

Zoology

Class Mammalia MAMMALS

CLASS MAMMALIA

1. production of milk in females for the nourishment of young, from mammary glands
2. skin with various glands
3. body usually covered with hair



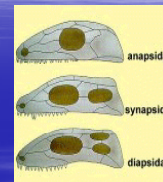
1. three small bones within the ear
2. skull with 2 occipital condyles
3. jaws usually with differentiated teeth in sockets
4. limbs adapted for walking, climbing, burrowing, swimming, or flying

5. diaphragm between thoracic and abdominal cavities
6. endothermic or "warm-blooded" bodies
7. heart 4 - chambered, with left aortic arch only

- Mammals encompass some 5,500 species (including humans)
- distributed in about 1,200 genera
- 152 families
- up to 46 orders

Evolution

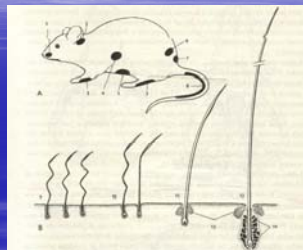
- synapsids - have a single hole (temporal fenestra) low on each side of the skull on each side where jaw muscles attach



Archaeothyris, one of the first synapsids (or mammal-like "reptiles")

Mammalian hair

- keratinized derivate of the epidermis
- seated in an invagination of the epidermis called a hair follicle
- periodically molted



underhairs guard hairs vibrissae

Glands

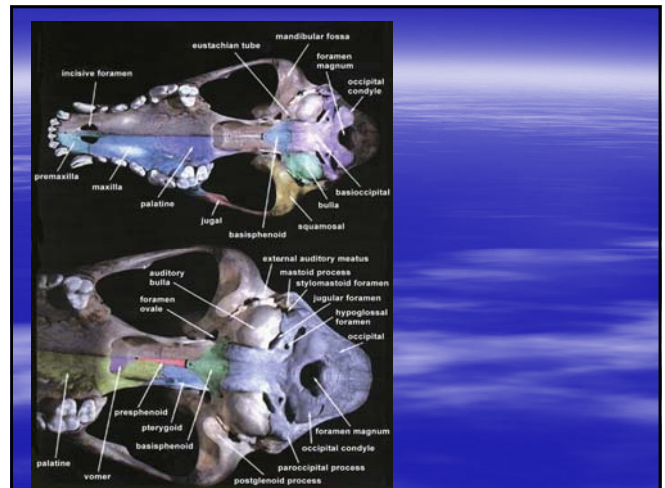
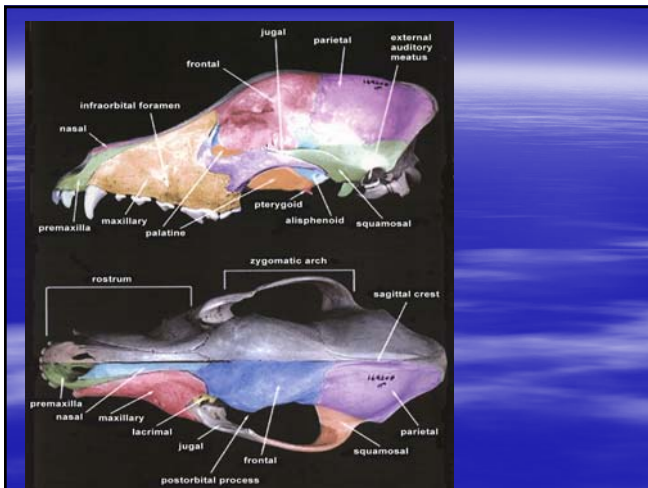
- Glands develop from the epidermis of the skin
- Subcutaneous (oil) glands – associated with hair follicles
- Sudoriferous (sweat) glands – eccrine glands used in evaporative cooling, apocrine glands converted to odorous products by microorganisms in the skin
- Scent or musk glands secrete feromones
- Mammary glands

Skeletal system

- The skeleton is largely of **bone**, with cartilage over joint surface, on parts of the ribs

Skeletal system

- **three auditory ossicles** (malleus, incus, stapes)
- **jaw articulation by a single bone of the lower jaw**
- reptiles – the jaw articulates at two small bones



▪ **two rounded occipital condyles**

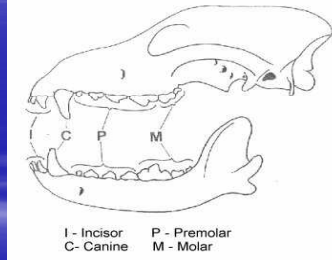
- the majority of mammals have **seven cervical vertebrae** (bones in the neck)
- the few exceptions include the manatee and the two-toed sloth, which have only six cervical vertebrae
- the three-toed sloth with nine cervical vertebrae
- adjacent vertebrae are separated by **intervertebral disks** of dense fibrocartilage

▪ **teeth – heterodont** (specialized for different function)

- are set **into sockets** of the jaw
- **two sets** of teeth

Teeth

- **Incisors** (chisel-like, for gnawing or nipping)
- **Canines** (long, stout conical, used for catching, killing, tearing prey)
- **Premolars** (one or two roots, truncated surfaces for chewing)
- **Molars** (broad chewing surfaces, two or three roots)



I - Incisor
C - Canine
P - Premolar
M - Molar

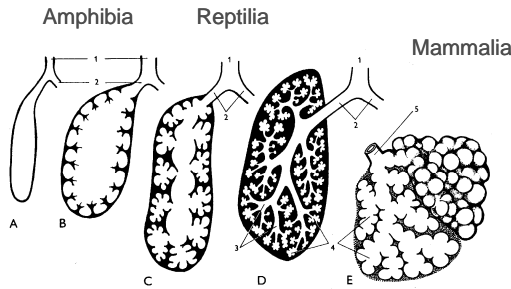
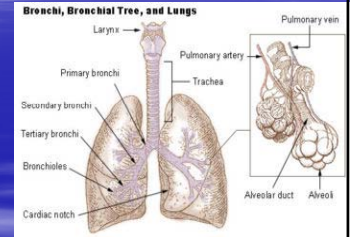
Breathing

The lungs:

- **bellows lung**
- **spongy texture**

Breathing is largely driven:

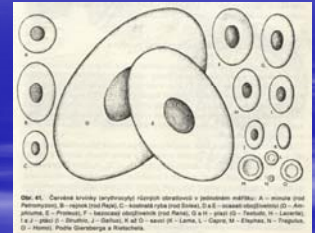
- **diaphragm**
- **rib case** through the action of other respiratory muscles



Obr. 35. Schéma hlavního trendu ve zdokonalování plic během fylogeneze: A – primitivní a B – pokročilý obojživelník, C – plaz (řádu šupinatí), D – savec, E – detail plicních skřípků savec, vpravo nahoře celkový pohled, vlevo dole řez. 1 – průdušnice, 2 – průdušky, 3 – průdušinky, 4 – plicní skřípky, 5 – koncová průdušinka. Podle Hickmana, doplněno.

