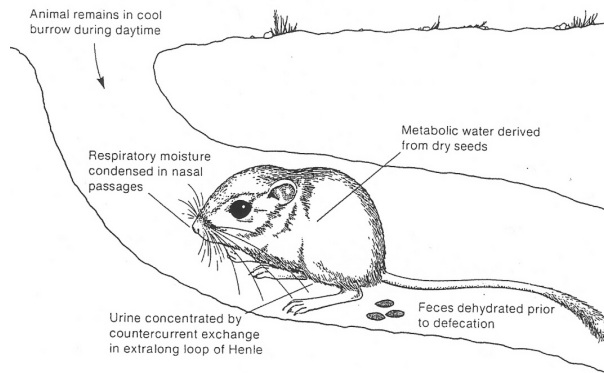
1. What are Capybaras?
2. Where are they found?
3. What is the term for how they eat? What does it mean?

**Station 41 – Beavers**

1. What characteristics do they have? What makes them unique?
2. What are they known for? What are their homes called?
3. How is their social structure unique among rodents?

**Station 42 – Other Rodents**

1. What adaptations are seen in kangaroo rats for their existence in the desert?



12-14 Water-conserving strategies of the kangaroo rat.

2. Be able to recognize the following rodents: Ground Squirrel, Gray Squirrel, Gopher, Deer Mouse, Norway Rat, Antelope Ground Squirrel, and Chipmunk.

**Station 43 – Order: Lagomorpha**

1. What animals does this order include?
2. How are they different from rodents?
3. Be able to recognize the Desert Cottontail, the Black-tailed rabbit and the Jackrabbit.

**Station 44 – Order: Dermoptera**

1. What are they most closely related to?
2. What are the gliding membranes called?

**Station 45 – Order: Scandentia**

1. What do they have in common with primates?
2. What kind of studies are they often used for?

**Station 46 – Order: Primates**

1. What is included in the primates order?
2. What characteristics are shared by all primates?

**Station 47 – Gorilla**

Be able to recognize the skulls of the gorillas

1. When do they appear in the fossil record?
2. Where are they found and how do they walk?
3. What do they eat?
4. How can you tell male from female?

**Station 48 - Orangutan**

Be able to recognize the skull of the orangutan

1. When do they appear in the fossil record?
2. Where are they usually found?
3. What do they eat?
4. What type of social structure do they have?

**Station 49 - Chimpanzees**

Be able to recognize the skull of the different Chimpanzees

1. When do they appear in the fossil record?
2. How are Common Chimps different from Bonobo's?
3. How much DNA do humans share with Bonobo's?

**Station 50 – *Australopithecus boisei***

Be able to recognize the skull of this species

1. When do they appear in the fossil record?
2. What basic hominid characteristics are found in this species?
3. Where are these fossils from?

**Station 51 – *Australopithecus africanus***

Be able to recognize the skull of this species

1. When do they first appear in the fossil record?
2. What basic hominid characteristics are found in this species?
3. Where are these fossils from?

**Station 52 – *Homo erectus***

Be able to recognize the skull of this species

1. When do they appear in the fossil record?
2. How do they differ from *Australopithecus boisei*?
3. Where was this species found?
4. What characteristics do they have?

**Station 53 – *Homo neanderthalensis***

Be able to recognize the skull of this species

1. When do they appear in the fossil record?
2. What evidence suggests they are different from *Homo sapiens*?
3. What evidence suggests they are the same as *Homo sapiens*?

**Station 54 – Cro-Magnon**

Be able to recognize the skull of this species

1. When do they appear in the fossil record?
2. How do they differ from Neandertal and other early humans?

**Station 55– CLASS: MAMMALIA – EXTERNAL FEATURES**

1. Note the skeleton and the preserved specimen of the rat. What two characteristics can be seen that differentiate mammals from other vertebrate classes?
2. Note the pectoral girdle. What bones make up this structure? How does the sternum differ from that of the bird?
3. What are the five types of vertebrae seen in mammals?



**Station 56 – CLASS: MAMMALIA – INTERNAL FEATURES (PP 209 – 210, Figs. 8.49-8.58)**

<b>System</b>	<b>Structure</b>	<b>Function</b>
<b>Digestive System</b>	Esophagus Stomach Intestine Liver Pancreas Spleen	
<b>Excretory System</b>	Kidneys Urinary Bladder	
<b>Circulatory System</b>	Atria (2) Ventricle (1) Double Circuit system (whole system) Compare to bird (Why the difference in size?)	
<b>Respiratory System</b>	Lungs Diaphragm	
<b>Nervous System</b>	Olfactory lobe Cerebral hemisphere Cerebellum Medulla Oblongata	
<b>Reproductive System</b>	Ovaries or Testes	

**Station 57– COMPARATIVE DENTITION**

Compare the dentition between the following animals and be able to describe the function of each type of teeth (Fish, Frogs, Lizards, Turtles, Pigeons, Sheep, Dogs, and Humans).

