



# Eulipotyphla, Chiroptera, & Artiodactyla

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Mammalogy 2019



# Expectations for Today

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- You will be expected to be able to:
  - Produce the common and scientific names of 38 species of Eulipotyphla, Chiroptera, and Artiodactyla when given samples (skeletons, skins, tracks, scat, etc.)
  - Describe some basic biological and ecological characteristics of those 38 species when given the name

# Taxonomy



All Other Mammals



Xenarthra



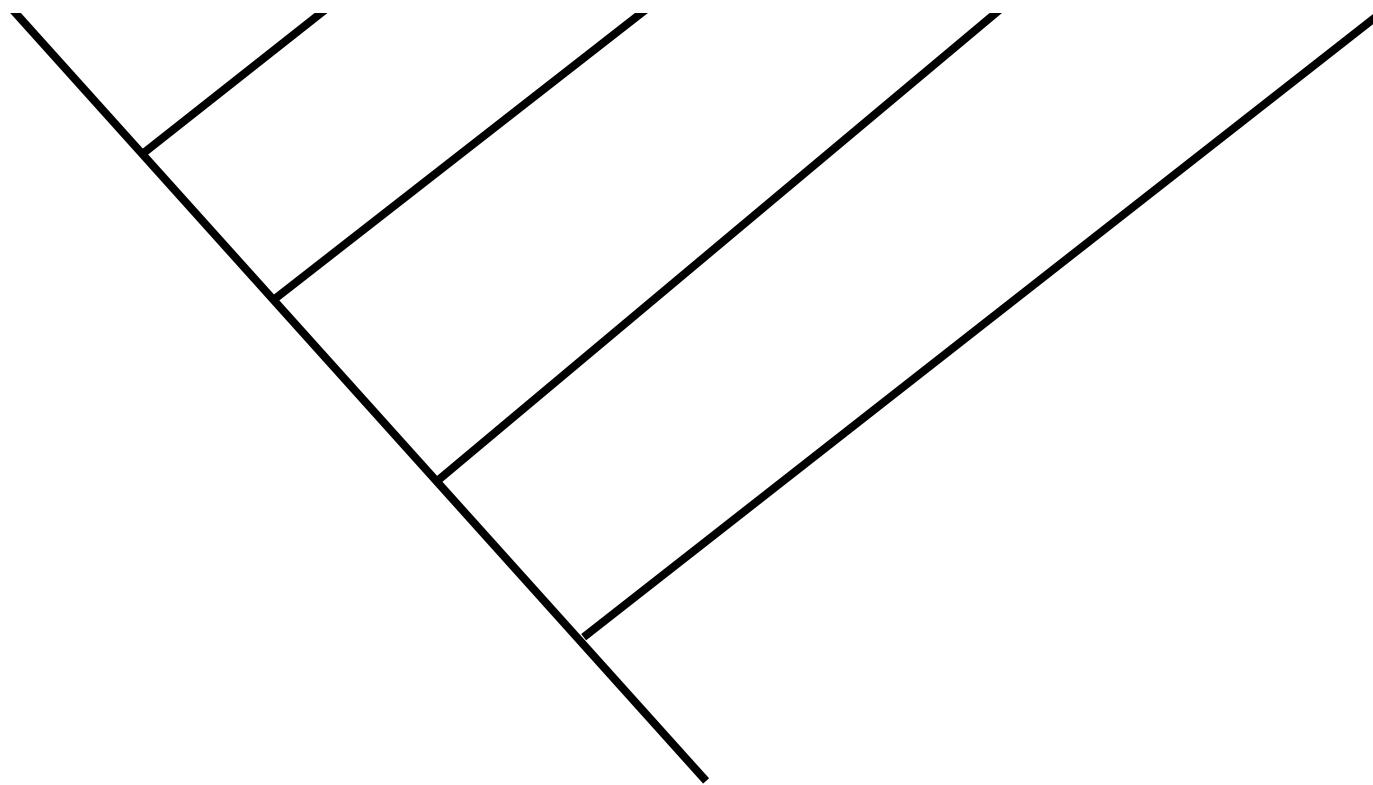
Afrotheria



Marsupiala



Monotremata



Monotremata, Marsupiala, Afrotheria, Xenarthra

# Taxonomy

Laurasiatheria



Rodentia



Primates



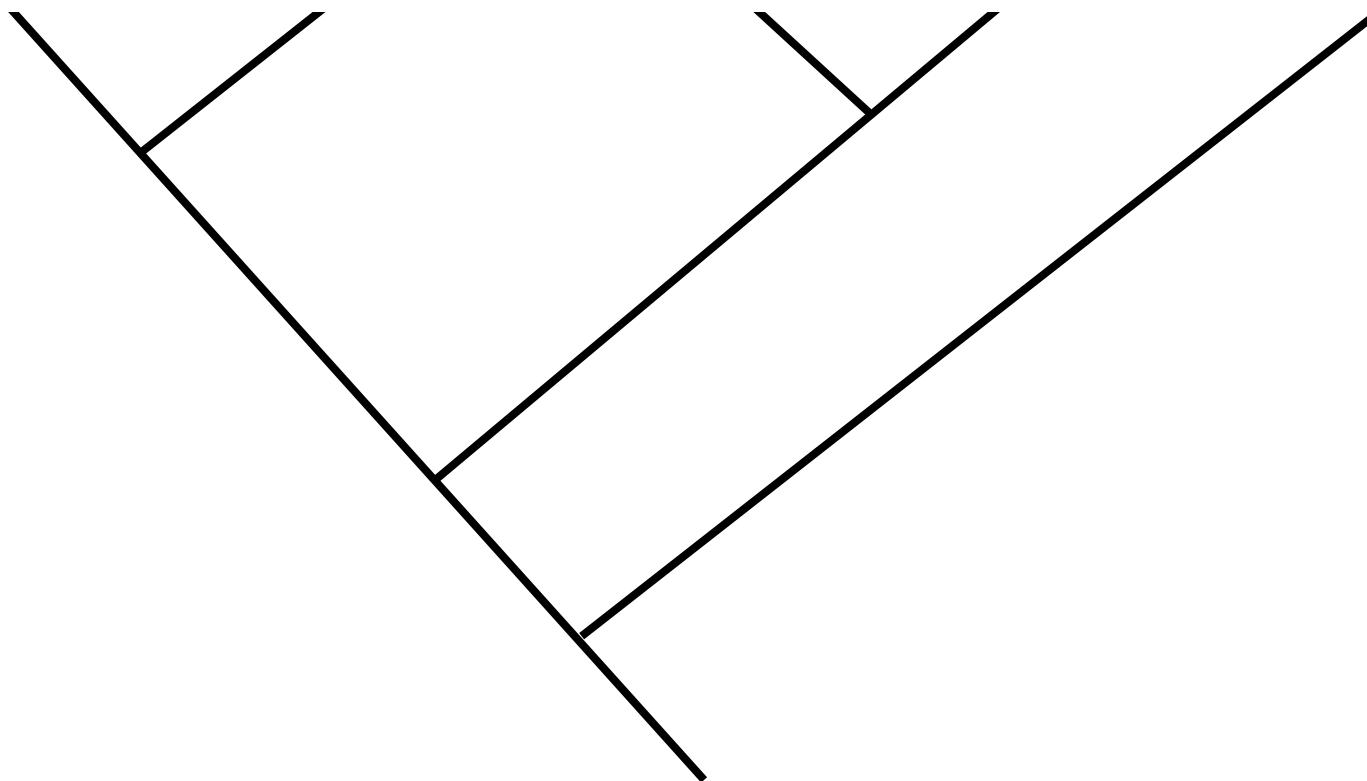
Artiodactyla



Eulipotyphla



Xenarthra



Eulipotyphla, Chiroptera, Artiodactyla

# Laurasiatheria



Carnivora

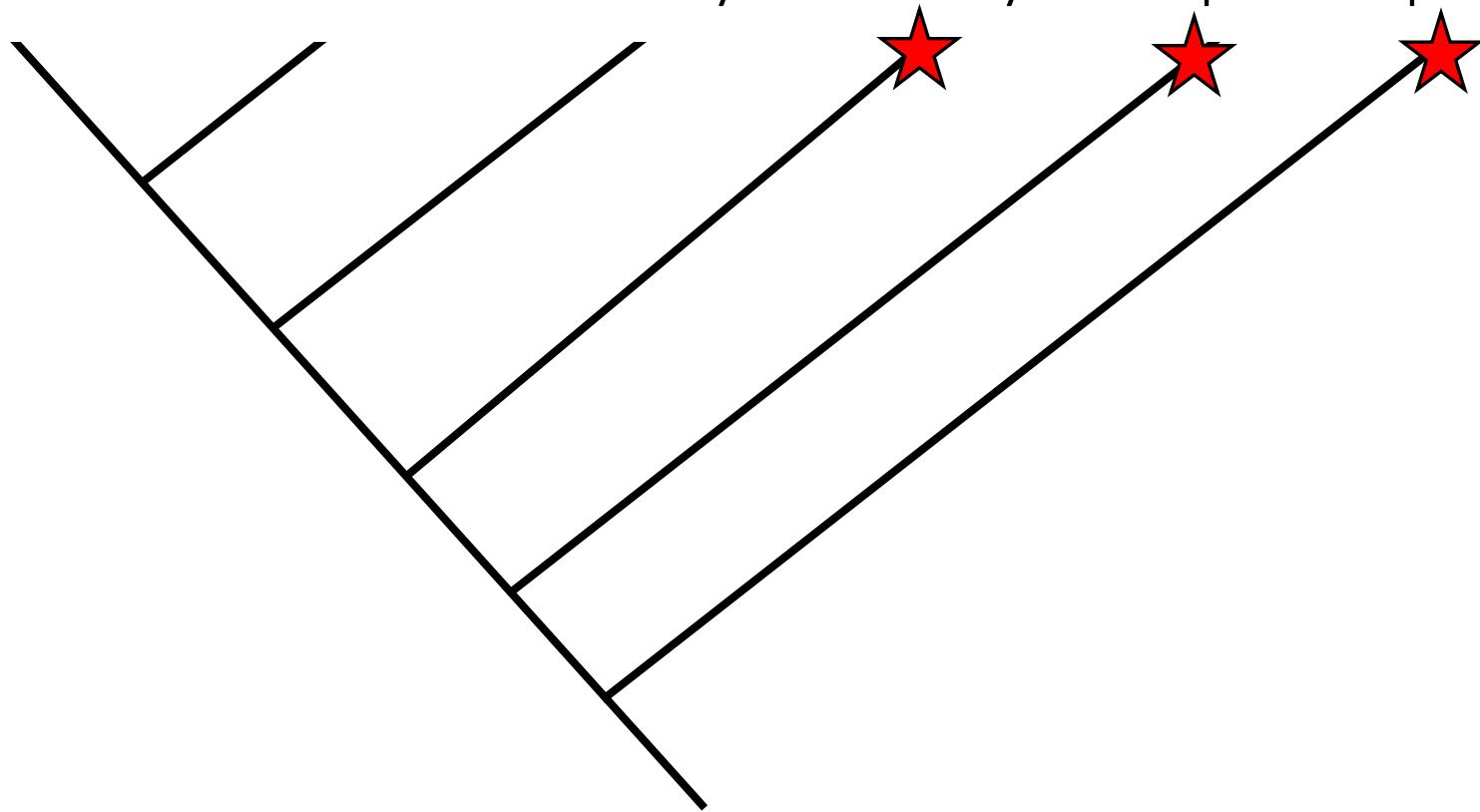
Pholidota

Perissodactyla

Artiodactyla

Chiroptera

Eulipotyphla



Eulipotyphla, Chiroptera, Artiodactyla

# Order: Eulipotyphla

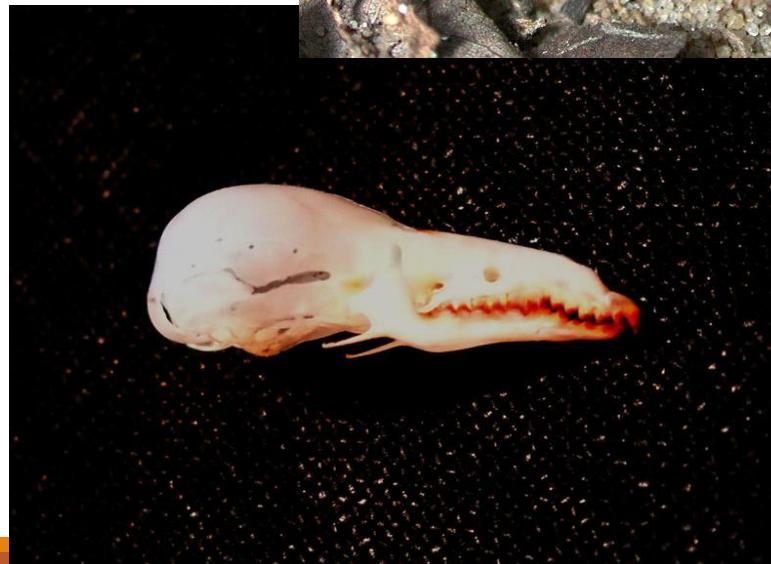
