

“Meeting the Mammals”

MSc. Pilar Negreros

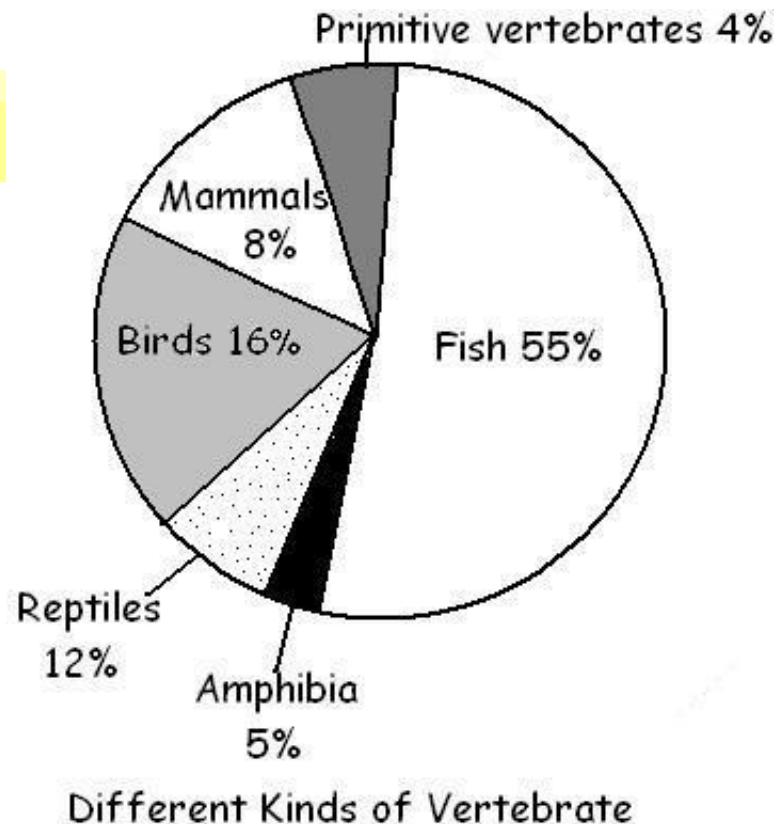
Diversity and Abundance

Phylum Chordata

Vertebrata Subphylum

Class Mammalia

- More than 5,000 species
- 28 orders
- There is much debate according to the taxonomy of groups



Origin and evolution

Paleozoic era

Carboniferous Period (360 to 286 million)

Pelycosaur
Synapsids



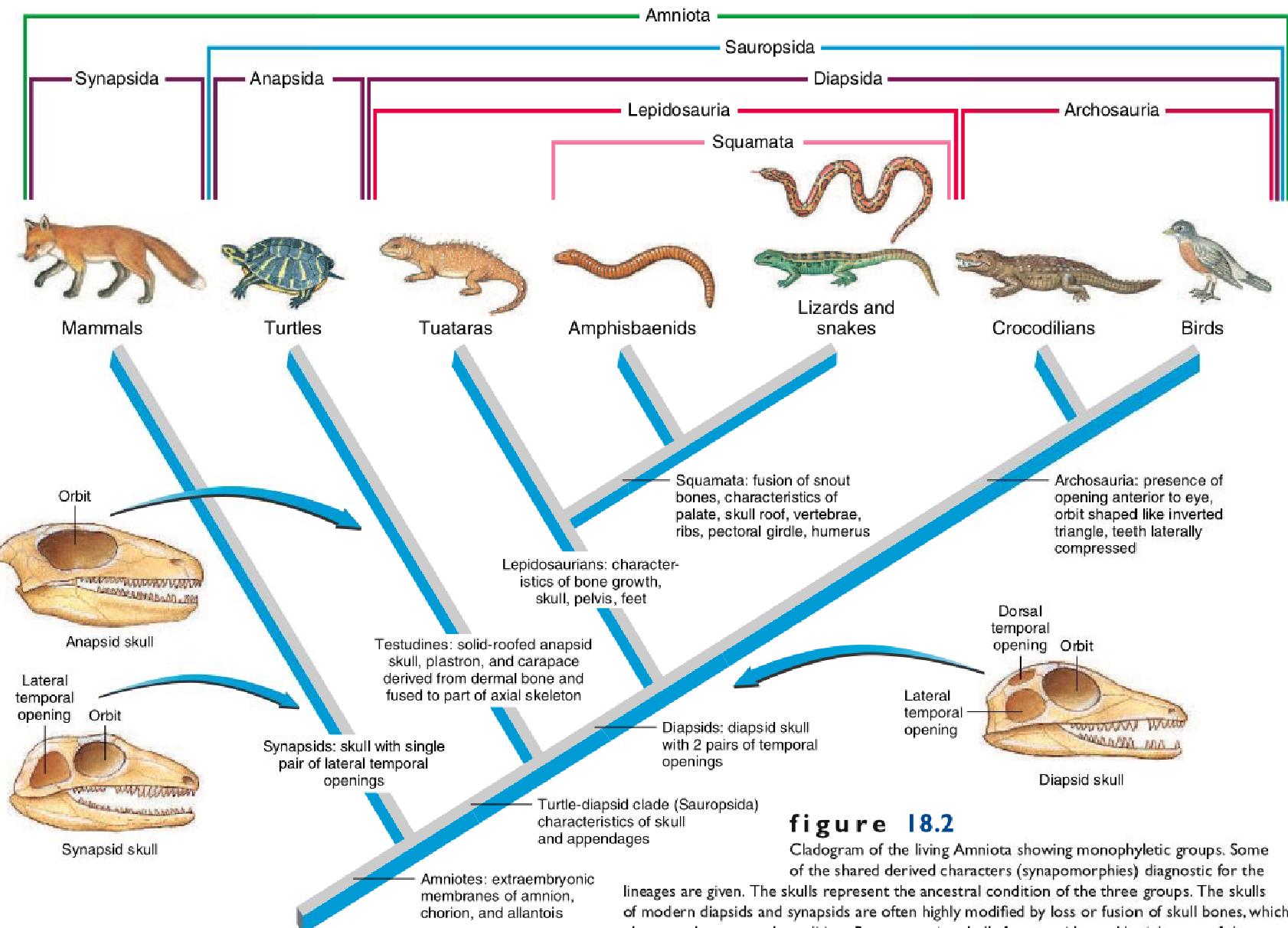
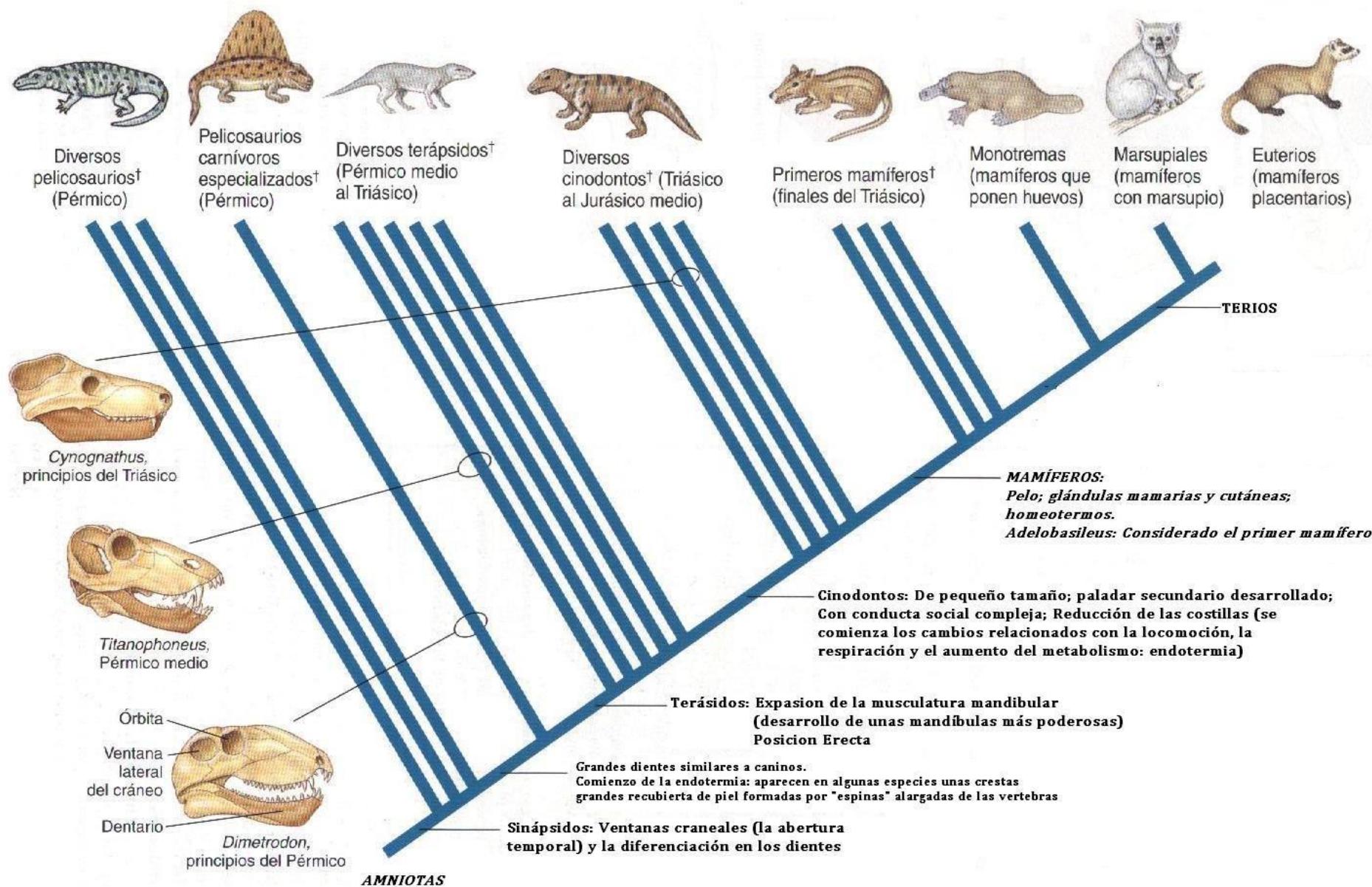