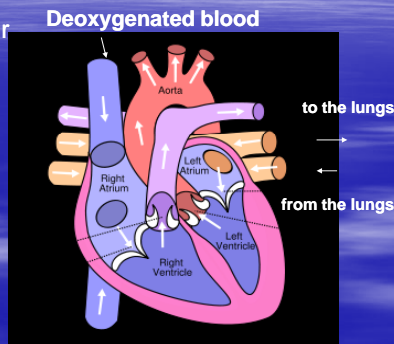
Circulatory system

- The red blood corpuscles – round, biconcave, nonnucleated
- The hearts of birds and mammals are similar
- - but in mammal it leaves the left ventricle of the heart through a left aortic arch



Heart

- The **heart** has four chambers:
- the right **atrium**
- right **ventricle**
- left **atrium**
- left **ventricle**



Excretion

- metanephridic kidney
- adaptation: loop of the nephron
- excrete urea (unlike reptiles and birds – uric acid)
- urea to be stored in bladder

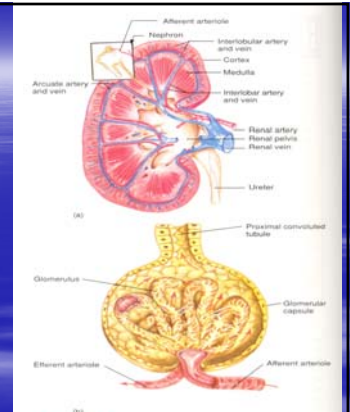
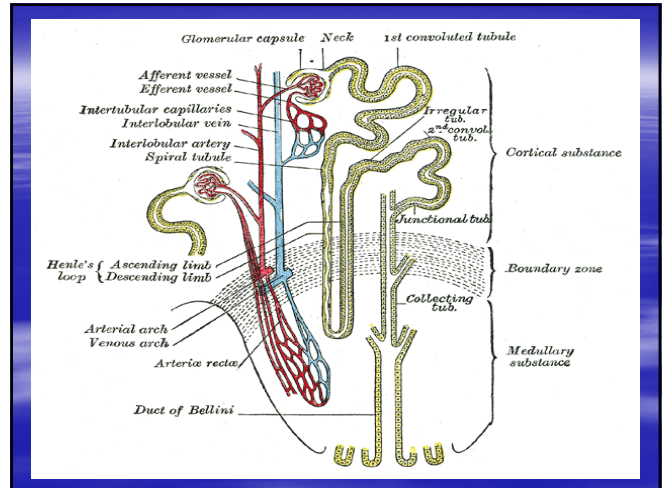
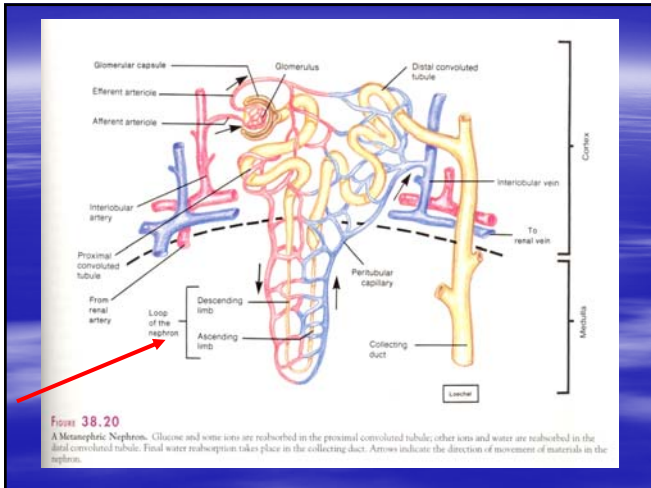


FIGURE 38.19 The Filtration Device of the Metanephric Kidney. (a) Interior of a kidney showing the processing of the nephron and the blood supply to and from the kidney. (b) The afferent arteriole with an artery illustrating that high blood pressure forces water and ions through small pores in the walls of the glomerular capillaries to form the glomerular filtrate.



Excretory system

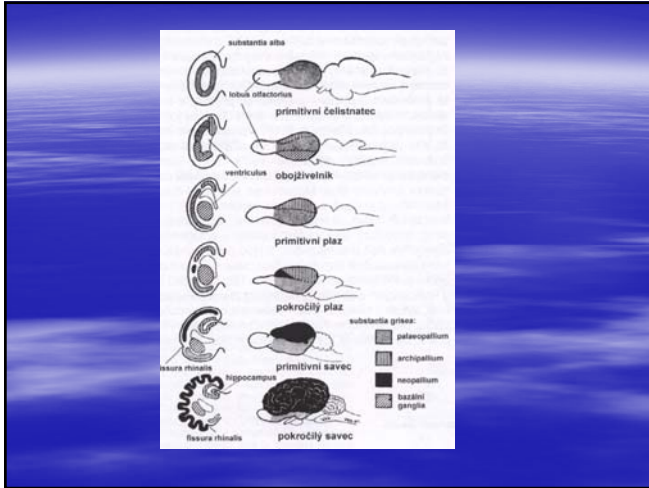
amphibian reptile mammal female mammal male

Nervous system

- **NEOPALLIUM** (the top layer of the **cerebral hemispheres**, 2-4 mm thick, and made up of six layers, labelled I to VI)
- take the controls of all important functions
- It is involved in higher functions such as **sensory perception**, generation of **motor commands**, spatial reasoning, **conscious thought**, and in humans, **language**.

- **brain larger** than in terrestrial nonmammalian vertebrates
- both **cerebrum** and **cerebellum** are large
- **cerebral hemispheres**
- 1, covered the **olfactory lobes** and brainstem
- 2, undertake the **functions of TECTUM** of primitive mammals
- **12 pairs of cranial nerves**
- from nerve cord a pair of spinal nerves

Olfactory lobes



Sensory function

- **Sense of touch** – associated with hair follicles
- **Sense of hearing** – three auditory ossicles (malleus, incus, stapes) – cochlea spirally coiled
- **Sense of smell** – important for many mammals

- amphibians
- birds

mammals

Reproduction system

UTERI

uterus duplex u. bicornis u. simplex

marsupials rodents insectivores, carnivores, subungulates primates

Placenta

Placenta difusa (pigs, horses)

Placenta kotyledonata (ruminants)

Placenta zonaria (carnivores)

Placenta discoid (rodents, primates)

MAMMALIA

Classification

SUBCLASS : PROTHERIA

Order: **Monotremata**

- egg-laying mammals
- polylecital type of the egg
- females oviparous
- cloaca present

- teeth only in young
- adults with horny beak
- no uterus or vagina
- mammary gland **without nipples**
- ureters open in dorsal wall of urogenital passage
- penis conduct only sperm
- oviducts distinct, entering cloaca separately
- Australia and Tasmania



Tachyglossidae

Tachyglossus spp.

- genera: *Tachyglossus*, *Zaglossus*
- five species
- food - ants and termites



Zaglossus spp.