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- Moles, hedgehogs, and shrews
- Eulipotyphla = “truly fat and blind”
- Primarily insectivorous
- Simplified hindgut, which lacks a caecum
- Primarily live fossorial lifestyle (subterranean)



# Order: Eulipotyphla

- Typically 10 fingers + 10 toes
- Plantigrade foot posture
- Long pointed snouts
- Sharp teeth
- No auditory bullae



# *Scalopus aquaticus*

## eastern mole

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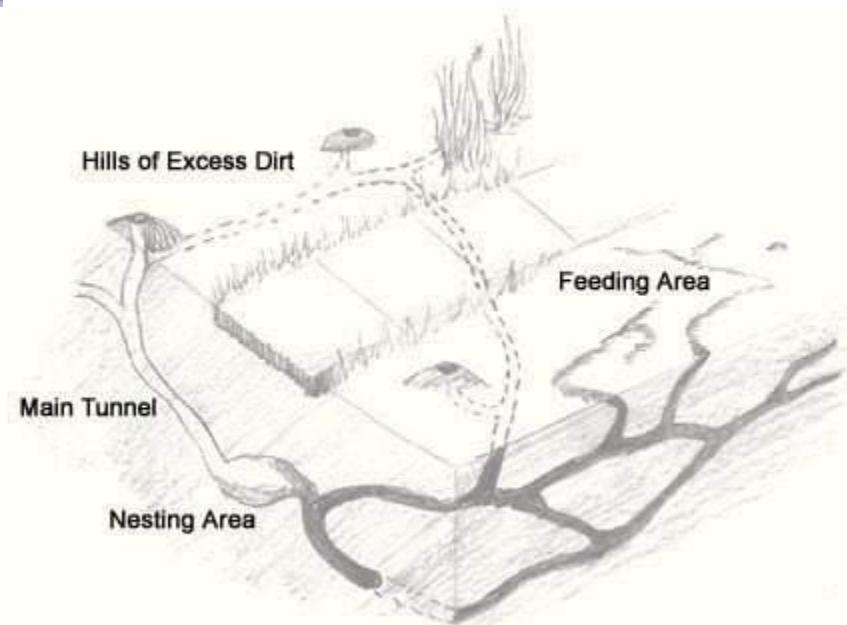
- Moles have web-like feet
- No external ears
- Forelimbs are rotated for digging
- Small eyes
- Active during both day and night
- Flattened skull
- Eat earthworms and insects
- Considered pests because of holes



# *Scalopus aquaticus* eastern mole

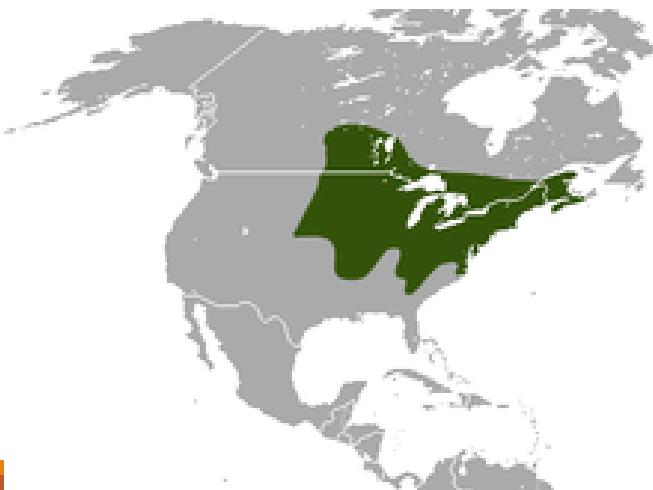


- Considered pests because of holes
- Tear up lawns and golf courses
- Weaken infrastructure of homes/buildings



# *Blarina brevicauda* northern short-tailed shrew

- All shrews do not have a zygomatic arch
- Insectivorous; semi-fossorial
- Venomous
- Echolocation