figure 18.2

Cladogram of the living Amniota showing monophyletic groups. Some of the shared derived characters (synapomorphies) diagnostic for the lineages are given. The skulls represent the ancestral condition of the three groups. The skulls of modern diapsids and synapsids are often highly modified by loss or fusion of skull bones, which obscures the ancestral condition. Representative skulls for anapsids are *Nyctiphrurus* of the upper Permian; for diapsids, *Youngina* of the upper Permian; for synapsids, *Aerosaurus*, a pelycosaur of the lower Permian. The relationships expressed in this cladogram are tentative and controversial, especially that between birds and mammals. Contrary to the view shown here, in which mammals are the outgroup, some authorities support a sister-group relationship between birds and mammals based on several kinds of molecular and physiological evidences.

(Source: F. H. Pough, J. B. Heiser, and W. N. McFarland, 1996, *Vertebrate life*, ed. 4. Upper Saddle River, NJ, Prentice Hall.)

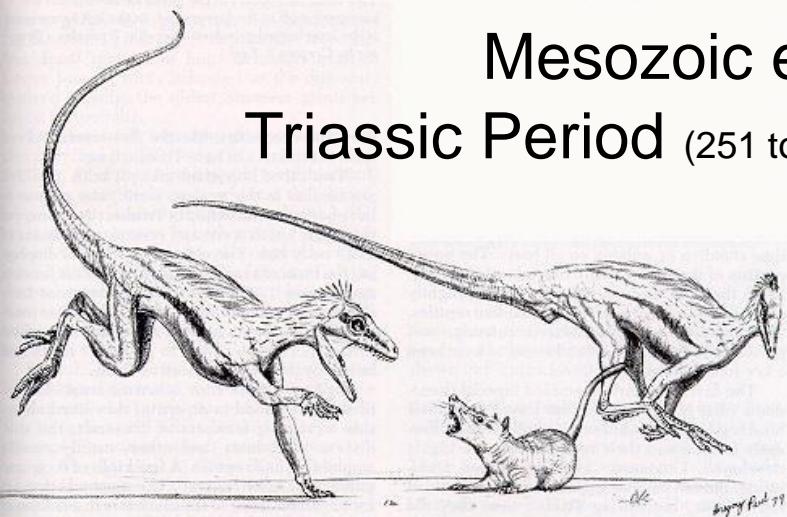
Amniote phylogeny



Origin and evolution



Mesozoic era
Triassic Period (251 to 200 million years)



Mega Mammals

Cenozoic era
Tertiary Period



What is a mammal?

- Fur



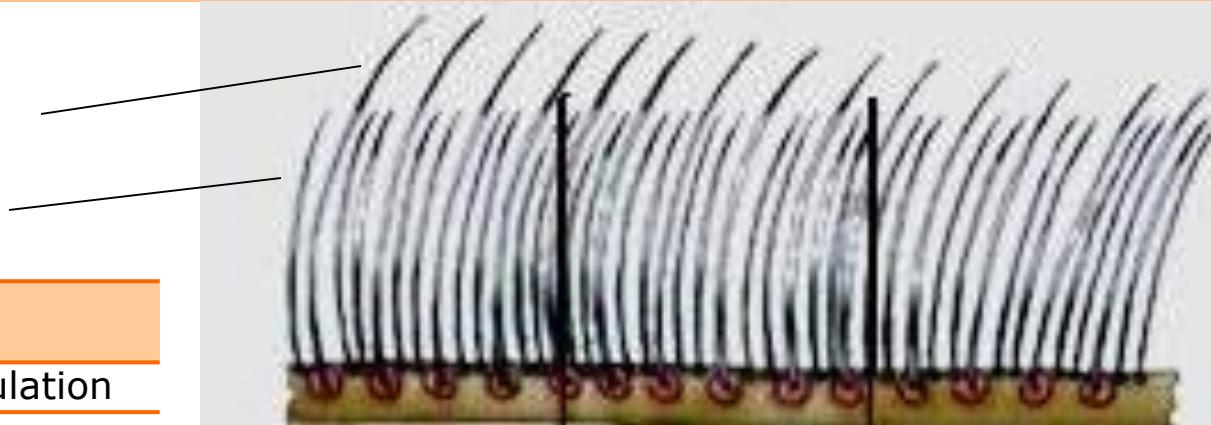
- Cetaceans and other ancient mammals have absent or reduced fur

The Hair

Keratinized filaments

Guardian or primary

Basal or secondary



Guardian

Basal

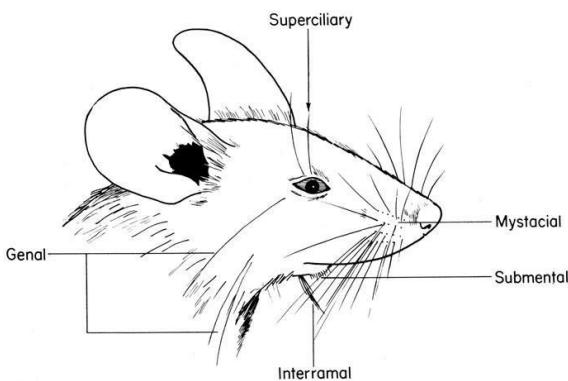
Coloration

Thermoregulation

Display (Male)

Waterproofing

whiskers



spikes



Angora



Fur

- Crypsis



Fur

- Seasonal moult



Mustela sp.



Alopex lagopus (arctic fox)