Ornithorhynchidae

Ornithorhynchus anatinus

- sole living representative
- gloves for the poison spur
- feeds by digging in the bottom of streams with its bill
- electrolocation

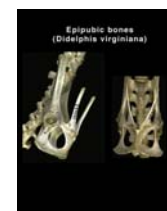


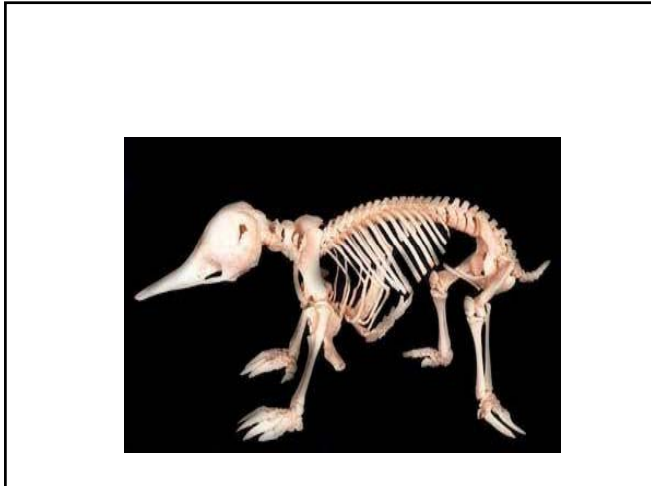
THERIA

- cloaca absent
- oligolecital (alecital) eggs

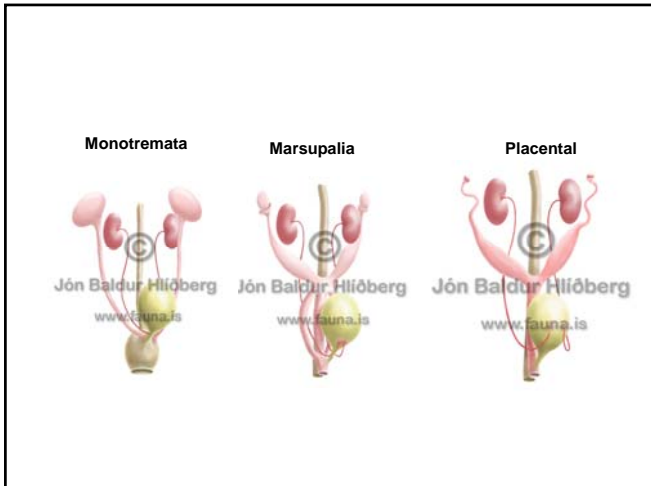
SUBCLASS : MARSUPIALIA

- female with marsupium (ventral pouch) or marsupial folds surrounding nipples on abdomen
- epipubic bones
- uterus and vagina double
- usually no placenta





- the premature fetuses in marsupium



- Clade **Ameridelphia**
 - Order **Didelphimorphia** (93 species)
 - Family **Didelphidae**: opossums
 - Order **Paucituberculata** (6 species)
 - Family **Caenolestidae**: shrew opossums
- Clade **Australidelphia**
 - Order **Microbiotheria** (1 species)
 - Family **Microbiotheriidae**: Monte del Monte
 - Order **Dasyuromorphia** (71 species)
 - Family **Thylacnidae**: Thylacine (a.k.a. marsupial wolf, Tasmanian wolf, Tasmanian tiger)
 - Family **Dasyuridae**: **antechinus**, **quolls**, **dunnarts**, **Tasmanian Devil**, and relatives
 - Family **Marsupiolidae**: **Numbat**
 - Order **Peramelemorphia** (24 species)
 - Family **Thylacomyidae**: **bilbies**
 - Family **Chaerophoridae**: **Pinchfooted Bandicoot**
 - Family **Peramelidae**: **bandicoots** and allies
 - Order **Notoryctemorphia** (2 species)
 - Family **Notoryctidae**: marsupial moles
 - Order **Diprotodontia** (137 species)
 - Family **Phascolarctidae**: **Koala**
 - Family **Vombatidae**: **wombats**
 - Family **Diprotodontidae**: **diprotodon**
 - Family **Phalangeridae**: **brushtail possums** and **uscuses**
 - Family **Burramidae**: **pygmy possums**
 - Family **Tarsipedidae**: **Honey Possum**
 - Family **Petauridae**: **Striped Possum**, **Leadbeater's Possum**, **Yellow-bellied Glider**, **Sugar Glider**, **Mahogany Glider**, **Squirrel Glider**
 - Family **Pseudocheiridae**: **ringtailed possums** and relatives
 - Family **Potoridae**: **potoroos**, **rat kangaroos**, **bettongs**
 - Family **Acrobatiidae**: **Feathertail Glider**
 - Family **Hypsignathodontidae**: **Musky Rat Kangaroo**
 - Family **Macropodidae**: **kangaroos**, **wallabies**, and relatives
 - Family **Thylacoleonidae**

Order **Didelphimorphia**

Family **Didelphidae**

- semi-arboreal omnivores

opossum (*Didelphis marsupialis*)

Virginia opossum (*Didelphis virginianus*)

Order **Dasyuromorphia**

Family **Dasyuridae**:

Tasmanian Devil (*Sarcophilus harrisi*)

- weighing between 6 and 10 kg
- little carnivore
- Tasmania

Family †Thylacinidae:

Tasmanian Wolf (*Thylacinus cynocephalus*)

- extinct (in 1936)
- 20 to 25 kg
- Tasmania



Order Diprotodontia (137 species) Family Phascolarctidae: Koala

Koala (*Phascolarctos cinereus*)

- arboreal herbivore
- the only extant representative of the family
- sleeps about 20 hours a day
- Tasmania or Western Australia



Family Macropodidae

- herbivorous
- bacteria, protozoans and fungi in the forestomach

Red Kangaroo (*Macropus rufus*)

- largest surviving marsupial
- can leap in full force approximately 30 feet (9.14 meters) in one leap
- **Length:** males: to 1.8 m, females to 1.1 m. Tail up to 1 m.
- **Weight:** males to 85 kg, females to 35 kg



SUBCLASS : EUTHERIA (PLACENTALIA)

- fetus is nourished during gestation via a placenta

order: ERINACEOMORPHA

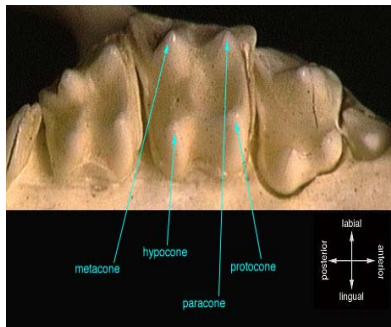
- hedgehogs
- small spiny mammals
- hibernation
- omnivorous



- 16 species in five genera
- Europe, Asia, Africa, and New Zealand

Atelerix albiventris

- **Quadrate (=euthemorphic) teeth of a hedgehog**



E. concolor



Erinaceus europaeus



- *Atelerix albiventris*
- Afrika
- small

- *Erinaceus concolor*



- **pet species** of hedgehog are **hybrids** of the **White-bellied Hedgehog** or **Four-toed Hedgehog** (*Atelerix albiventris*) and the **North African Hedgehog** (*A. algirus*).