1. What type of teeth are seen in fish, frogs, and lizards? What are they used for?
2. What type of teeth are seen in turtles? How do they chew their food?
3. What type of teeth are seen in birds? How do they chew their food?
4. What type of teeth are seen in mammals? What are each of them used for?
  - a) What type of teeth are seen in sheep? What teeth are reduced? Why?
  - b) What type of teeth are seen in dogs? What type are enlarged? Why?
  - c) What type of teeth are seen in humans? What type of food do they eat?

**Station 58 – Animal Sounds – Mammals**

Be able to recognize the songs from the following Mammals.

Harbor Seal

California Sea Lion

California Ground Squirrel

Coyote

Mountain Lion

<b>Order</b>	<b>Description</b>	<b>Characteristics</b>
Order: Monotremata	Egg laying mammals	
Order: Marsupialia	Pouch bearing mammals	
Order: Proboscidea	Long, muscular trunk	
Order: Hyracoidea	Shrew Mice	
Order: Tubulidentata	Pig-like with a tubular snout and long ears	
Order: Sirenia	Aquatic herbivores, possessing fin-like forelimb	
Order: Xenarthra	Have reduced or no teeth	
Order: Artiodactyla	Possesses hooves with an even number of toes	
Order: Cetacea	Marine forms with fish-shaped bodies, paddle-like front limbs	
Order: Perissodactyla	Possesses hooves with odd numbers of toes	
Order: Carnivora	Possesses sharp, pointed canine teeth and molars	
Order: Chiroptera	Adapted for flying	
Order: Insectivora	Insect eating animals	
Order: Pholidata	Anteaters with scaly skin	
Order: Rodentia	Possesses chisel-like incisor teeth	
Order: Lagomorpha	Possesses chisel-like incisors, hind legs longer than forelegs for jumping	
Order: Dermoptera	Large gliding mammals	
Order: Scandentia	Larger shrew-like animals with teeth	
Order: Primates	Opposable thumb, binocular vision	

## Meek Collection

### Station 1 – Deer of the World

#### Order: Artiodactyla

1. Be able to recognize the following deer: **Fallow, Rusa, Red, Chital, and Sika.**
2. What are the three stages in the Red Deer Rut between males?
3. What animals do the Chital Deer Associate with? What do the Deer get from the association? How does the other animal benefit?
4. What is the Fallow deer's relationship with man?

### Station 2 - North America - North Wall

#### Order: Artiodactyla

1. Be able to recognize the following deer: **Moose, Mule Deer, and White-tailed Deer**
2. What limits a moose's daily feeding time? How do they meet their daily energy requirements? How do they meet their daily salt requirements?
3. Which of the other two deer are found in our area?

### Station 3 – North America – East Wall

#### Order: Artiodactyla

1. Be able to recognize the following deer: **Caribou and Elk** and the Goat Antelope: **Musk Ox**
2. What characteristic behavior is seen in Caribou? Why do they do this behavior?
3. What is another name of Elk? What deer do they resemble from Europe?
4. Where are Musk Ox found and how did they get their name?

**Station 4 – North America – Top Platform****Order: Artiodactyla**

1. Be able to recognize the **Mountain Goat**.
2. Where are Mountain Goats found? What adaptations are seen for this location?

**Order: Carnivora**

1. Be able to recognize the following: **Mountain Lion, Bobcat, Grizzly Bear, and River Otter**.
2. How do you recognize a Grizzly bear? How large are they and where are they found?
3. How is the hair on otters arranged? How dense is this hair in Sea Otters?
4. Where are sea otters found and what do they eat?
5. How do river otters differ from sea otters?

**Station 5 – North America – Middle Platform****Order: Carnivora**

1. Be able to recognize the following: **Kit Fox, Red Fox, Silver Fox, Arctic Fox, and Pine Marten**
2. What family are foxes found in? What do they eat? How do they hunt?
3. The Silver Fox is actually a color phase of which fox? What distinction does this animal have today?
4. What family are Martens found in? What do they eat?

**Order: Rodentia**

1. Be able to recognize the **Woodchuck**.
2. What are other names for this animal? What are they closely related to? What are they known for?