Other coating structures

Claws, nails and hooves



Horns and antlers



Other coating structures

Scales and plaques



Pholidota

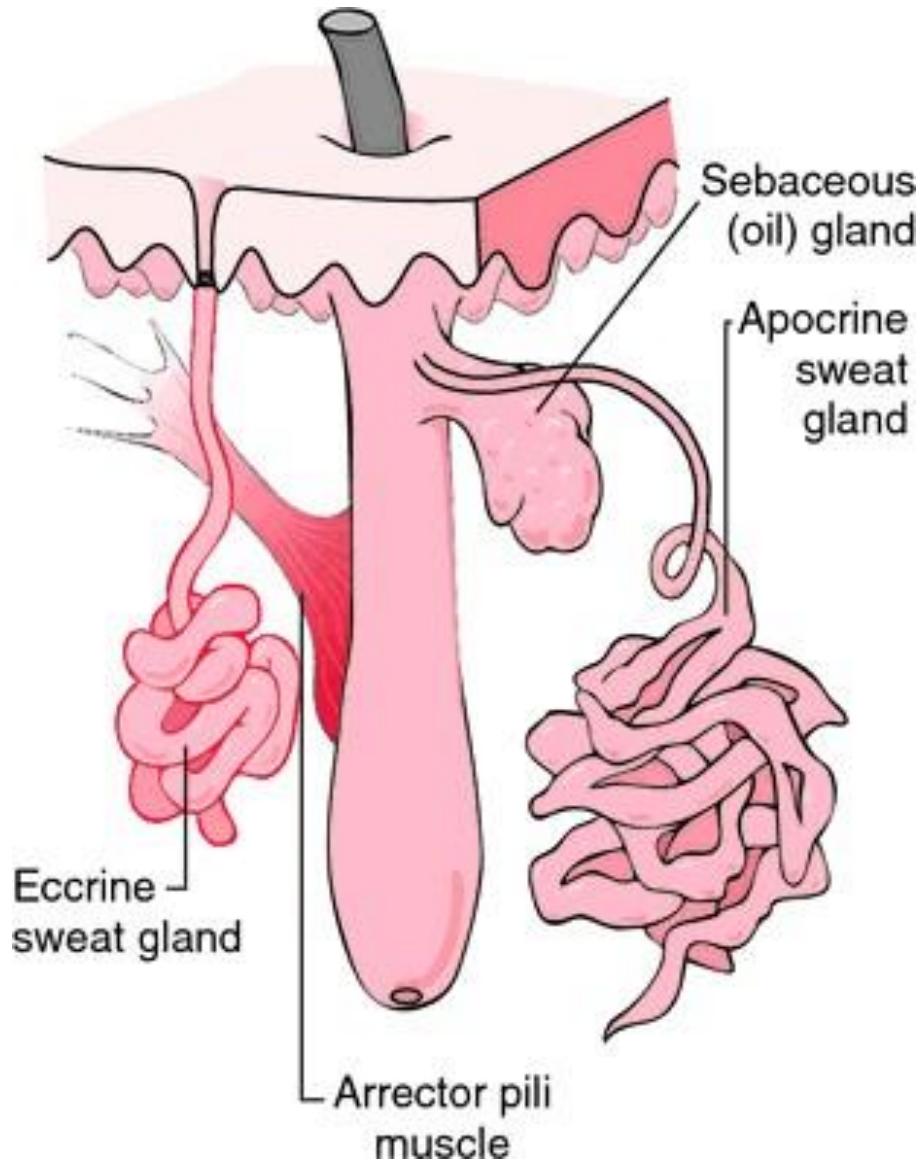


Dasypus

Various types of glands

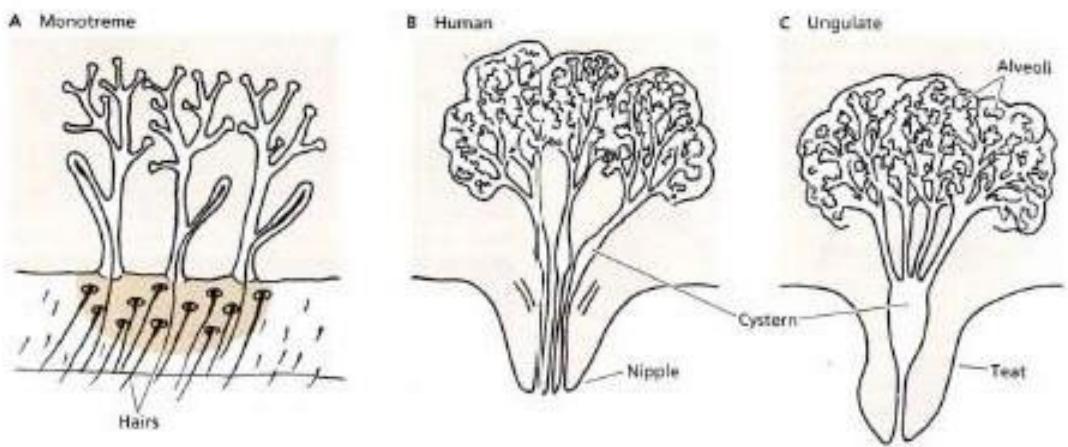
At least 4 types of glands

- Sebaceous
- Sweaty
- Eccrine
- Apocrine
- Mammary
- Odoriferous



Mammary glands

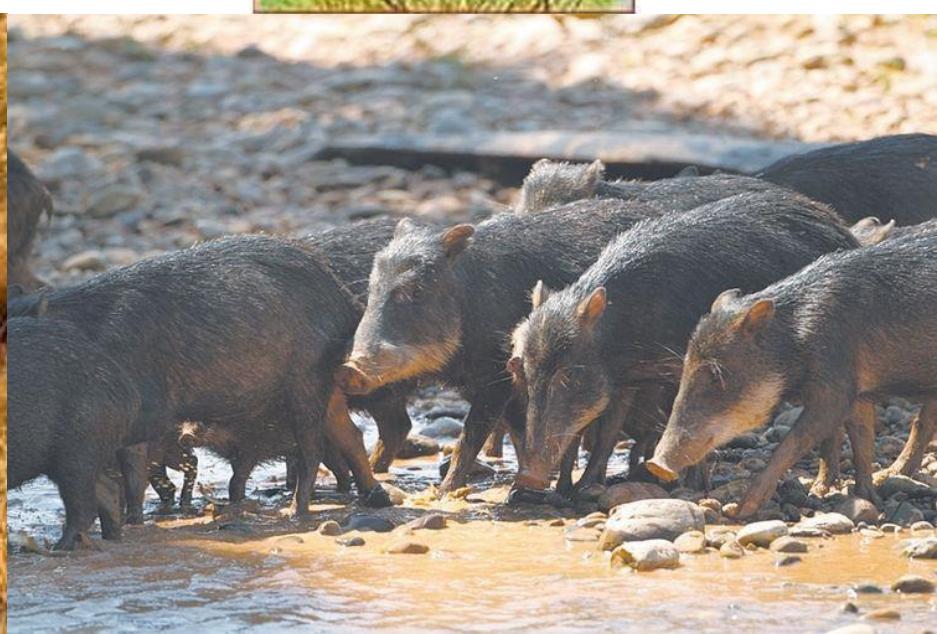
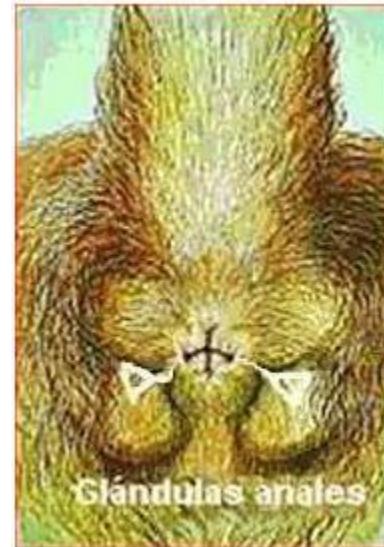
- Specialized in milk production
- Composition of milk varies according to
- Species and according to the age of the offspring
- No nipple
- With nipple inside folds, less volume
- With nipple and greater volume



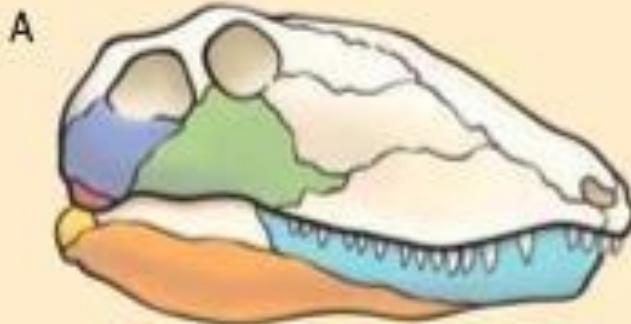


Scent glands

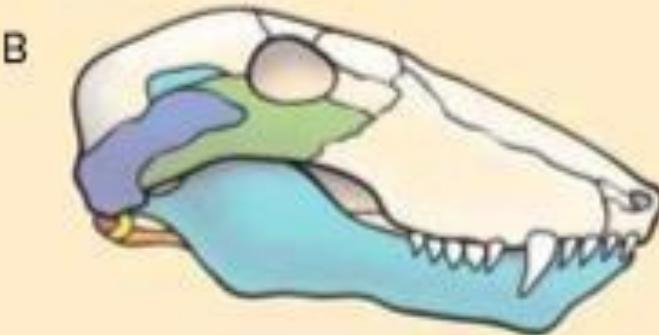
- Pheromones
- Territory marking
- Defending
- sexual communication
- space communication



Other definitions of class Mammalia

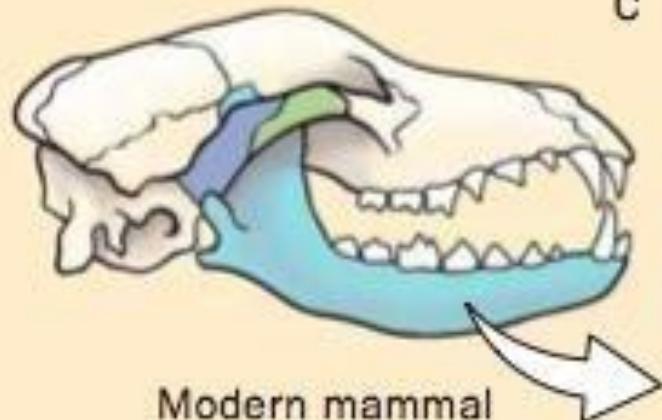


Early reptile

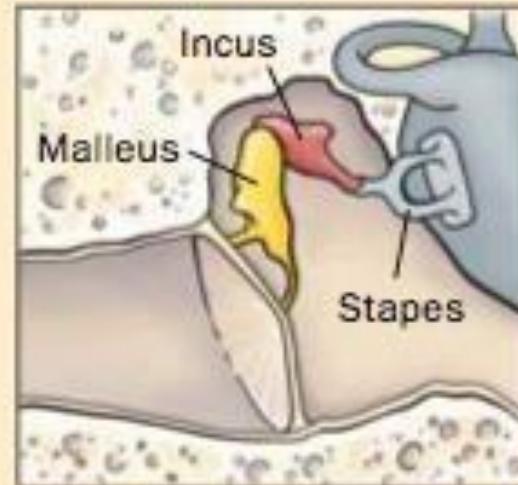


Triassic mammal

- [Light Blue Box] Dentary
- [Orange Box] Angular
- [Yellow Box] Articular
- [Red Box] Quadrate
- [Dark Blue Box] Squamosal
- [Green Box] Jugular