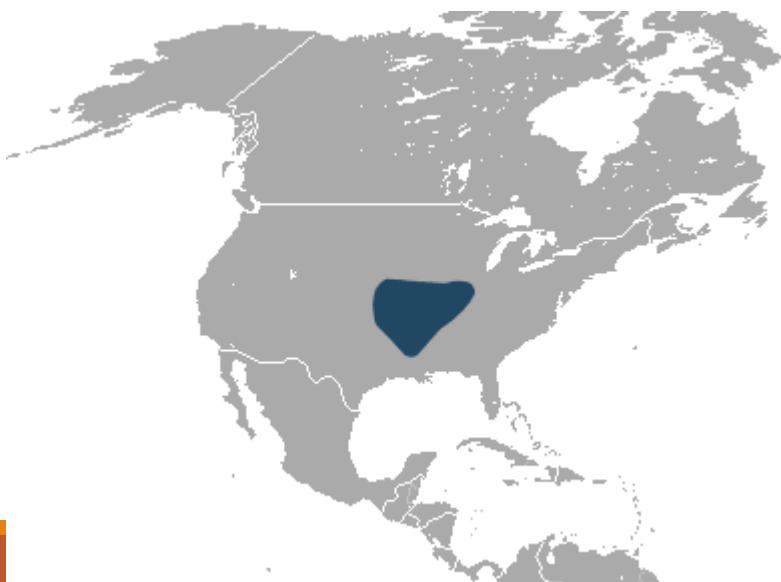


# *Blarina hylophaga*

## Elliot's short-tailed shrew

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- All shrews do not have a zygomatic arch
- Prefers dense vegetation
- Smaller than the northern short-tailed shrew



# *Cryptotis parva*

## North American least shrew

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- All shrews do not have a zygomatic arch
- Only 3" long
- Hoard food



# *Sorex cinereus* masked shrew



- All shrews do not have a zygomatic arch
- Do well in disturbed habitats such as logging or burns
- Typically found in colder regions
- Largest range of North American shrews



# *Sorex merriami*

## Merriam's shrew

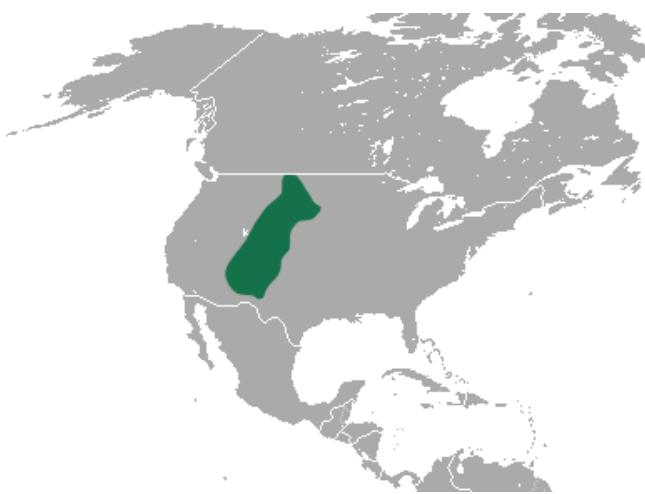
- All shrews do not have a zygomatic arch
- Fur is light on bottom and dark on top during summer, but flips to dark on bottom and light on top during winter



# *Sorex nanus* dwarf shrew

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- All shrews do not have a zygomatic arch
- Have long tails



# Order: Chiroptera

## Biology



- Chiroptera = “hand-wing”
- >220 extant species worldwide
- True flight (wings formed from the hand bones)
- Echolocation
- Hibernate by lowering body temperature and heart rate
- May be insectivorous, carnivorous, piscivorous, nectivorous, frugivorous, sanguinivorous (all bats in North America are insectivores)
- Many are long-lived (>30yrs) and give birth to only 1-2 young each year

# Order: Chiroptera Management

- White-nose syndrome
  - Caught using harp traps
  - Surveyed using acoustic recording devices



# *Tadarida brasiliensis*

## Brazilian free-tailed bat

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- Tail extends beyond the wing flaps (uropatagium)
- Have distinct curled incisors
- Young from individual colonies are typically born across 10 days

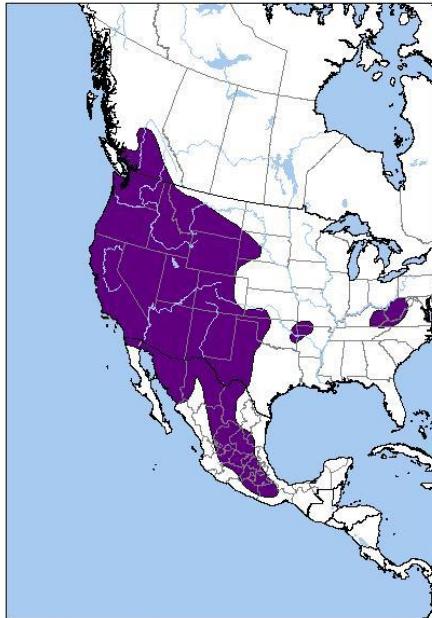


# *Corynorhinus townsendii*

## Townsend's big-eared bat

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- Big ears and a lumpy nose
- Specialize in moths
- State bat of Virginia



# *Eptesicus fuscus* big brown bat

- Generalists that adapt well to humans
- Primarily eat beetles



# *Lasionycteris noctivagans*

## silver-haired bat

- Migrates and hibernates
- Long flat skull
- Silver-tipped fur



# *Lasiurus borealis*

## eastern red bat



- Fur extends onto tail flap
- Sexually dimorphic coloration (male is more red)



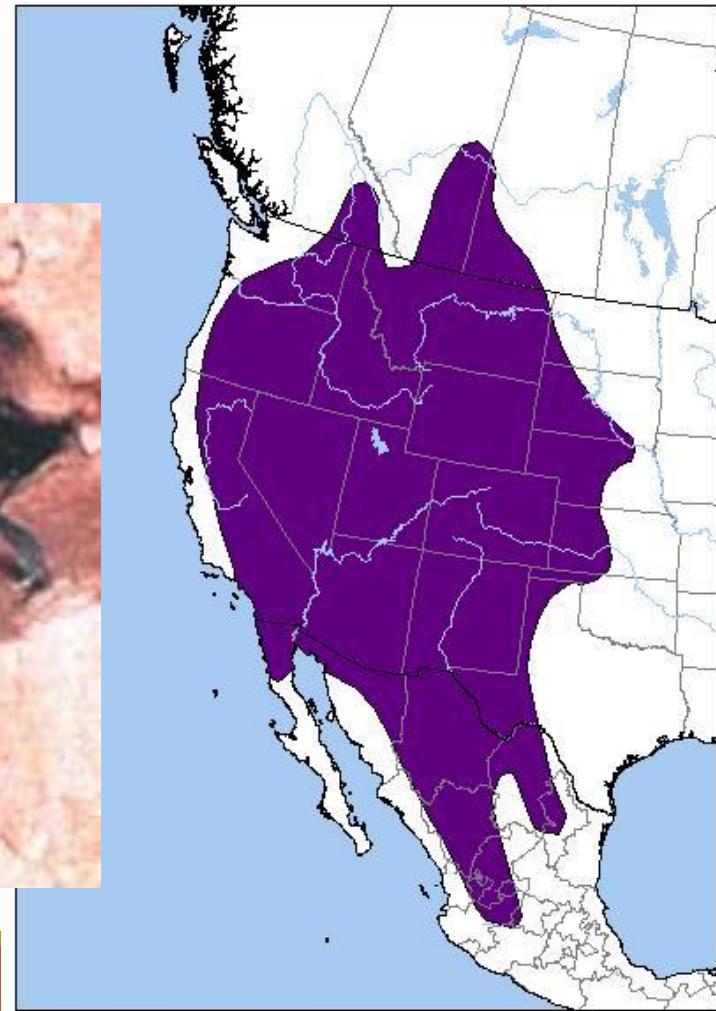
# *Lasiurus cinereus* hoary bat

- Fur extends onto tail flap
- Silver-tipped fur
- Solitary
- Only land mammal endemic to Hawaii