order: **SORICOMORPHA**

- Family **Soricidae**
 - Subfamily **Crocidurinae**: [white-toothed shrews](#)
 - Subfamily **Soricinae**: [red-toothed shrews](#)
 - Subfamily **Myosoricinae**: [African white-toothed shrews](#)
- Family **Talpidae**
 - Subfamily **Scalopininae**
 - Subfamily **Talpinae**
 - Subfamily **Uropsilinae**
- Family **Solenodontidae**: solenodons
- Family †**Nesophontidae**: West Indian shrews

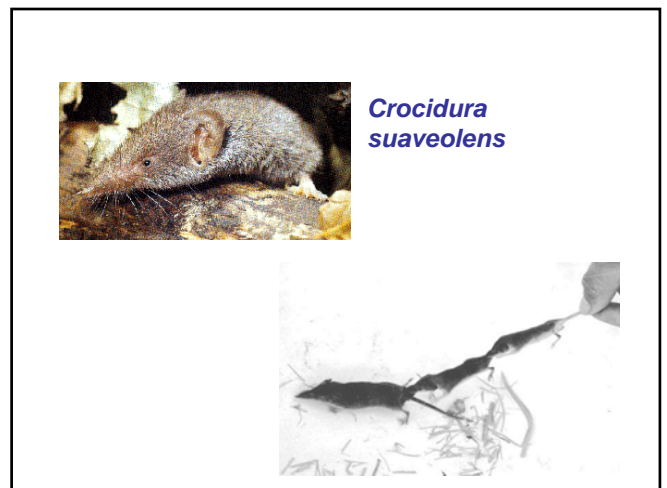
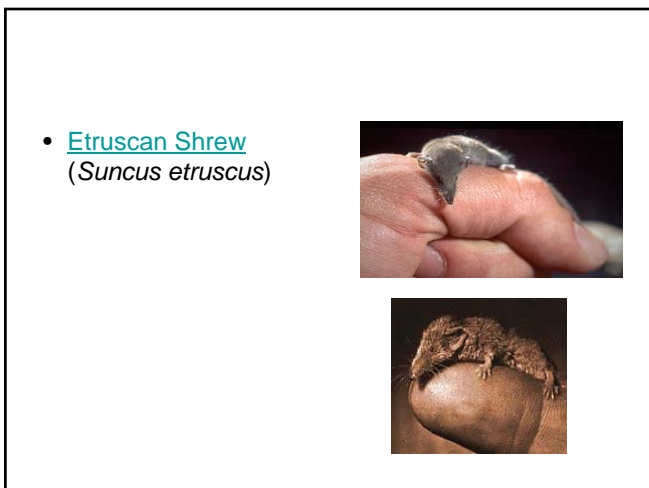
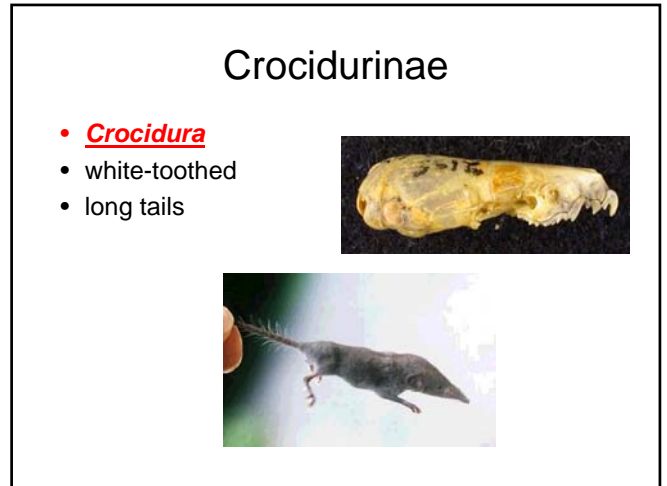
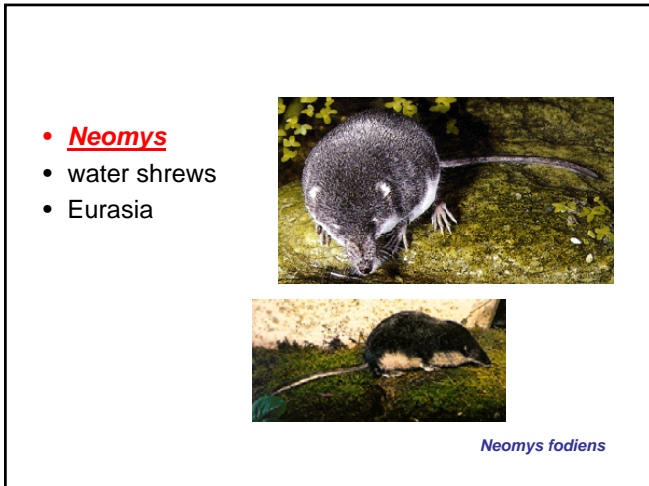
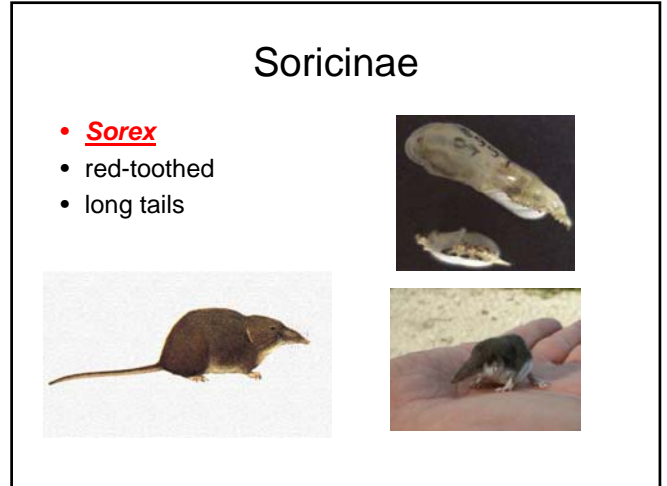
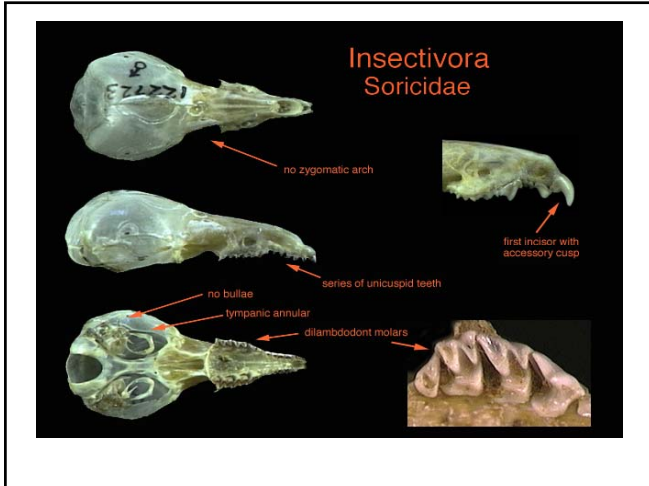
Family **Soricidae**