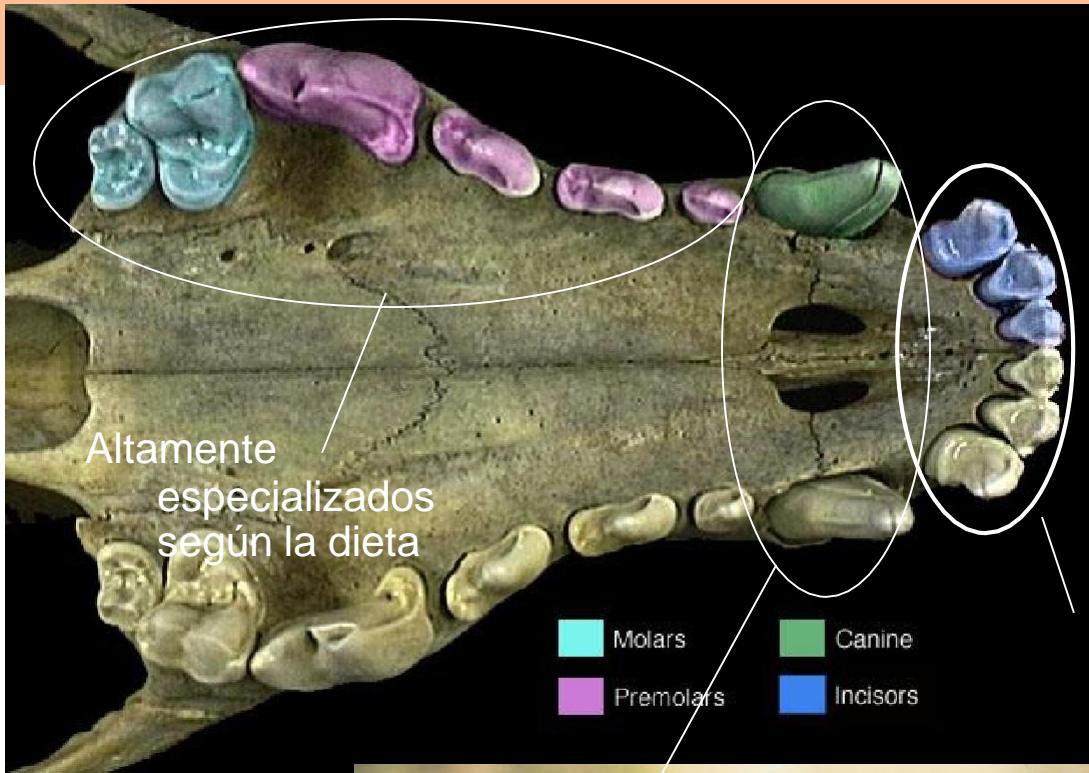


Modern mammal



Middle ear bones
of modern mammal

Teeth



molar incisor canine

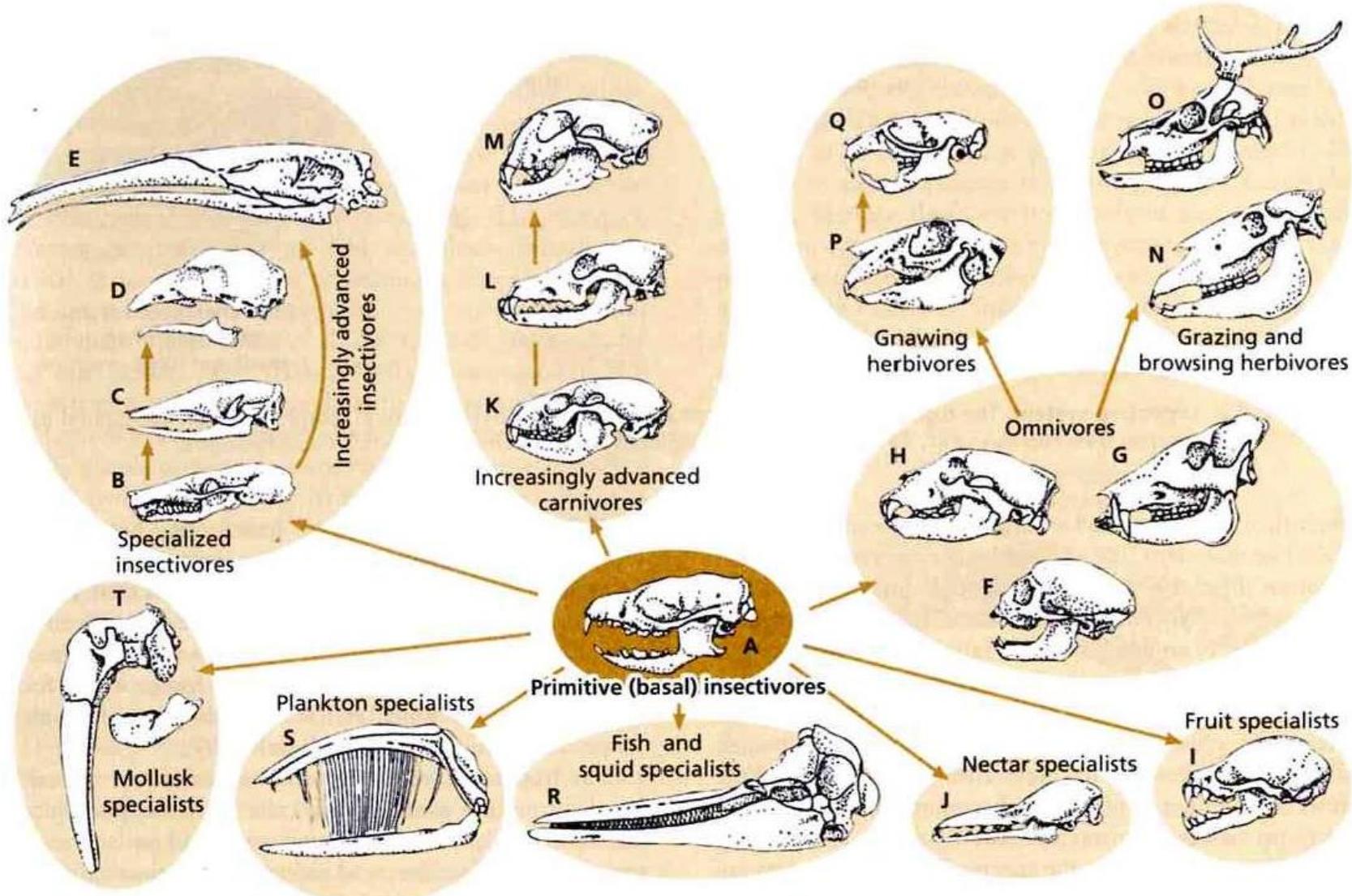


Caninos aferrando la presa

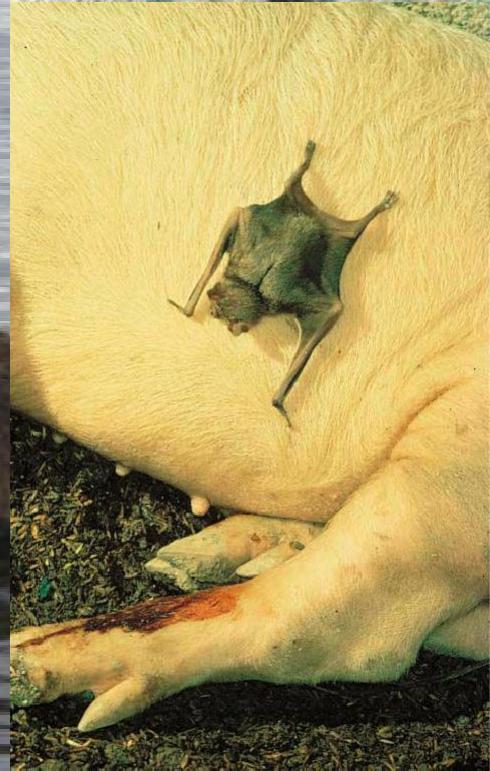
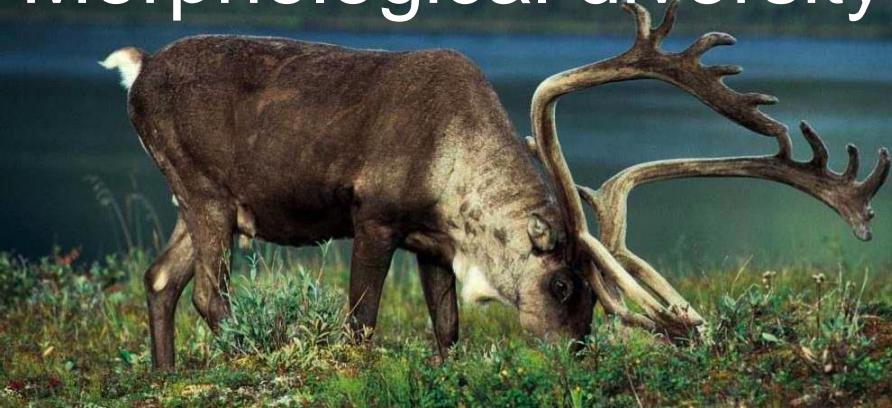