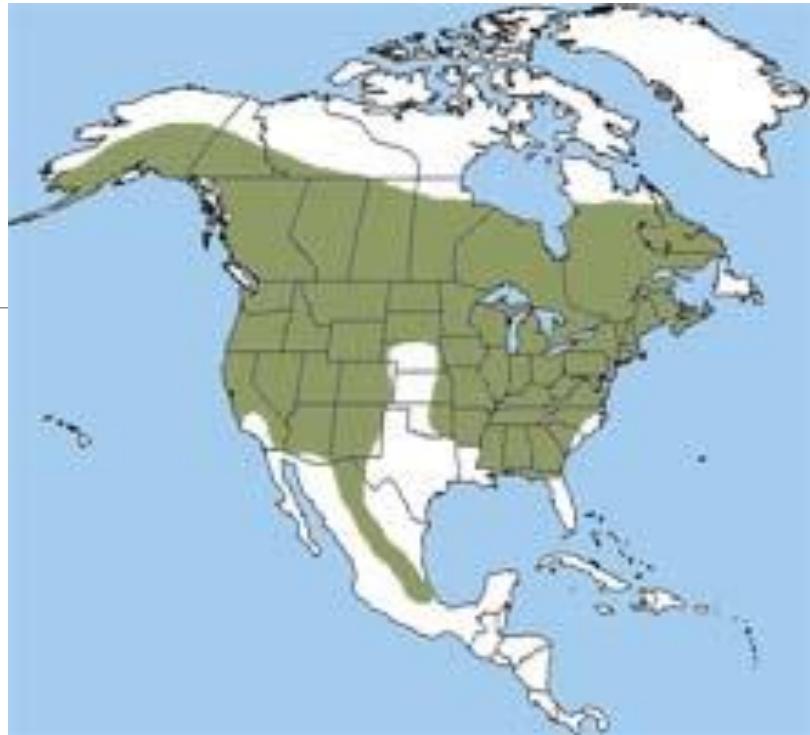
# *Myotis ciliolabrum* western small-footed myotis

- Known for small feet



# *Myotis lucifugus* little brown bat

- Promiscuous
- Depredated by owls
- Hibernate in caves
- Roost on cliffs/bridges
- Hairy toes

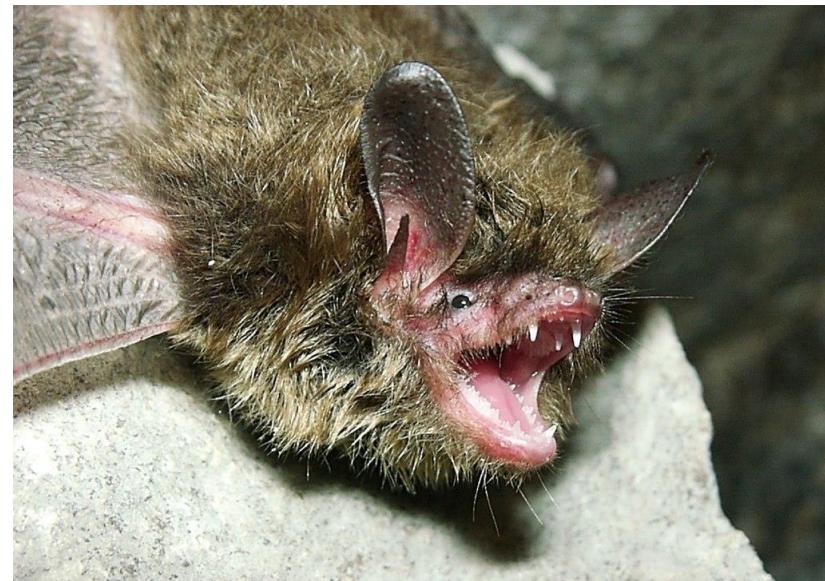


# *Myotis septentrionalis*

## northern myotis

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- Has longer ears than other *Myotis* species
- Usually roost in trees or man-made structures



# *Myotis thysanodes* fringed myotis

- Eat mostly beetles
- Prefers desert shrublands



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Kristi DuBois

# *Myotis volans* long-legged myotis

- Longer than normal tibia
- Females are bigger than males



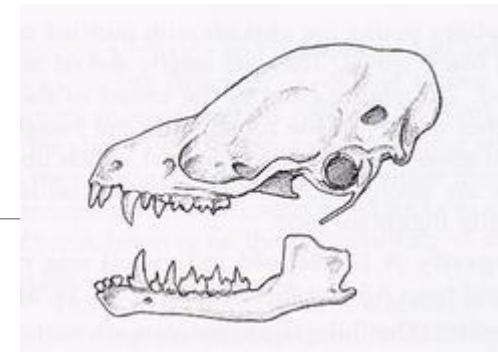
# *Nycticeius humeralis* evening bat

- Migratory
- Form maternity colonies
- Roost inside hollow trees

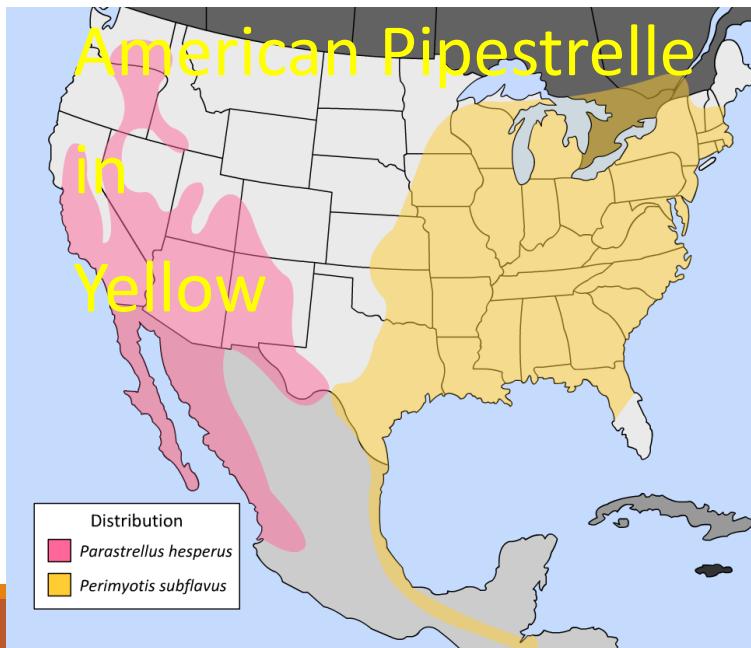


# *Perimyotis subflavus*

## American pipistrelle



- AKA tricolored bat
- body being yellowish
- Prefer habitats near open water



# Artiodactyla



Cervidae



Bovidae



Giraffidae



Antilocapridae



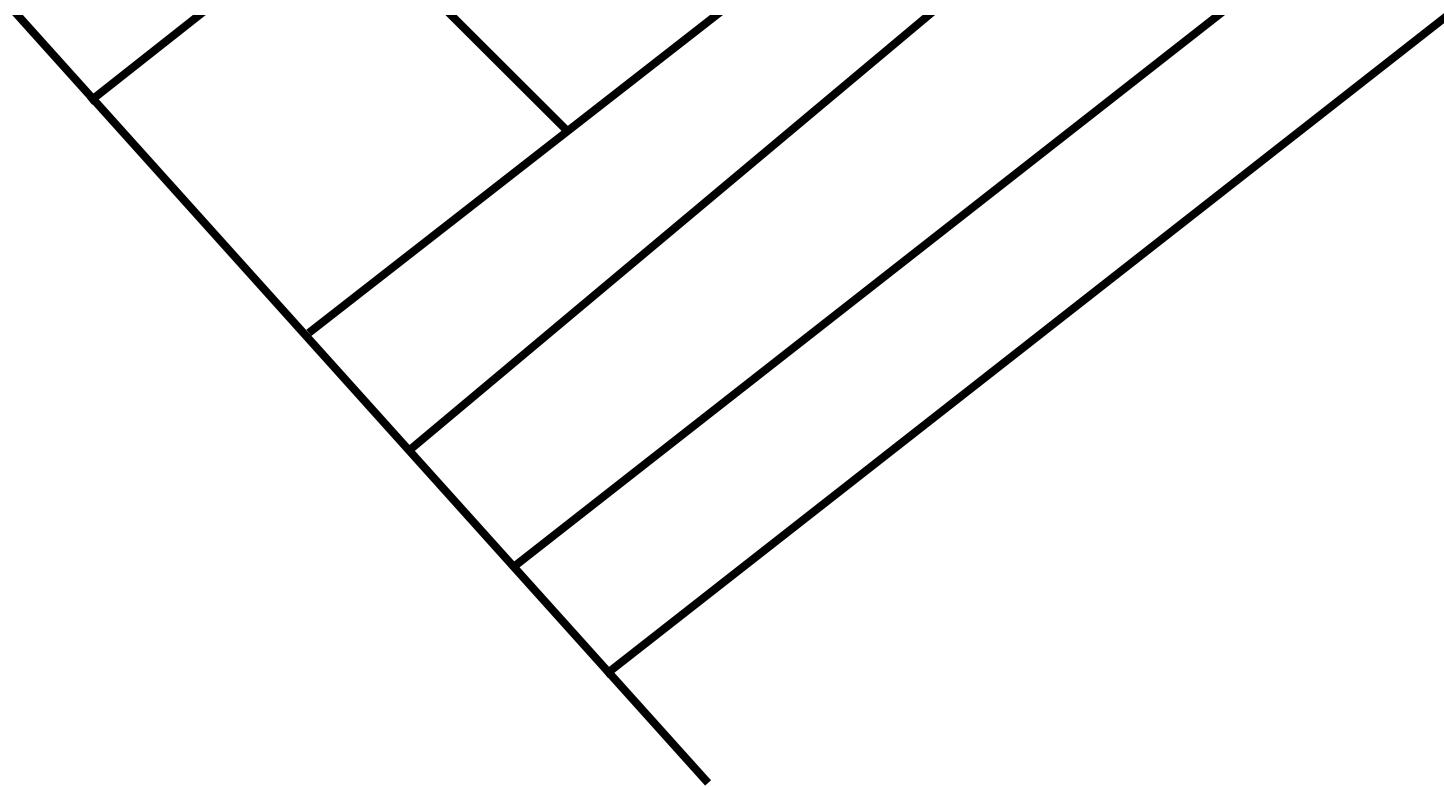
Cetacea



Suidae



Camelidae



# Order: Artiodactyla

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Lots of diversity:

- Clavicle (collarbone) is reduced or absent
- 2 or 4 toes (except hind feet of peccaries)
- Bunodont, brachyodont, selenodont, hypsodont teeth
- Simple stomachs to 4-chambered ruminating stomachs
- Ornamentation
- Artiodactyla = “even-toed”

# *Llama glama*

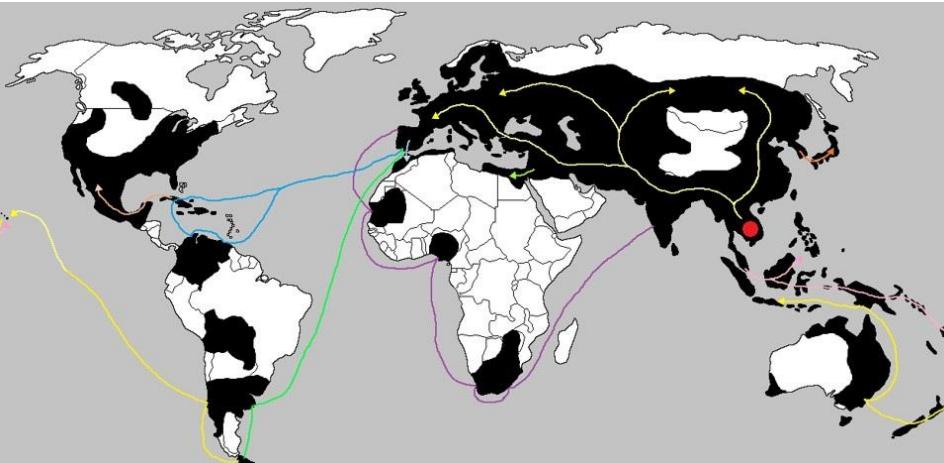
## llama

- Live 15-25 years
- Originated in North America, but moved into South America during the Great American interchange
- Lots of breeds due to domestication



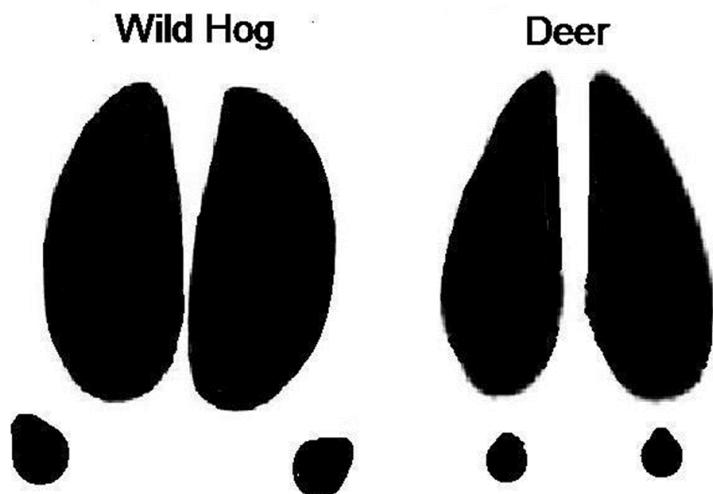
# *Sus scrofa* wild boar

- Invasive in North America
- Have constantly growing canines (tusks)
- Dorsal hump stores fat
- Omnivorous
- Fur color variable in feral populations



# *Sus scrofa* wild boar

- Known for rooting
- Tracks are very similar to whitetail deer



# *Sus scrofa* wild boar



- Most states have no bag limits and very minimal weapon restrictions
- Snares and corral traps are common for removal on larger scales



# *Pecari tajacu* collared peccary

- Similar in appearance to pigs
- Only have 3 hind foot toes
- Have special glands in rump for communicating
- Also called javelinas
- Threatened by invasive wild boar in  
North America



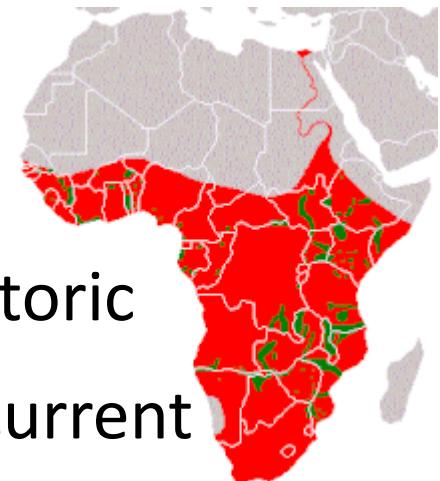
# *Hippopotamus amphibius*

## common hippopotamus

- Closer related to whales and dolphins than other artiodactyls
- Heaviest terrestrial artiodactyl
- Prefer habitats with lots of water
- Highly aggressive



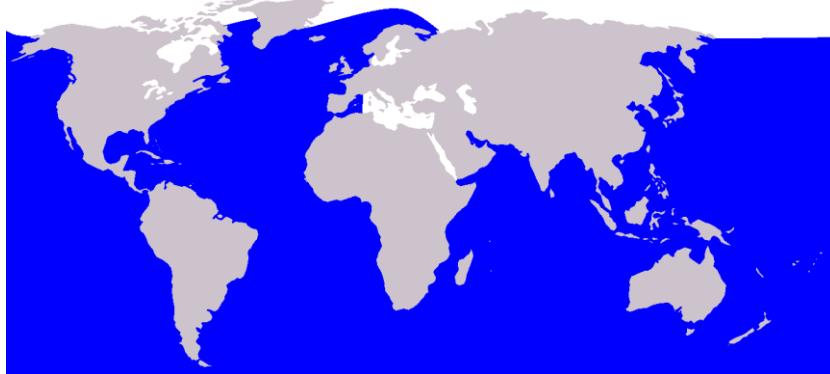
Red = historic  
green = current



# *Megaptera noveangliae* humpback whale

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- Baleen teeth
- Migrate from the poles to tropics to breed
- Males battle for females



# *Megaptera noveangliae* humpback whale



# *Physeter macrocephalus*

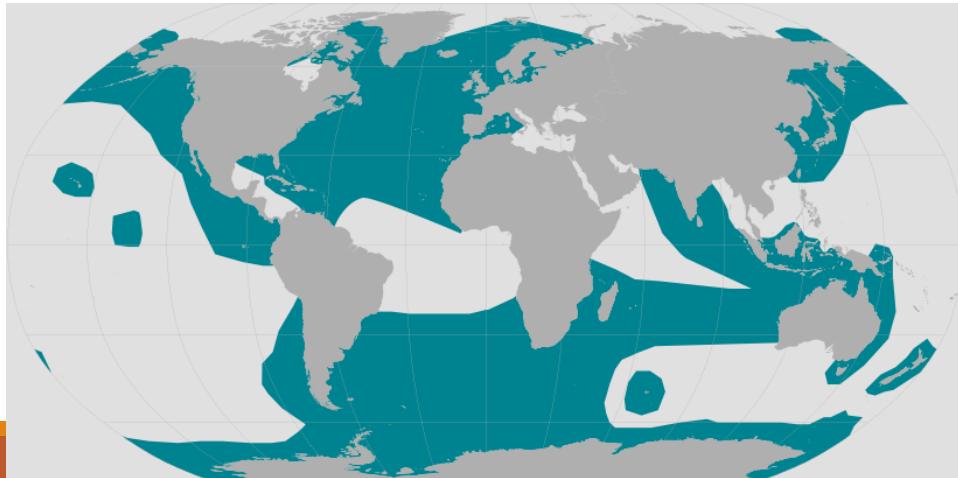
## sperm whale

- Have homodont teeth
- Known to battle giant squids
- Have white fluid in cavity in head  
to help with echolocation