- have feet with **five clawed toes**
- long pointed snouts
- small ears which are often not visible
- scent glands located on the side of the body
- terrestrial
- born with permanent teeth



- worldwide (except New Guinea, Australia, and New Zealand)





Family Talpidae (moles)

- live underground, burrowing holes
- with small or covered eyes
- not visible the ears



Talpa europaea

order: XENARTHRA

- column-shaped stapes
- unique vertebral joints
- lack incisors or canines
- the number of cervical vertebrae varies from five to nine
- anteaters, sloths, and armadillos
- America



Myrmecophaga tridactyla

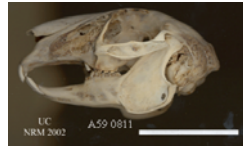


Priodontes maximus

Bradypus tridactypus

order: LAGOMORPHA

- dental formula is 2/1, 0/0, 3/2, 3/3 = 28
- four incisors in the upper jaw
- they will only eat vegetation
- the male's scrotum is in front of the penis
- the penis has no bone
- they will redigest first-time droppings



Leporidae

- hares and rabbits
- the ear are generally longer than wide
- the hindlimbs are longer than forelimbs
- rudimentary clavicle
- hypsodont molars



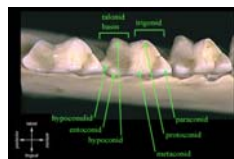
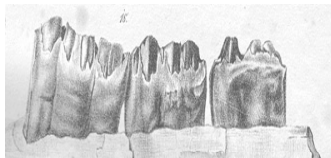
Lepus europaeus

Oryctolagus cuniculus



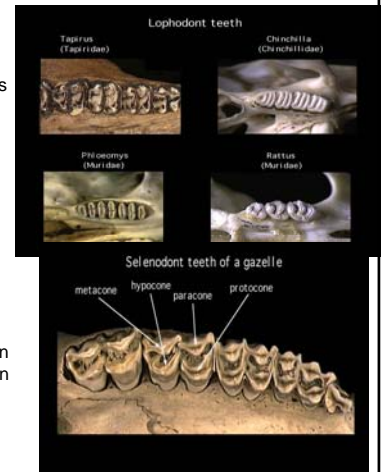
TEETH

- hypsodont**
- high-crowned teeth** (herbivores)
- brachydont**
- low-crowned teeth** (human)



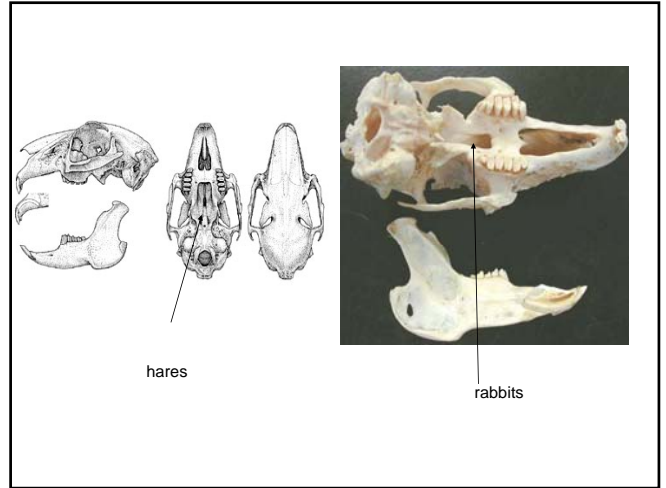
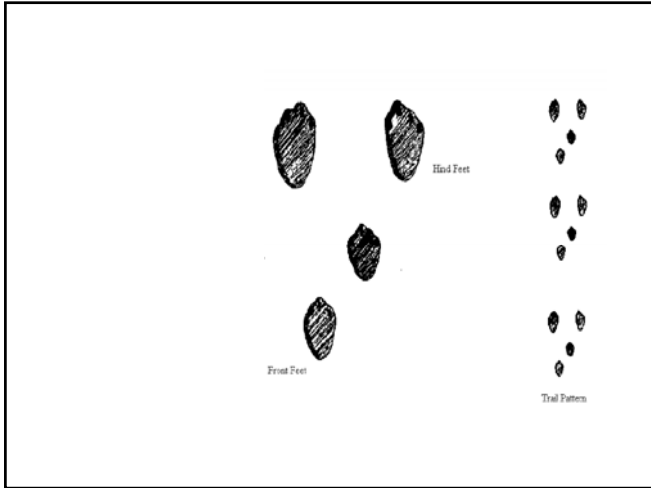
• lophodont

- elongated ridges called lophs that run between cusps (rodents, tapirus)





• selenodont

- elongate the primary cusps in an anterior-posterior direction (deer, cattle)



Ochotonidae

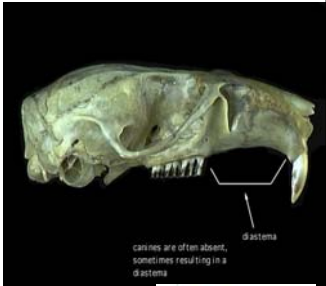


- **Ochotona** (30 species)
- mountains Euroasia, North America

Ochotona alpina
Asia


order: RODENTIA

- 7g – 45 kg (capybara)
- two incisors in the upper as well as in the lower jaw
- incisors grow continuously
- lack canines
- diastema (the space between their incisors and premolars)
- have feet with **four** clawed toes