- Heterodontia
- Occlusal

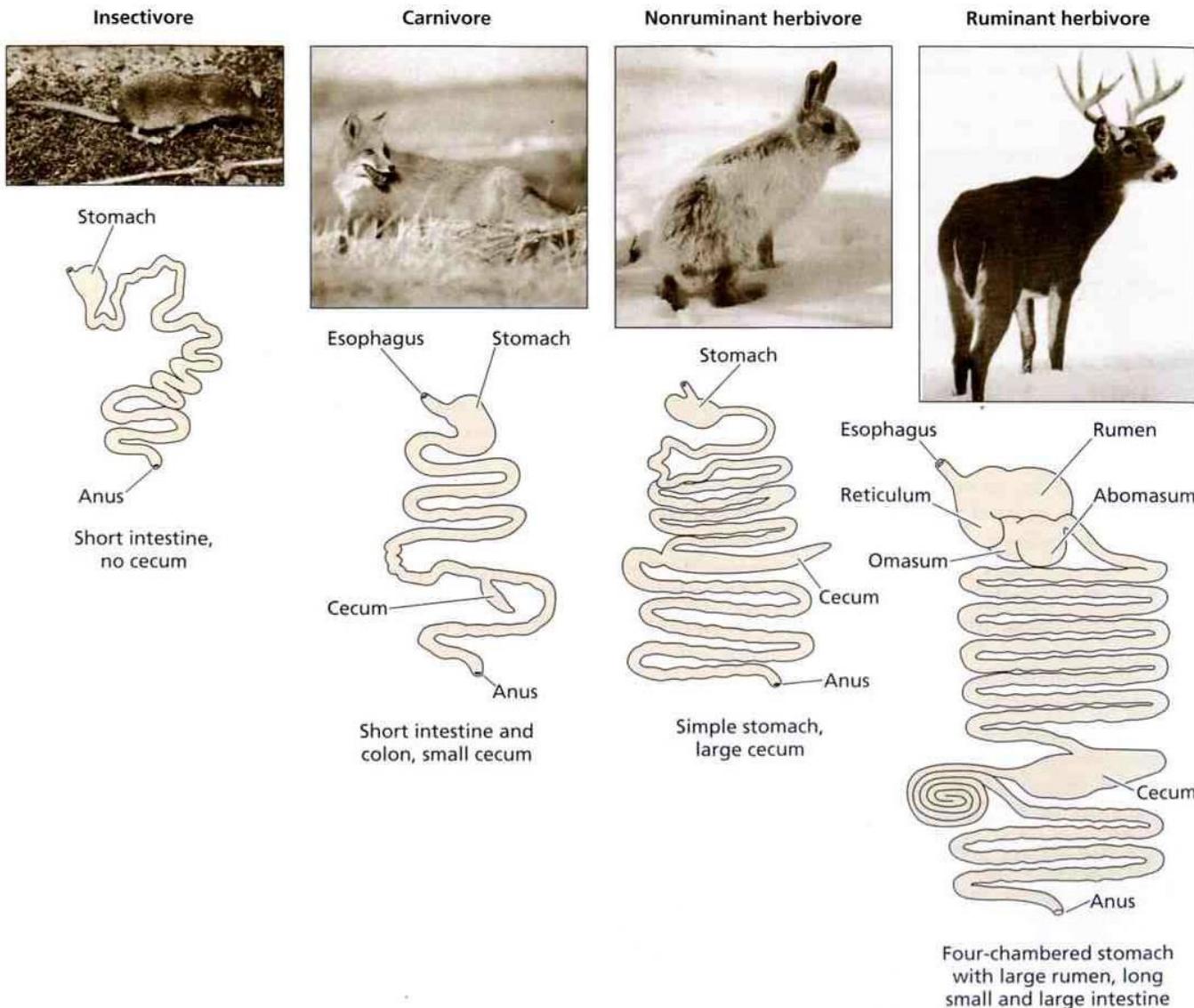
Foraging strategies



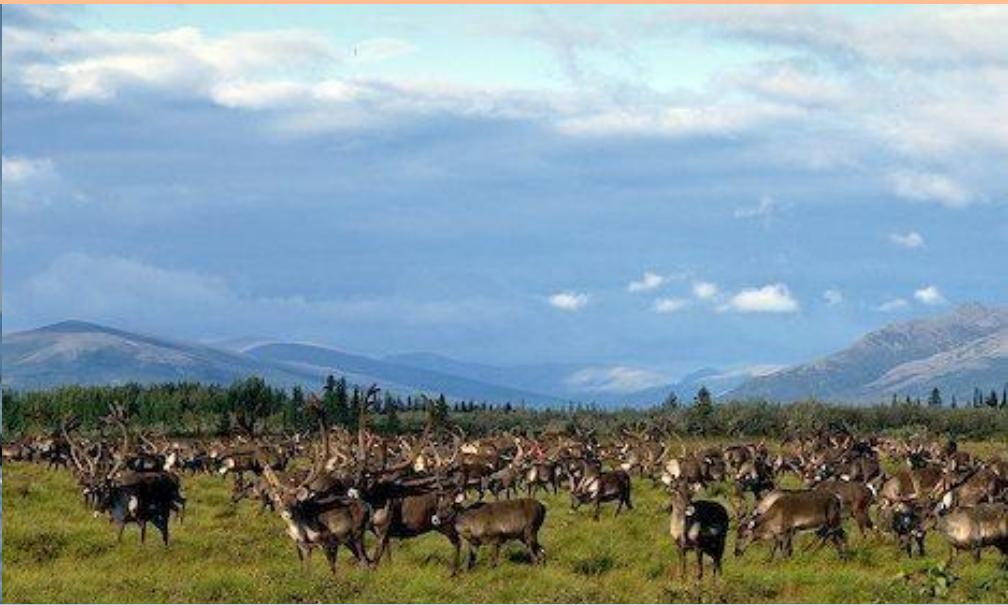
Nutritional adaptation Morphological diversity



Digestive system specializations



Migration



Aestivation and Hibernation

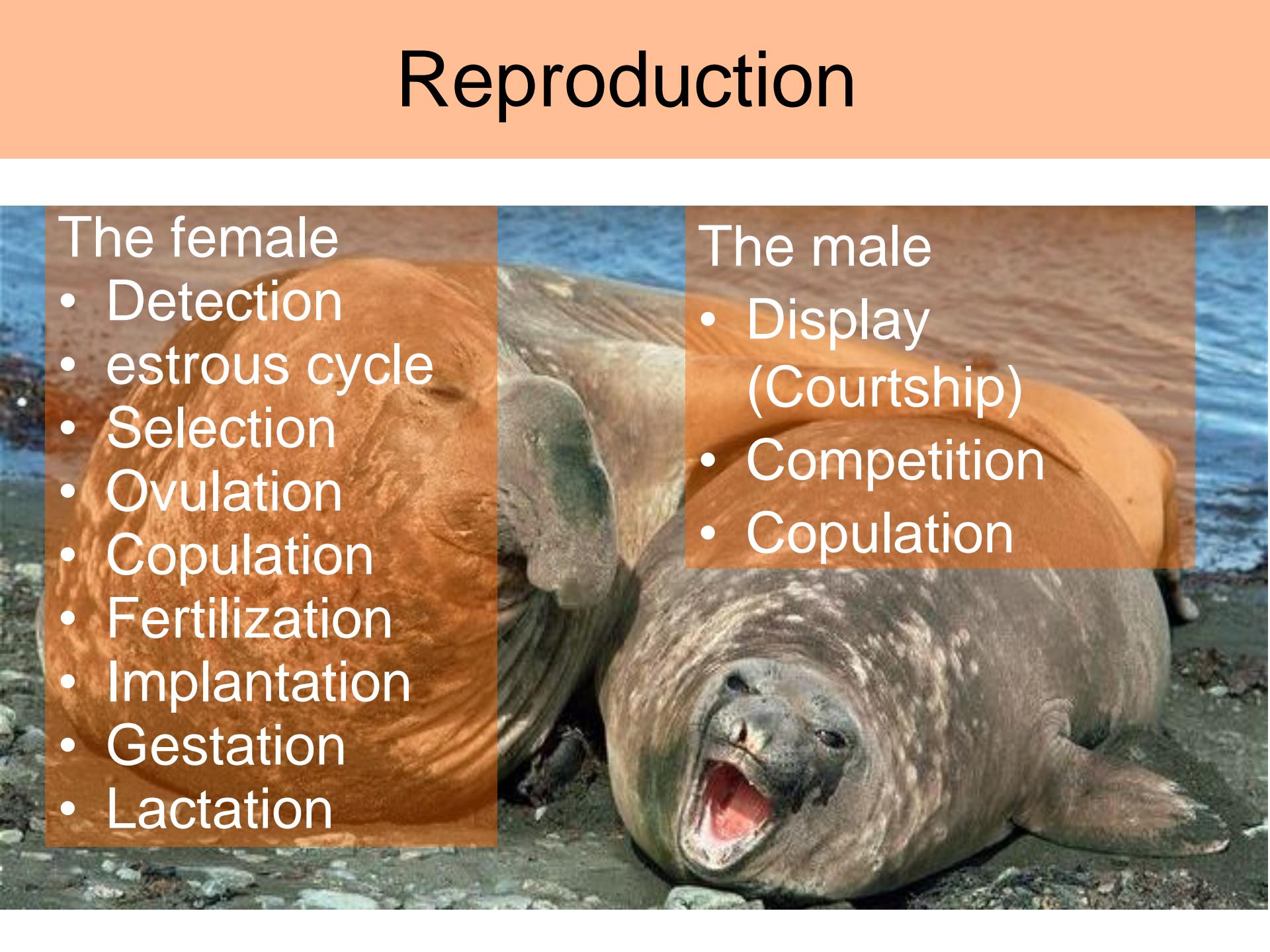
Hot climates



Cold climates



Reproduction

A photograph showing two large elephant seals on a grassy, rocky hillside. One seal is in the foreground, facing the camera with its mouth open, while another is visible behind it. The background shows a vast expanse of blue ocean under a clear sky.