# *Orcinus orca* killer whale

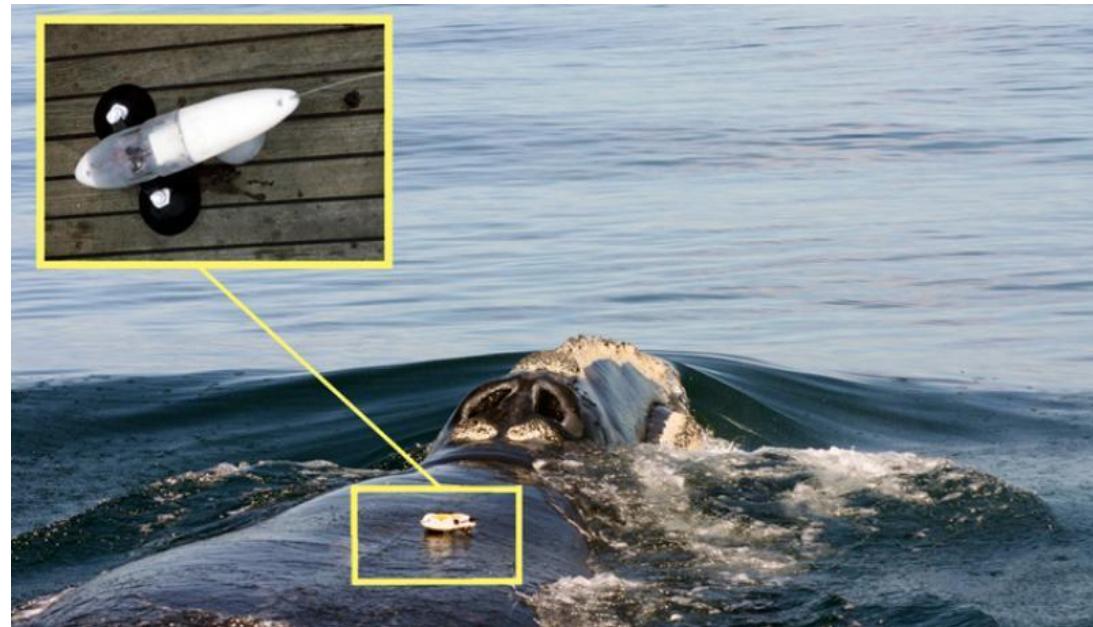
- Closer related to dolphins than other whales
- Hunt in packs
- Can be trained in captivity



# Studying Whales

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- We can track whales by attaching suction cup transmitters to them with modified harpoons (when the suction releases they float to the surface and can be reused)



# *Lagenorhynchus obscurus* dusky dolphin

- Concentrated in shallow water of Southern hemisphere
- Live in large groups called pods
- Piscivorous



# *Lagenorhynchus obscurus*

## dusky dolphin



# *Antilocapra Americana* pronghorn

- AKA “speed goats”
- Fastest North American mammal
- Evolved speed to compete with now extinct American cheetah and American lions
- Males shed the outer layer of their horn sheath each year
- Migratory
- Site fidelity

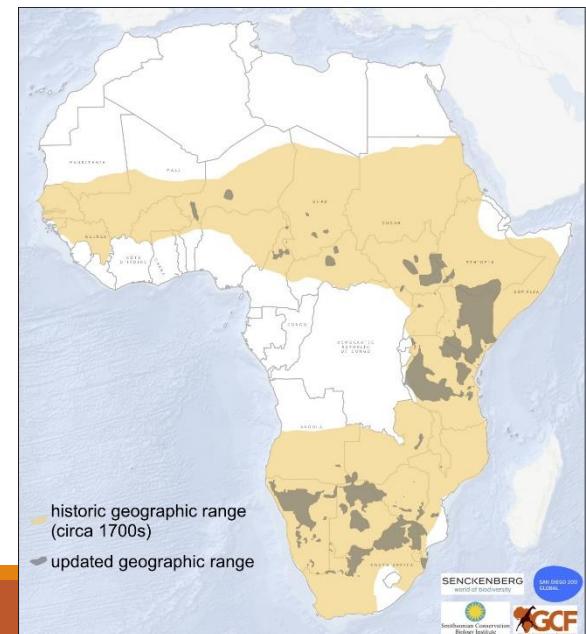
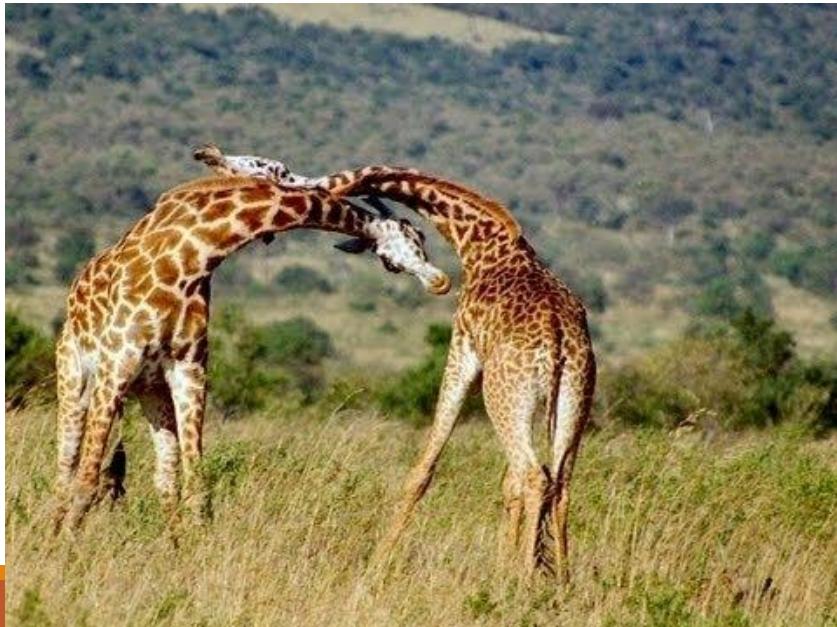


Artiodactyla

# *Giraffa camelopardalis*

## giraffe

- Tallest living terrestrial mammal
  - “horns” are ossicones
  - Males use horns to fight for females by necking



# *Alces alces* moose

- Largest member of Cervidae (deer)
- Antlers are palmated
- Both males and females have beards



# *Alces alces*

## moose

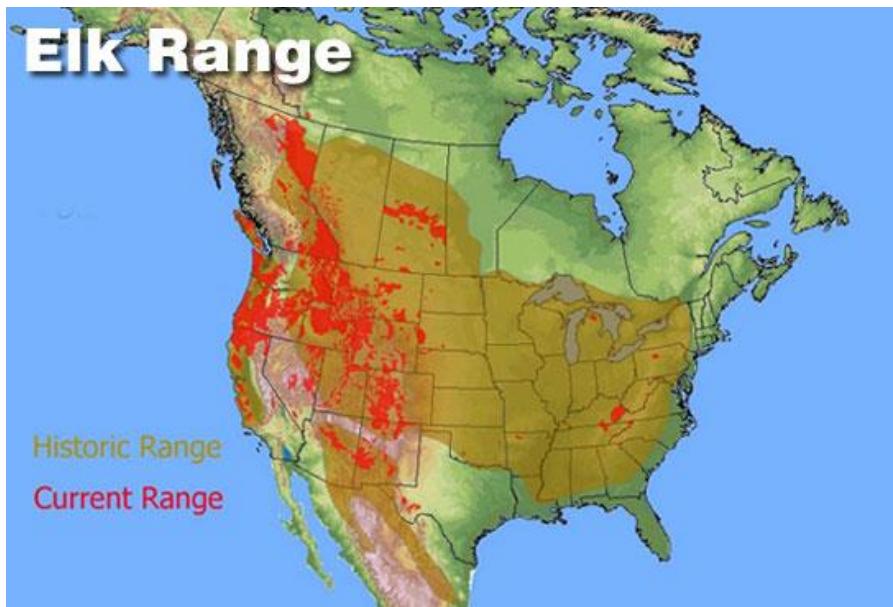


- Moose, elk, and deer have similar tracks and scat, but different sizes
- All three also rub antlers on trees, but at different scale
- Moose examples:



# *Cervus Canadensis* elk / wapiti

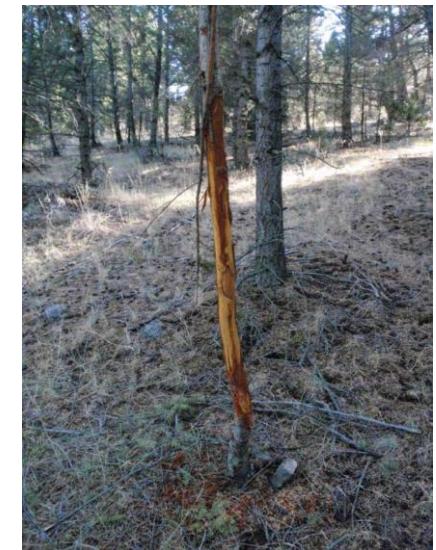
- Known for their loud bugles during mating season
- Raised commercially for meat



# *Cervus Canadensis* elk / wapiti



- Moose, elk, and deer have similar tracks and scat, but different sizes
- All three also rub antlers on trees, but at different scale
- Elk examples:



# *Cervus elaphus* red deer



- Previously thought to be same species as elk
- Also bugle to obtain females,  
but known as the “roar”
- Females called “hinds”



# *Odocoileus hemionus* mule deer

- Closely related to white-tailed deer
- Have rope-like tail
- Have larger ears
- Subspecies called black-tailed deer along Pacific Northwest coast



# *Odocoileus hemionus*

## mule deer



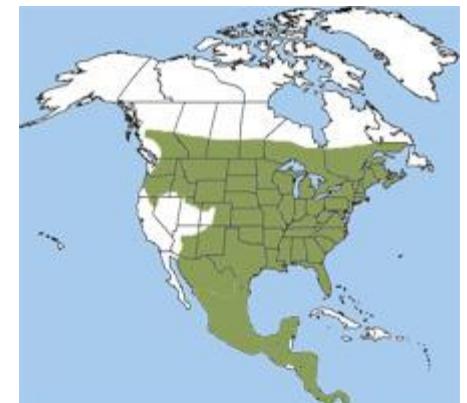
- Moose, elk, and deer have similar tracks and scat, but different sizes
- All three also rub antlers on trees, but at different scale
- Mule deer examples:



5369911

# *Odocoileus virginianus* white-tailed deer

- Closely related to mule deer
- Have smaller ears
- Have fan-like tail
- Flash tail to show predators they've already escaped
- Most common game species along entire east coast



# *Odocoileus virginianus* white-tailed deer

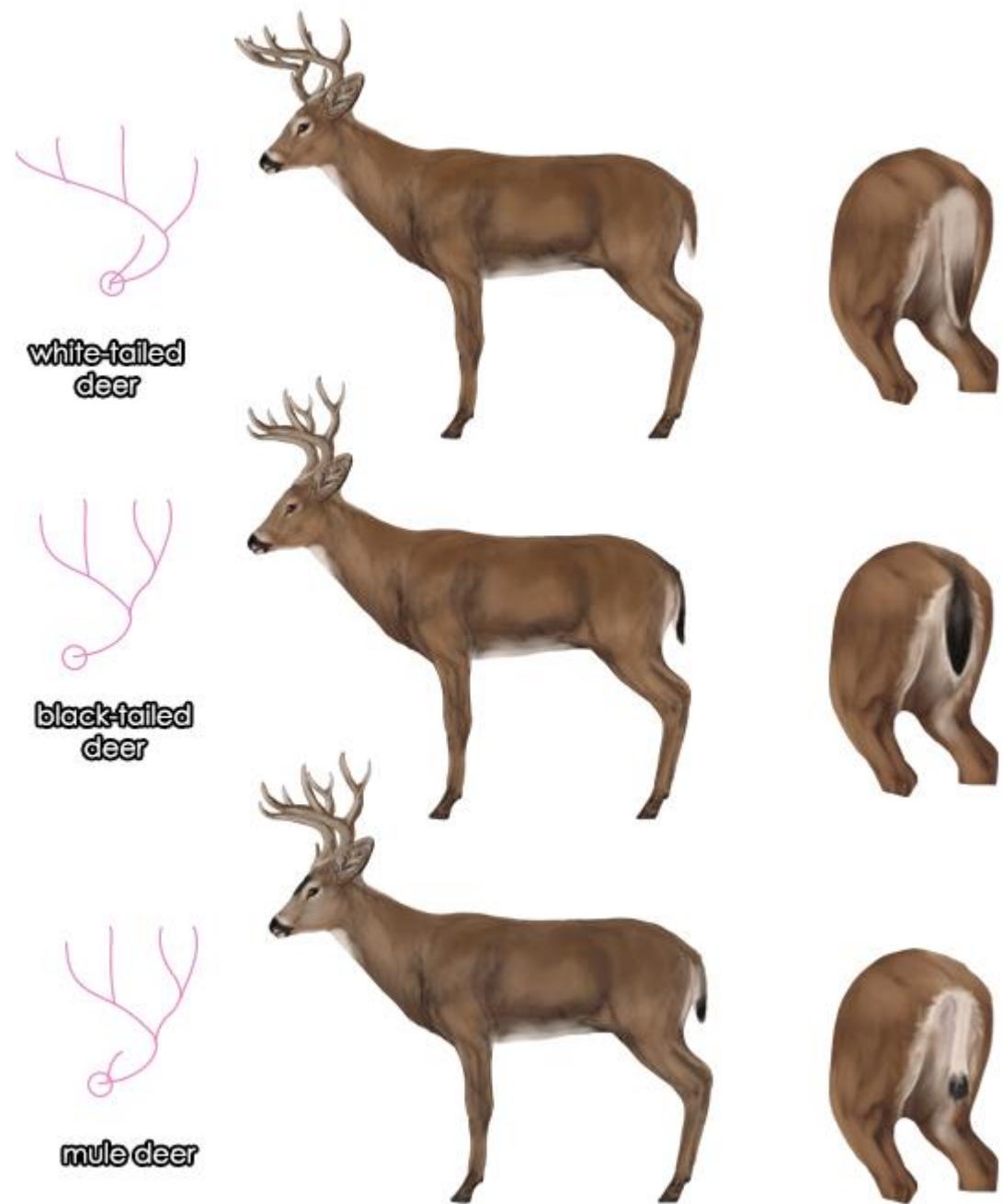


- Moose, elk, and deer have similar tracks and scat, but different sizes
- All three also rub antlers on trees, but at different scale
- White-tailed deer examples:



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# Telling deer apart



# Sexual Dimorphism

## Male Antlers

### Annual antler growth cycle

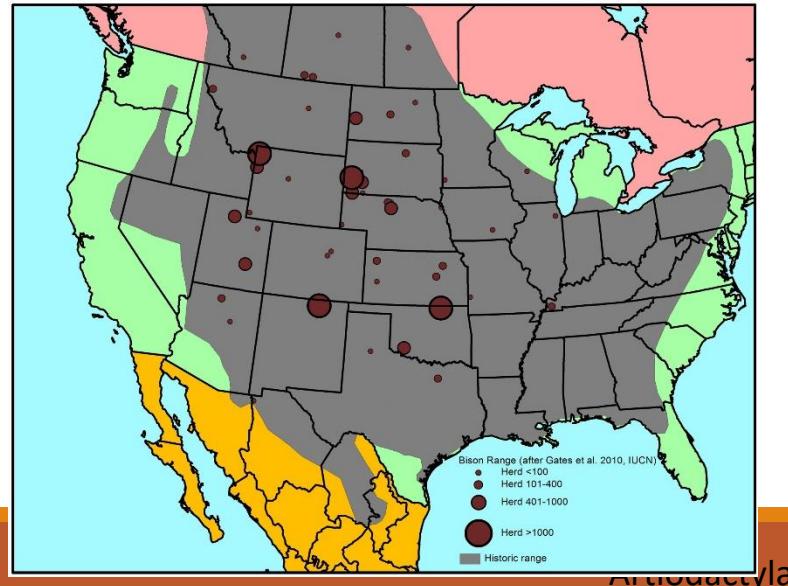


# *Bison bison*

## American bison

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- Were hunted heavily by American Indians and white settlers of the west
- Are not “buffalo”
- Can be crossbred with domestic cattle



# *Bison bison*

## American bison

- Buffalo wallow to rid themselves of parasites
- Scat is in big “paddies”