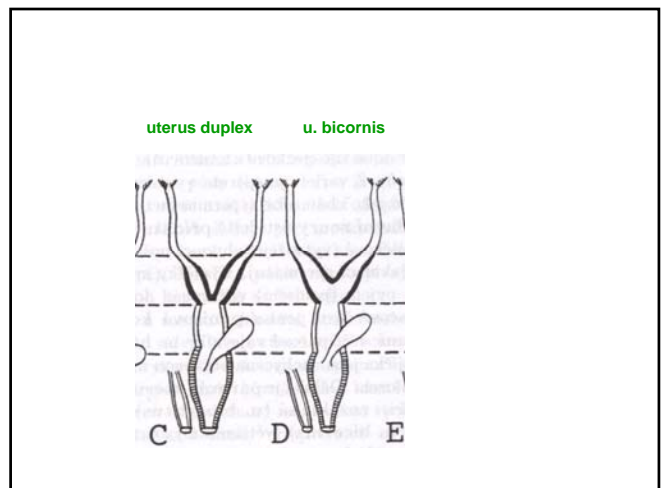




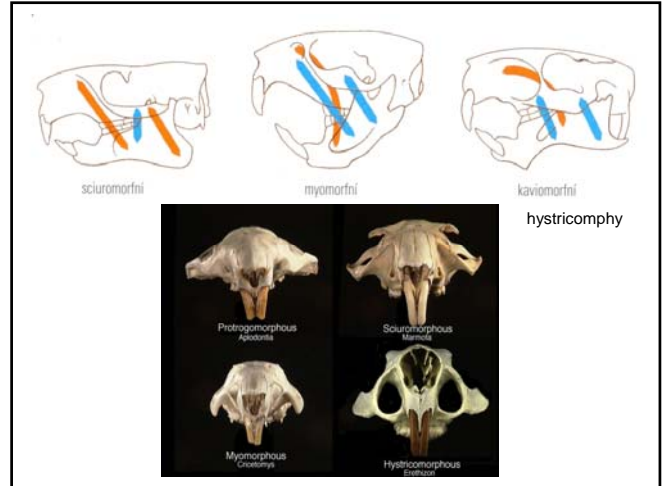
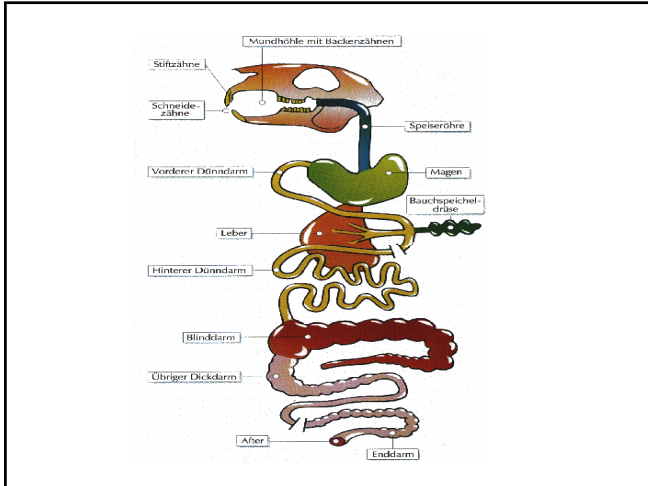
canines are often absent, sometimes resulting in a diastema

- herbivorous – bunodont molares (mouse)



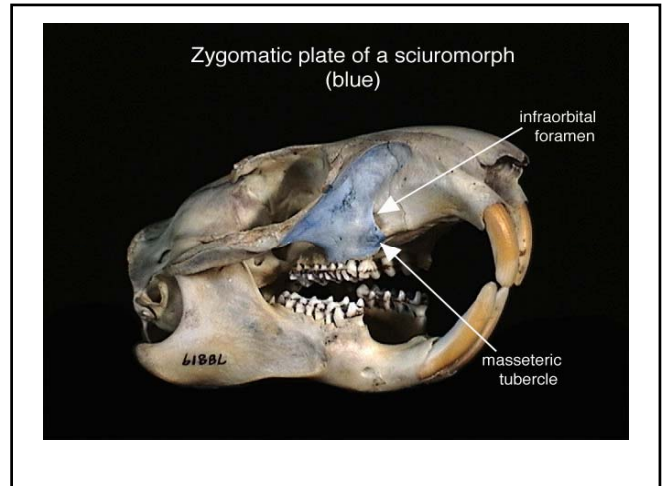
- herbivorous – hypsodont molares



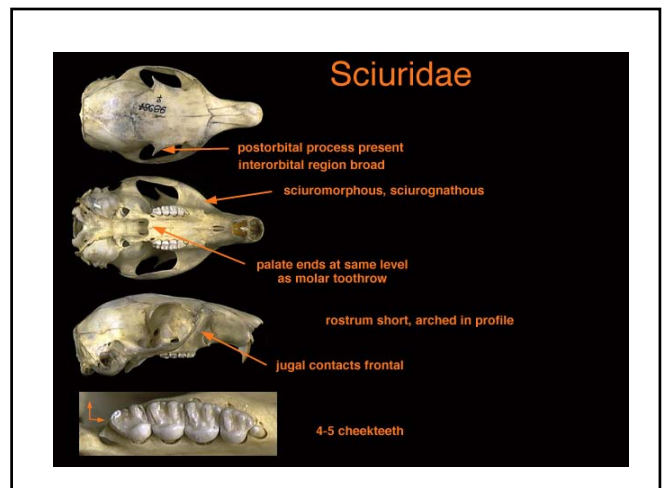
suborder: Sciuromorpha

- zygomatic system - sciuromorphy
- [Aplodontiidae](#) - mountain beaver
- [Sciuridae](#) - squirrels, chipmunks, marmots, flying squirrels
- [Gliridae](#) - dormice



Sciuridae

- Spermophilus citellus*
- Marmota marmota*
- 7 kg




- *Sciurus vulgaris*
- Europa, Asia




- *Glaucomys volans*
- North America





- *Pteromys voland*






Gliridae

- lack postorbital process
- feed on fruits, berries, flowers, nuts and insects
- arboreal
- nocturnal
- hibernation




Muscardinus avellanarius
6 - 8 cm

Glis glis
12 - 18 cm






- *Eliomys quercinus*
- 11 - 13,5 cm

Dryomys nitedula
7 - 11,5 cm

suborder: Castorimorpha

- Family **Castoridae**: **beavers** – Europe, North America
- Family **Heteromyidae**: **kangaroo rats** and **kangaroo mice** - America
- Family **Geomysidae**: pocket gophers (true gophers) – America

Castoridae

- semi-aquatic
- two species
- scent gland (castoreum)
- re-introduced throughout Europe
- North America, Europe

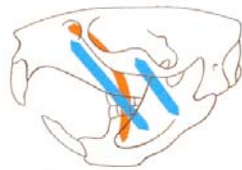


- *Castor fiber*
- *C. canadensis*



suborder: Myomorpha

- zygomatic system - myomorphy
- structure of the jaw
- structure of molar teeth



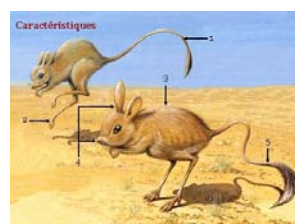
Spalacidae

- subterranean way of life
- blind
- front teeth - separated from the rest of the mouth by a flap of skin
- JV Europe, Asia
- *Nannospalax leucodon*
- Balkan Peninsula, Asia
- 140 220 g



Dipodidae

- jumping desert rodents
- long hind legs
- nocturnal
- *Jaculus jaculus*
- Egypt



- *Sicista betulina*
- (Zapodinae)

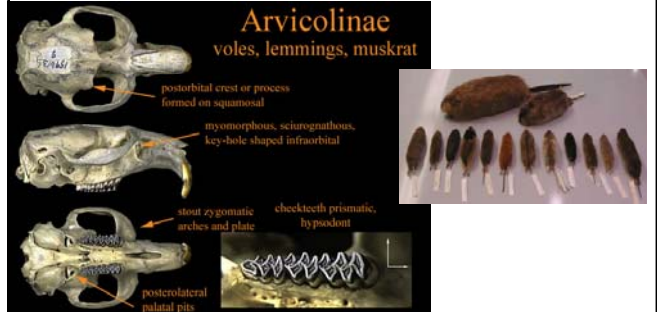


Cricetidae

- short tails
 - small eyes
 - small ears
 - cache food
- Subfamilies:
1. [Arvicolinae](#) (voles, lemmings, muskrat)
 2. [Cricetinae](#) (hamsters)
 3. [Neotominae](#) (North American rats and mice, including deer mice, [pack rats](#), and [grasshopper mice](#))
 4. [Sigmodontinae](#) (New World rats and mice, predominantly South American genera such as [brucies](#).)
 5. [Tylomyinae](#)

Arvicolinae

- molar teeth with triangles
- short tailed
- 26 genera, 143 species



- *Microtus arvalis*
- Head/body length: 9 to 13 cm
- Tail: 3.0 to 4.5cm
- Weight: 18 to 40g

Microtus agrestis

- Grey-brown
- Head/body length: 9 -13 cm
- Tail < 40% of head and body
- Weight: 20-40g
- ungrazed grassland, woodland etc.