The female

- Detection
- estrous cycle
- Selection
- Ovulation
- Copulation
- Fertilization
- Implantation
- Gestation
- Lactation

The male

- Display
(Courtship)
- Competition
- Copulation

Taxonomy

Subclass Prototheria



Underclass Metatheria



Subclass Theria

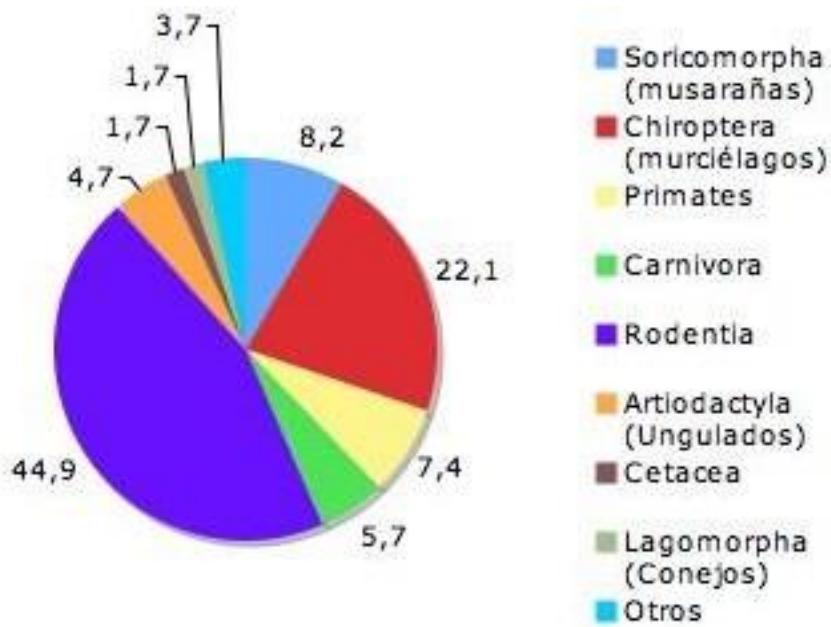


Underclass Eutheria

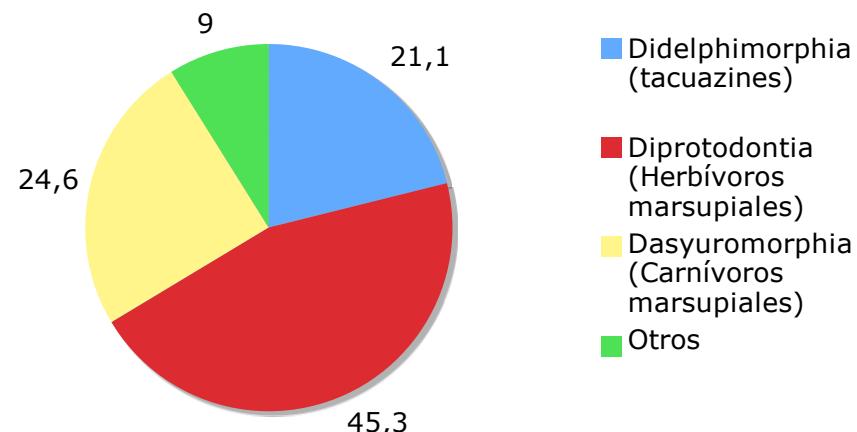
Taxonomy

Sub class	Common name	Order	Family	Species
Prototheria	Monotremes	1	2	3
Metatheria	Marsupials	7	20	289
Eutheria	Placentals	20	127	5060
TOTAL		28	149	5352

Eutheria



Metatheria



Subclass Prototheria



Echidna



Zagloso

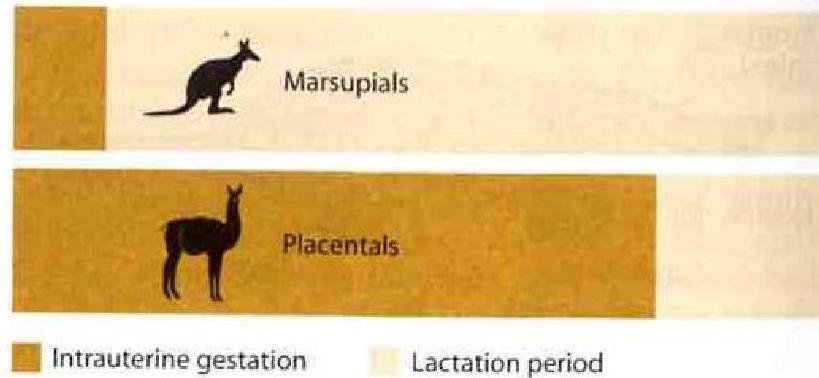
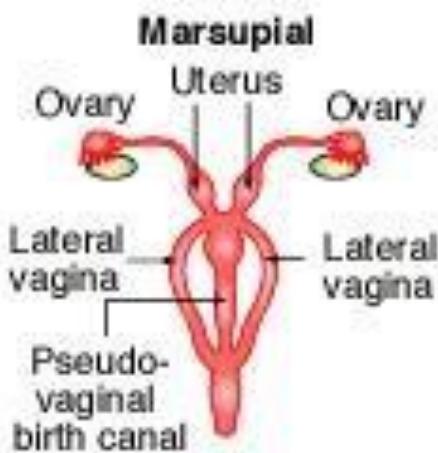


Platypus

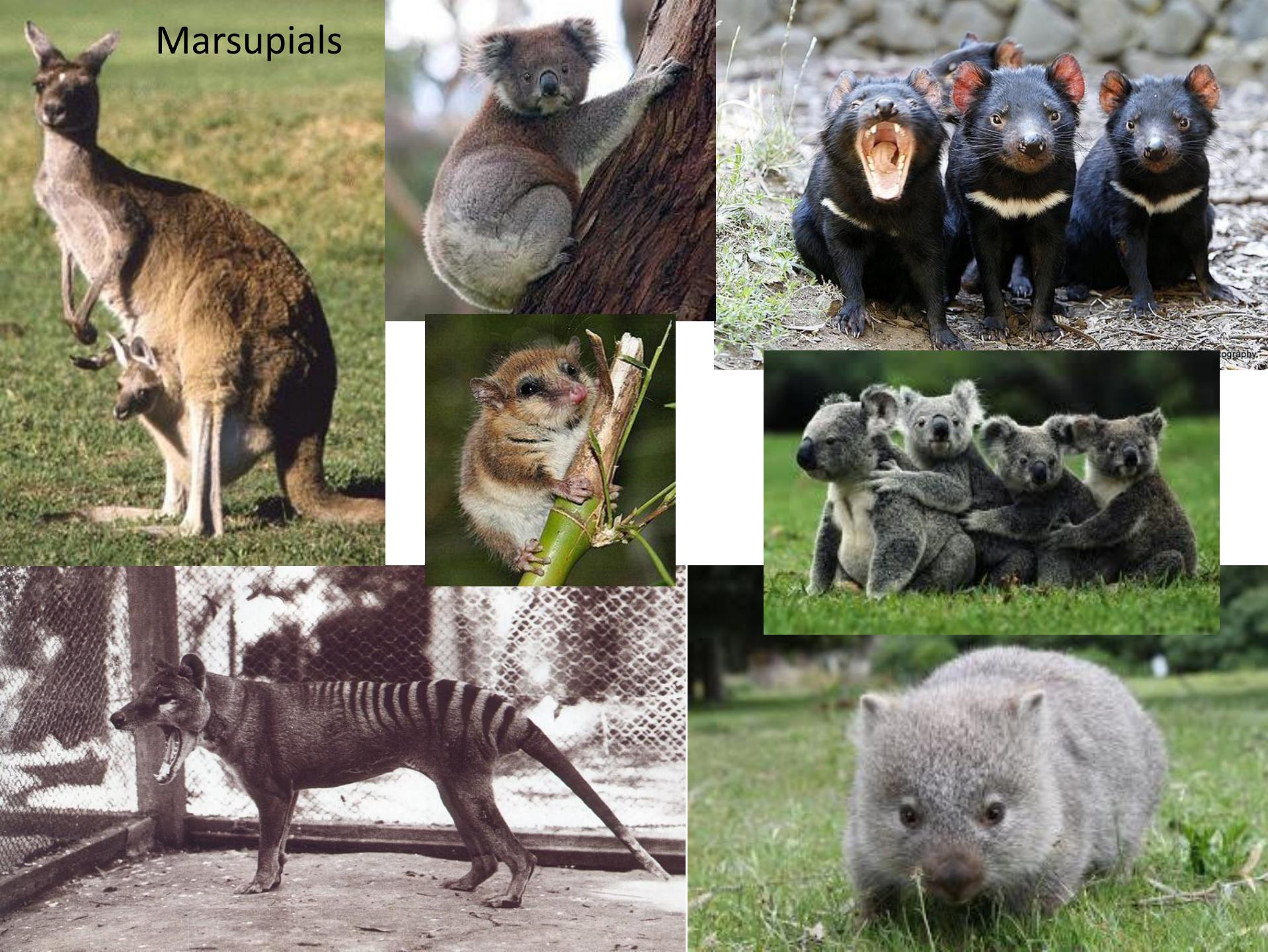


Subclass Theria, Infraclass Metatheria

- Several vaginas
- Two wombs
- Independent birth canal
- 7 Orders



Marsupials



Didelphis marsupialis (Tacuazín)