**Birds**

1. Be able to recognize the following birds: **Turkey, Ruffed Grouse, Gambel's Quail**

**Station 6 – North America – Left Bottom Platform**

**Order: Carnivora**

1. Be able to recognize the following: **Gray Wolf, Raccoon, and Wolverine.**
2. What makes the Gray Wolf stand out in the canid (dog) family? What was once its claim to fame? How large of prey can wolves take when hunting in packs?
3. How do Wolverines capture larger prey?

**Station 7 - North America – Right Bottom Platform**

**Order: Carnivora**

1. Be able to recognize the following: **Gray Wolf, Badger, and Mink.**
2. What adaptations do Badgers have to protect themselves from attack?
3. Where are minks found? What is their coat made of?

**Order: Rodentia**

1. What characteristics do **beavers** have? What makes them unique?
2. What are they known for? What are their homes called?
3. How is their social structure unique among rodents?

**Station 8 – East Wall – Left**

**Order: Perissodactyla**

1. What are Rhinos known for?
2. What is the shape of the **White Rhino's** mouth and what is it used for?
3. How does the Black Rhino differ from a White Rhino?

**Order: Carnivora**

1. What are **leopards** known as?
2. What do they often do with their prey?

**Order: Artiodactyla**

1. Know the following Horse-like Grazing Antelope: **Sable Antelope, Gemsbok, Roan, and the Fringed-eared Oryx.**
2. Where are they found? How did they get their name? What do they eat?

### **Station 9 – East Wall – Right**

#### **Order: Artiodactyla**

1. Be able to recognize the following Goat-like antelope: **Himalayan Tahr, Spanish Ibex, European Mouflan, and the Chamois** (also in left front window).
2. Where are these antelope found? What is their success due to?
3. How do chamois protect themselves from aggressive attacks from other chamois? How does this work?
4. What characteristics are seen in all wild pigs?
5. Where are Wild Boars originally found and what did they give rise to?

### **Station 10 – South Wall and Floor**

#### **Order: Carnivora**

1. Be able to recognize the **European Brown Bear and the Bengal Tiger**
2. How does this bear compare to the Grizzly Bear? What usually affects size in bears?
3. What make Tigers unique? Where are they usually found? How do they hunt?

**Station 11 – West Wall Far Left**

**Order: Marsupialia**

1. What is the name of the marsupial in this collection?
2. Where were they originally found? Where have they been introduced?
3. What problems are they causing in their new habitat?

**Order: Artiodactyla**

1. What animals are included in the Wild Cattle family?
2. What sense organ is strongest in Cattle? What do they eat?
3. Be able to recognize the following **Wild Cattle: Water Buffalo, Banteng, Asiatic Buffalo and Cape Buffalo.**



**Station 12 – West Wall Middle Left and Floor Center****Order: Artiodactyla**

1. What do all Dwarf Antelope have in common? What is the name of this Dwarf Antelope?
2. What is associated with their small size? How do they avoid predation?
3. They have to eat food high in nutritive quality. What is the name of this type of feeding?
4. What do all gazelles have in common?
5. Be able to recognize the following Gazelles: **Springbok, Southern Gerenuk, and the Grant's Gazelle.**
6. How are Gerenuk different than other Gazelles? How do they eat?
7. What does the name **Duiker** mean?
8. What do Duiker's eat?

**Station 13 – West Wall Center Left****Order: Artiodactyla**

1. What are the Spiral-horned Antelopes most closely related to? What do they eat? What is the name of this type of feeding?
2. How are the Spiral-horned Antelope different than other antelopes?
3. Be able to recognize these antelope: **Eland, Kudu, and Bushbuck.**

**Station 14 – West Wall Center Right****Order: Artiodactyla**

1. Be able to recognize the following Grazing Antelope: **Blesbok, Impala, Wildebeest and Hartebeest.**
2. What type of habitat are these animals found in?
3. What do they all have in common?
4. How do Wildebeest, Hartebeest and Impala differ in how they flee their predators?
5. Unlike other antelope, what are Blesbok not very good at? What do they do to compensate for this?

**Station 15 – West Wall Far Right and Over the Door****Order: Artiodactyla**

1. Be able to recognize the following wetland Antelope: **Reedbok, Kob, Lechwe, and Waterbuck**
2. Where are these antelope usually found?
3. The upward tusks on the **warthog** are what actual teeth? What are the warts thought to be for? Are warthogs a true pig?

**Station 16 – Floor Center**

**Order: Carnivora**

1. Where are **African Lions** found? How do they hunt?
2. Are the lions we have male or female? How can you tell?