Clethrionomys glareolus

- Red-brown fur
- Head and body length: 8-12cm
- Weight: 15-40g
- Woodland
- across Europe into central Asia



Microtus subterraneus



• *Ondatra zibethicus*

- adapted for swimming
- 25 - 40 cm
- 680 to 2000 g
- North America
- introduction in Europe (1905)



• *Arvicola terrestris*

- adapted for swimming
- 18 - 25 cm
- Euroasia



Criticeinae

- compact body
- small, furry ears
- short stubby tail
- cheek pouches
- sebaceous flank glands



- [Syrian or Golden Hamster](#)
- ([Mesocricetus auratus](#))





Cricetus cricetus
20 -32 cm (i 600g)



Muridae

- prominent, rounded ears
- long whisker
- long tail


- Subfamilies
- [Deomyinae](#)
- [Gerbillinae](#)
- [Lophiomyinae](#)
- [Murinae](#)

Rattus rattus
15 - 25 cm



Mus musculus
7 - 10 cm



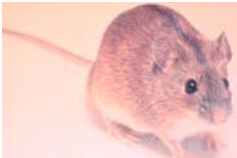

- *Apodemus sylvaticus*
- 7 - 11 cm
- Europe, Afrika




- *Apodemus flavicollis*
- band of yellow fur around the neck


Apodemus agrarius



Apodemus uralensis





Micromys minutus
5 - 7,5 cm



Suborder: Hystricomorpha

- zygomatic system - hystricomorphy

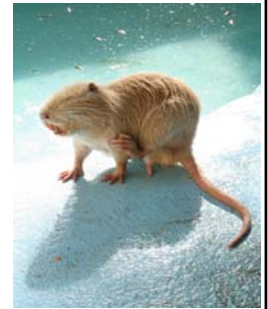
Hydrochoeridae

- *Hydrochoerus hydrochaeris* (capybara)
- only living member of the family
- semi-aquatic
- herbivorous
- the world's largest living rodent
- 105 to 135 cm in length, and weigh 35 to 65 kg



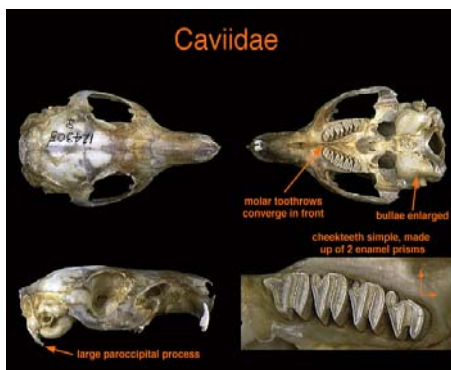
Myocastoridae

- *Myocastor coypus*
- herbivore
- semiaquatic
- South America
- introduced to every continent except Australia and Antarctica
- valued for its fur
- pest



Caviidae

- South America
- 600 g – 16 kg
- eat primarily plant material
- hypsodont molars (simple pattern of two prisms)



Cavia aperea



Dolichotis salinicola

steppes of Argentina



C.a. porcellus



Chinchillidae

- six species in 3 genera
- Andes mountains
- 20,000 hairs per square cm
- *Chinchilla lanigera*



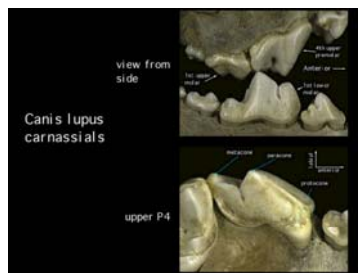
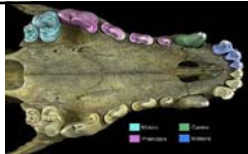
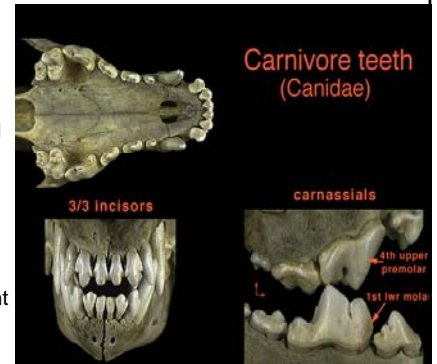
ORDER: MACROSCELIDEA

- the 15 species
- 100 mm to 300 mm, 50 g to over 500 g
- Africa

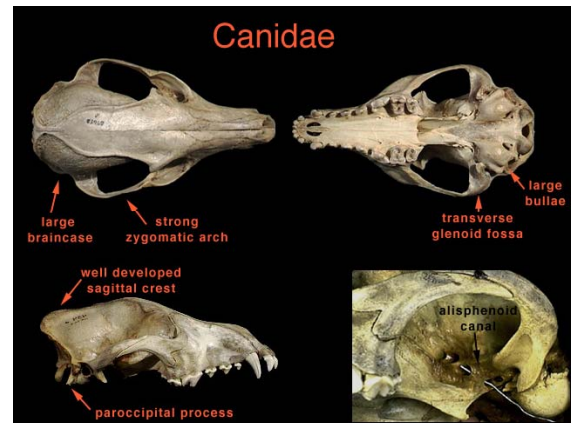


ORDER: CARNIVORA

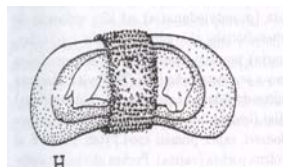
- piercing canines
- enlarged fourth upper premolar and first lower molar (carnassial pair)
- the jaw articulation does not allow sideways movement



- sekodont molares
- bunodont molares



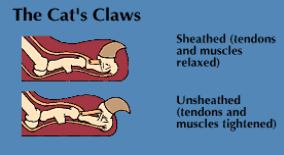
- tous usually 5 (at least 4)
- all with claws
- uterus bihorned
- placenta zonary
- without clavicle



Suborder Feliformia ("cat-like")

Felidae

- short rostrum
- large eyes
- cheek teeth are of the shearing type
- retractable claws



- *Felis silvestris*
- native to [Europe](#), the western part of [Asia](#), and [Africa](#)

Felis silvestris f. catus



Lynx lynx

- 20 kg (44 lbs) up to 30 kg (66 lbs)