Chironectes minimus (Tacuazín of water)



Philander opossum (Tacuazín 4 eyes)



*Some
marsupials
from
Guatemala*

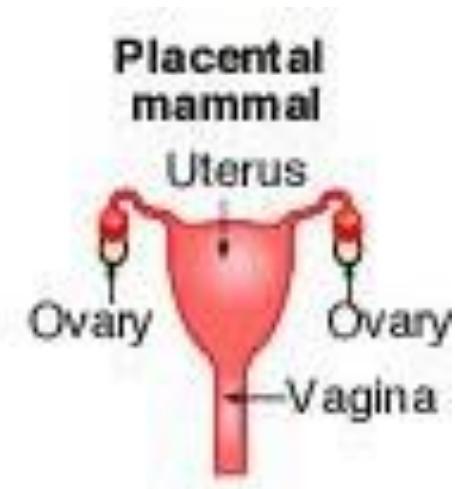
Marmosa mexicana (Tacuazín mouse)



Subclass Theria, Infraclass Eutheria



- Plain vagina
- without sewer



- A uterus
- 20 Orders

Order Pilosa

Cyclopes didactylus (beehive bear)



Myrmecopagha tridactyla
(giant anteater)

Tamandua mexicana (Arboreal
anteater)



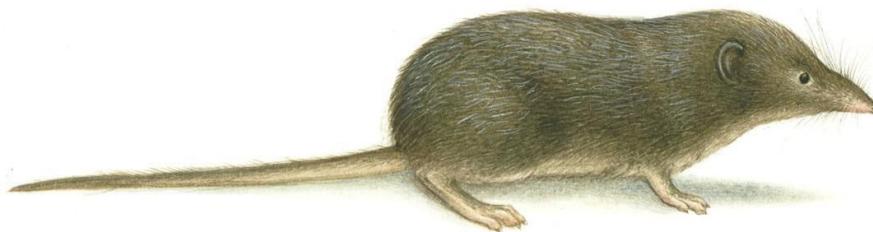
Order Cingulata

Dasypus novemcinctus (nine-banded armadillo)



Cabassous centralis (rag-tailed armadillo)

Order Eulipotyphla



Fuente: INBio
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***Sorex veraepacis* (shrew of las verapaces)**



Order Rodentia

Dasyprocta punctata (Tepezcuittle)

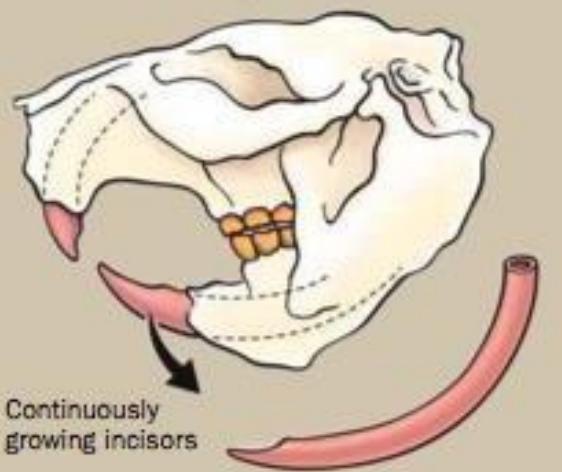


Sphiggurus mexicanus (porcupine)



...and many species of squirrels, mice and gophers

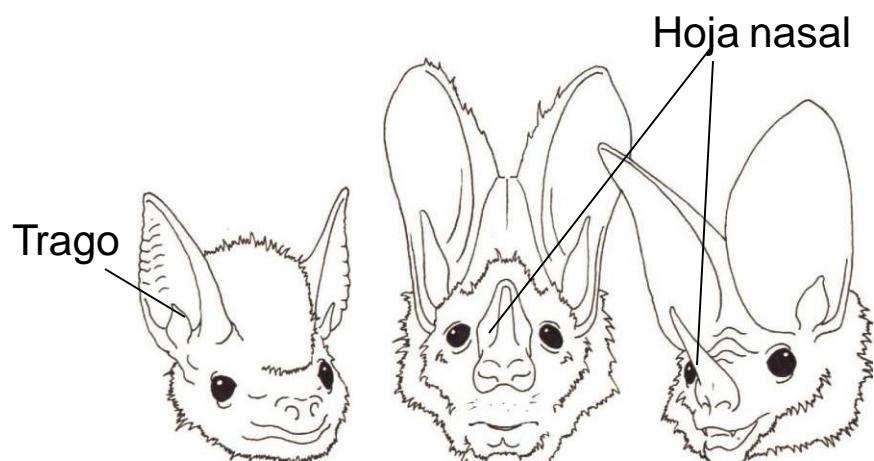
Gnawing (rodents)



Cuniculus paca (Cotuza)

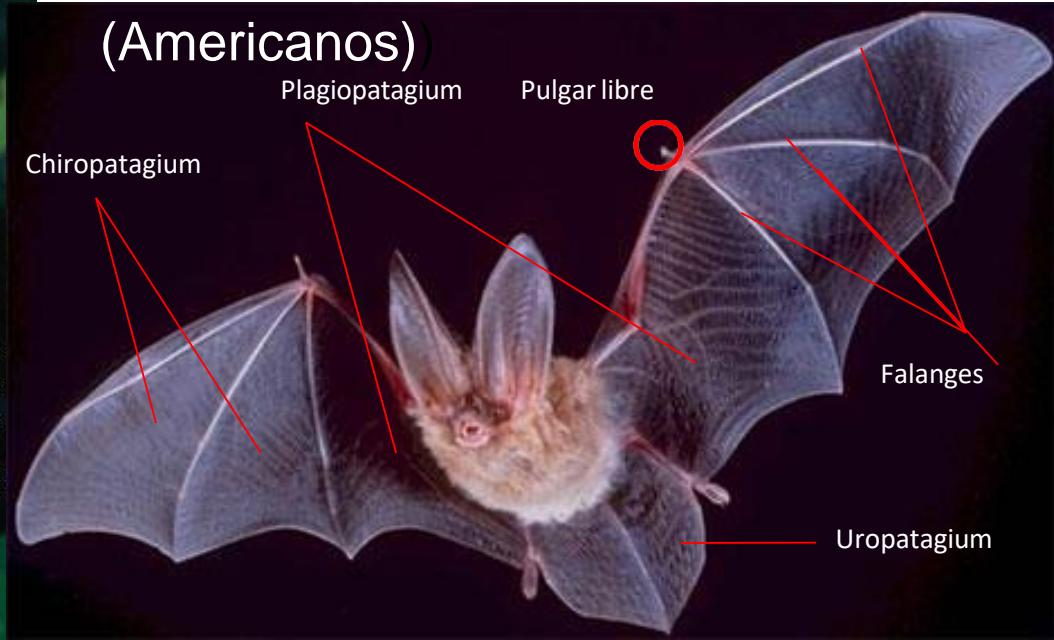


Order Chiroptera



SO: Microchiroptera (Echolocation)

(Americanos)



Order Chiroptera

Family Phyllostomidae (most varied)

- leaf-nosed bats
- Highly specialized in their diet
- (1) nectivore
- (2) frugivorous
- (3.4) Carnivore
- (5) Hematophagous



Order Primates



Alouatta pigra (howler monkey)



Alouatta palliata (howler monkey)



(Spider monkey)
Ateles geoffroyi

Order Lagomorpha

Rabbits, hares and pikas



Sylvilagus florianus



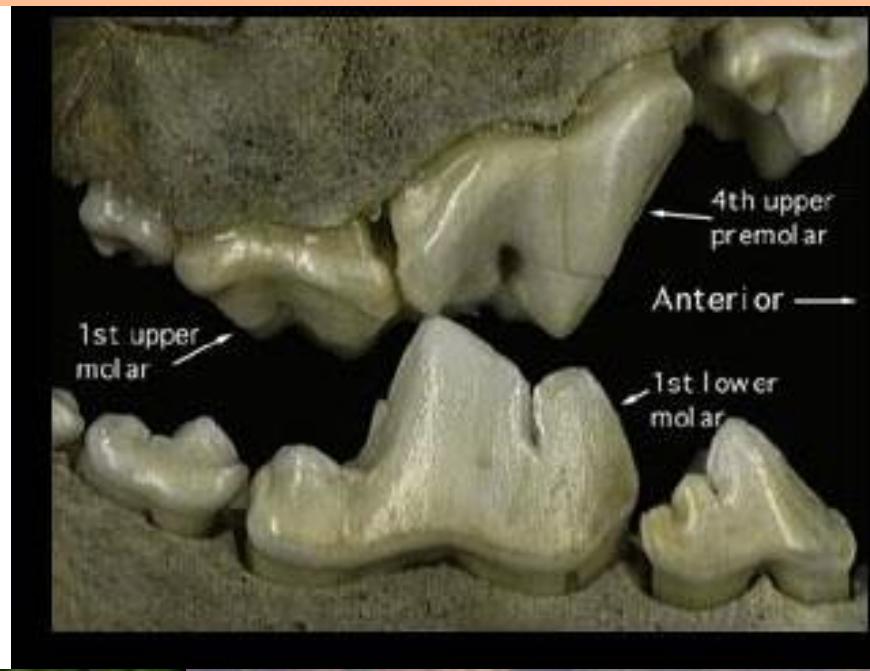
Sylvilagus brasiliensis

Order Carnivora



Pinnipedia
SuperFamily

Family
Canidae



Urocyon cinereoargenteus
(gray fox)