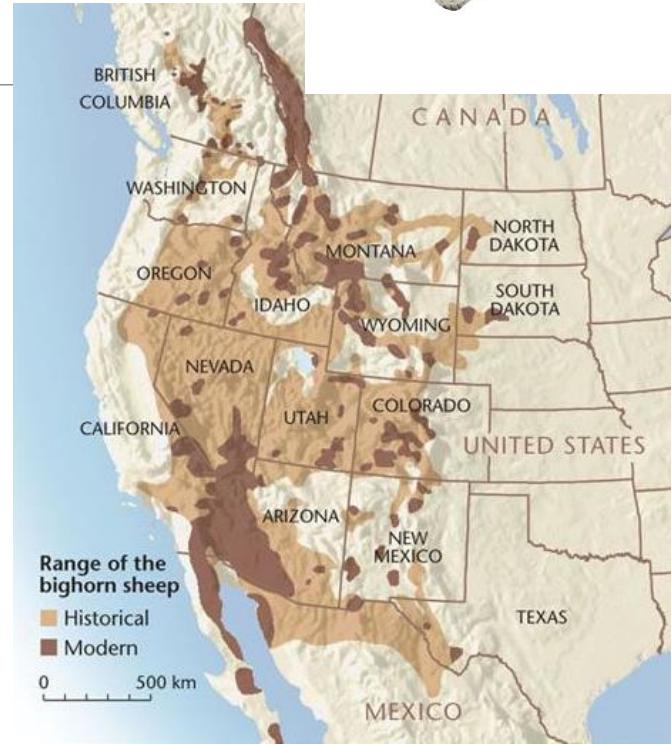
# *Oreamnos americanus* mountain goat

- Have ruminant stomachs
- Have true horns
- Known for being sure-footed on ice and rocks
- Lives in alpine and sub-alpine areas especially mountains



# *Ovis canadensis* bighorn sheep

- An icon of the American west
- Losing range due to humans as well as invasive audad sheep
- Can survive in many habitats
- Males fight for females by butting
- Scat similar to cervids



tiodactyla

# Evolutionary Benefits of Horns vs. Antlers

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- Antlers grow anew annually, so they are a reliable indicator of health for a given year (but don't get large until they've survived a few years)
- Antlers will be small if they've been sick, didn't forage well, etc., so they might not have good genes
- Horns keep growing throughout life, so older animals have larger horns
- Horns will be larger the longer you live, which means more offspring with good genetics for long lives

# Trapping Artiodactyls

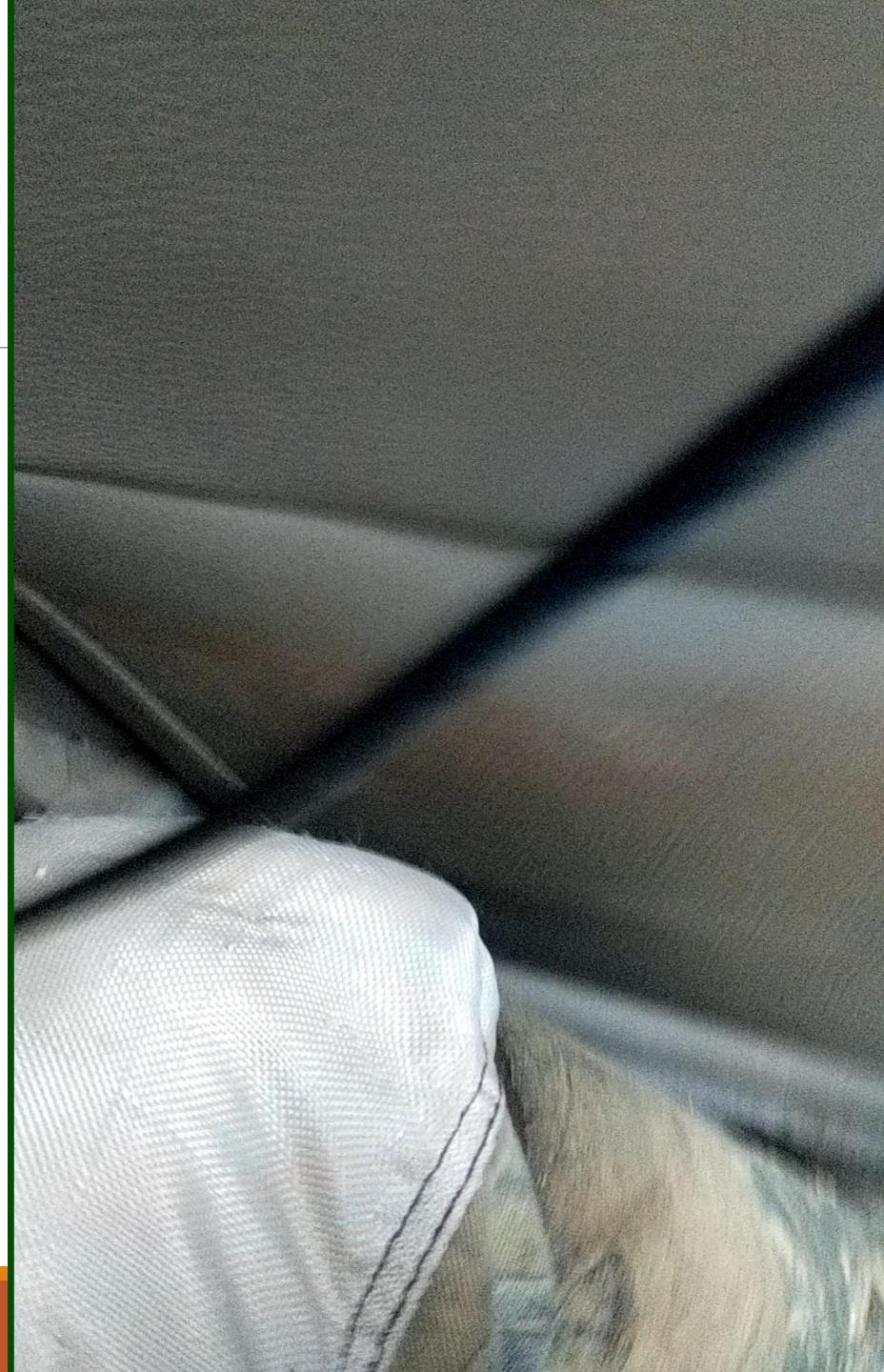


- Clover traps (are essentially large box traps) that catch deer/elk than can then be collared
- Darting is also common
- Drop nets and rocket nets can capture multiple deer simultaneously



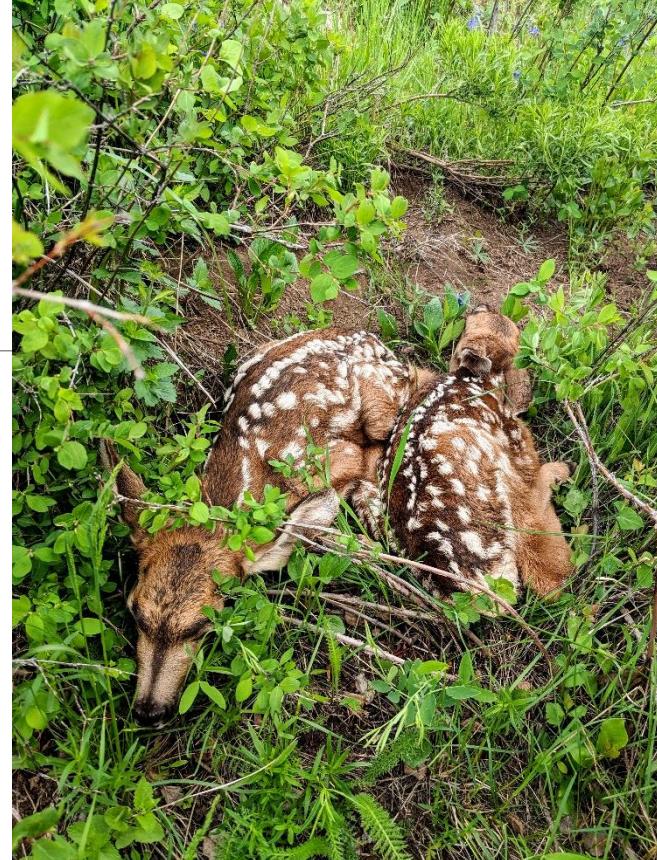
# Trapping Artiodactyls

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# GPS Collars on Artiodactyls

- GPS collars let us track locations at intervals of our choosing
- Can be satellite linked or VHF (radio) transmitted



# Specimens in the Lab

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- *Blarina brevicauda*
  - (skull & skin)
- *Sorex cinereus*
  - (skull & skin)
- *Scalopus aquaticus*
  - (skeleton, skull, & skin)
- *Corynorhinus towsendii*
  - (skin)
- *Eptesicus fuscus*
  - (skin)
- *Lasiurus borealis*
  - (skin)
- *Myotis septentrionalis*
  - (skeleton & skin)
- *Sus scrofa*
  - (skeleton)
- *Antilocapra americana*
  - (skull & tracks)
- *Alces alces*
  - (skull)
- *Cervus canadensis*
  - (antler & tracks)
- *Odocoileus virginianus*
  - (skulls, scat, & tracks)
- *Bison bison*
  - (skull)
- *Ovis canadensis*
  - (horn)