Canis latrans (Coyote)

Order Carnivora

Family Felidae

Panthera onca (Jaguar)



Order Carnivora

Puma concolor
(Cougar)



Leopardus pardalis (ocelot)



Puma jaguarundi (jaguarundi)

Leopardus weidii (margay)



Order Carnivora

Nasua narica
(coati mundi)



***Procyon lotor* (raccoon)**

Bassariscus sumichrasti
(cacomixtle)



Family
Procyonidae

***Potos flavus* (micoleon)**

Order Carnivora

Lutra longicaudis (otter)



Mustela frenata (weasel)



Family Mustelidae



Galictis vittata (grey ferret)



Eira barbara (light parakeet, old man's head)

Order Carnivora

Spilogale putorius (spotted skunk)



Mephitis macroura (hooded skunk)

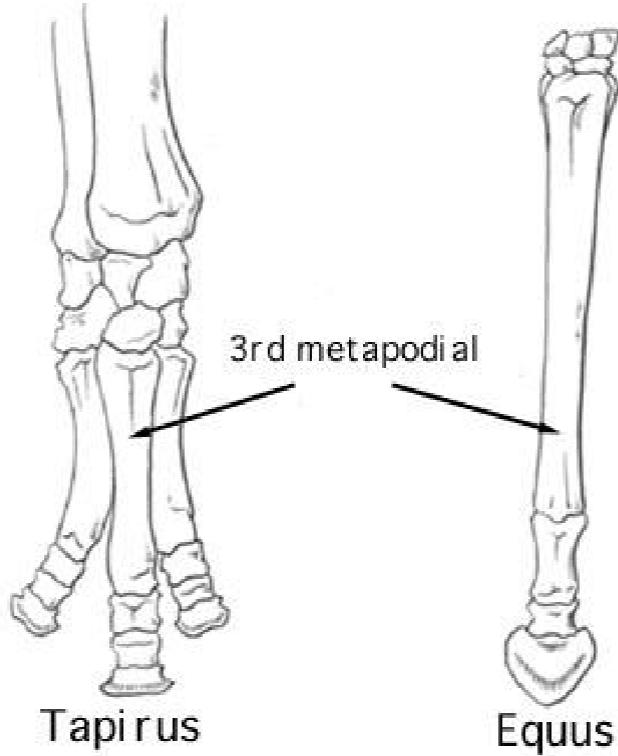


Conepatus leuconotus (skunk nose
pork)

Family Mephitidae

Order Perissodactyla

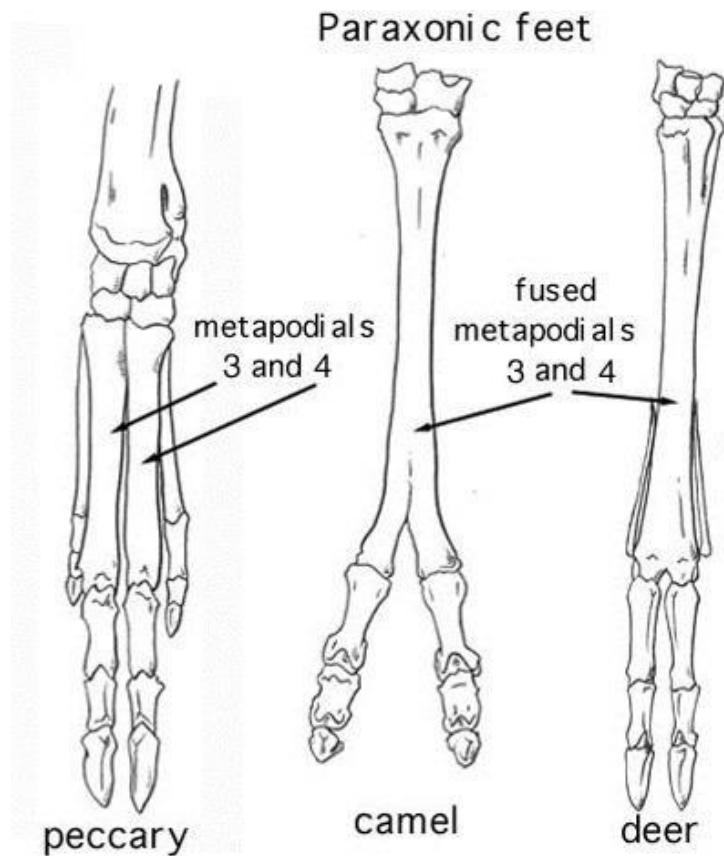
Mesaxonic feet



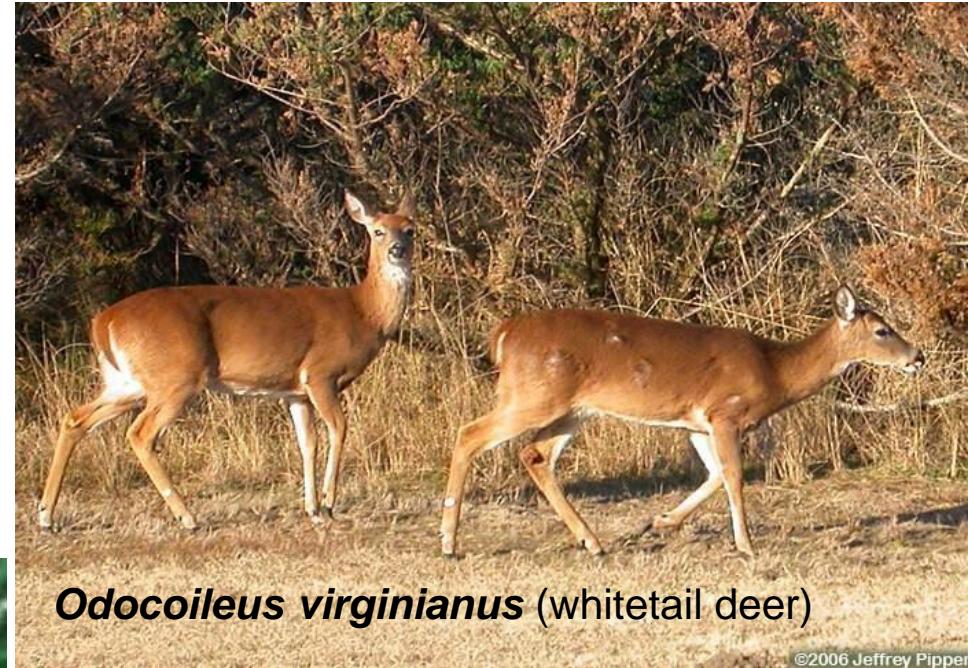
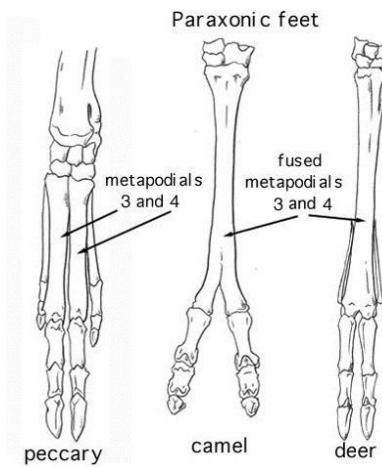
Tapirus bairdii
(central american tapir)



Order Artiodactyla



Order Artiodactyla



Mazama americana
(whitetail deer)



Odocoileus virginianus (whitetail deer)

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Order Sirenia



Trichechus manatus
(caribbean manatee)



Order Cetacea



*Bearded (Suborder Mysticeti)
Orcinus orca (Killer Whales)*



With teeth (suborder Odontoceti)



*Megaptera novaeangliae (humpback
whale)*



Delphinus delphis (Bottle nose dolphin)

Functions in the ecosystem

- They are an integral part of food webs: herbivores, carnivores, insectivores, nectivores, frugivores.
- Control of lower level populations in the food web.
- Pollinators.
- Seed dispersers.
- Soil fertilizers and aerators.
- Pest outbreak control.
- Symbiotic relationships with other mammals and other groups.
- They feed on tree parasites.

Main threats

Habitat Fragmentation / Ecosystem Destruction

- Cattle raising
- Agriculture
- monoculture system

Loss of ecosystem quality

- Simplification of ecosystems.
- Replacement of ecosystems.
- Pollution.
- Soil loss.

ECOLOGICAL INDICATORS

Diversity of rodents indicate good state of the structure of forest plants

Equal diversity of frugivorous and nectivorous bats.

Signs of medium and larger mammals can be indicators of good forest condition, although depending on the context they can also indicate high habitat fragmentation.

Hematophagous bats are indicators of anthropogenic disturbance.