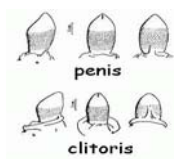
Viverridae

- 1 kg to 14 kg
- small head
- retractable claws
- perianal glands (secretion - „civet“)
- most are strongly arboreal
- Old World tropics, nearly all of Africa
- *Viverricula indica*



Hyenidae

- 25 and 55 kg
- the strongest jaws in the animal kingdom
- the front legs are longer than their back legs
- *Crocuta crocuta*
- pseudo-penis



Herpestidae

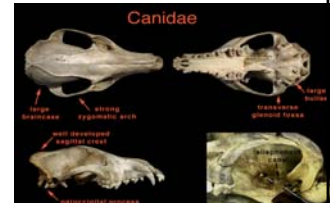
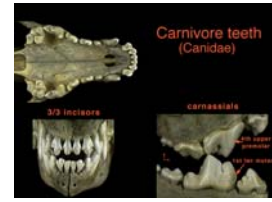
- 1 kg - 6 kg
- most are brown or gray
- small heads
- pointed snouts
- short, rounded ears
- [Asia](#), [Africa](#), the [Caribbean](#), and southern [Europe](#)



Suborder Caniformia
("dog-like")

Canidae

- 14 genera and 34 species
- non-retractile claws
- molars are of the crushing type
- skulls have an elongated facial region
- digitigrades



Canis lupus



Canis lupus familiaris



Canis lupus dingo



Vulpes vulpes

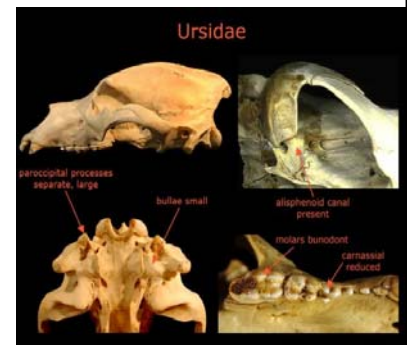


Nyctereutes procyonoides



Ursidae

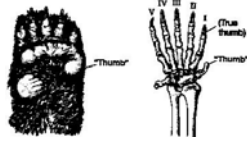
- eight species
- 25 to 800 kg
- small, rounded ears
- small eyes
- short tail
- bunodont cheek teeth
- diverse diet, mostly plant material
- five non-retractable claws per paw
- plantigrade



Subfamily Ailuropodinae

- *Ailuropoda melanoleuca*

- paw with a „thumb“ and five fingers (modified sesamoid bone)



Subfamily Tremarctinae

- *Tremarctos ornatus*

- up to 130 kg
- South America



Subfamily: Ursinae



- *Ursus arctos*
- Northern hemisphere
- weighing up to 130–780 kg
- subspecies -The grizzly bear (*Ursus arctos horribilis*), the Kodiak bear (*Ursus arctos middendorffi*)



- grizzly bear (*U. a. horribilis*)



- *Ursus americanus*



- *Ursus maritimus*

- up to 800 kg



Ailuridae

- *Ailurus fulgens*
- 3.70 to 6.20 kg
- mostly herbivorous
- semi-retractile claws
- native to the Himalayas and Nepal and southern China



Mephitidae

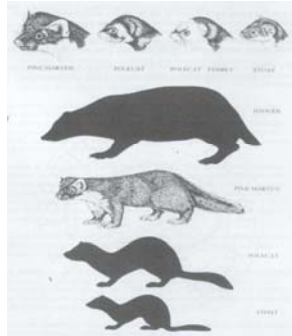
- 1 – 4,5 kg
- striped
- short, well-muscled legs
- enlarged anal scent glands



- *Mephitis mephitis*

Mustelidae

- 56 species in 22 genera
- enlarged anal scent glands
- the loss of the second upper molar



Subfamily: Lutrinae

- aquatic or marine
- dense layer of underfur
- short limbs
- webbed paws



• *Lutra lutra*



Subfamily Melinae

- short-legged
- "heavy-set"
- up to 1 m long

- *Meles meles*



• *Meles meles*



subfamily: Mustelinae

- *Martes martes*
- 48 - 53 cm,
- 650 - 1800 g



Martes foina



Mustela vison



• *Mustela putorius*



Mustela eversmanni

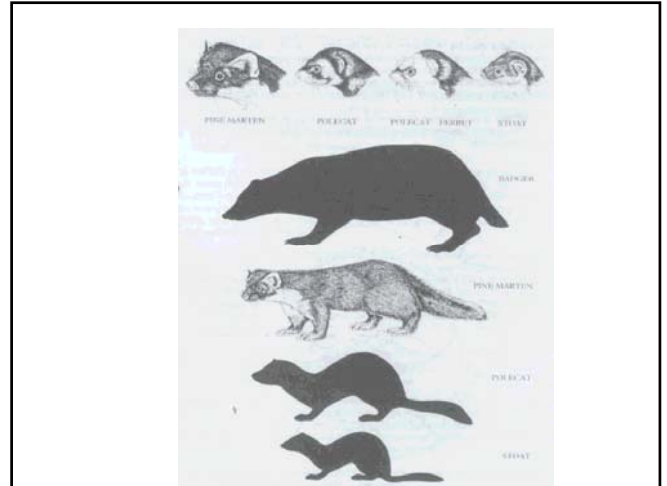


Mustela erminea

- white fur is known as "ermine"



- *Mustela nivalis*



Procyonidae

- from 1 kg to 20 kg
- medium or long tails
- short, broad faces
- short erect ears



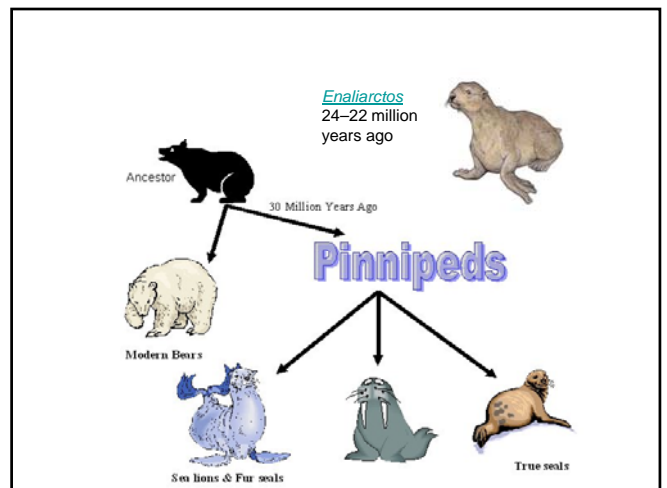
Procyon lotor
North America



Nosua nosua
Latin and South America

Pinnipedia

1. forelimbs are large **flippers**
2. **modified respiratory system** (which is able to retain large quantities of oxygen)
3. **generate internal body heat** (by maintaining a high metabolic rate and conserving the heat produced in layers of insulating fat or fur)
4. **osmotic adaptations**



Odobenidae

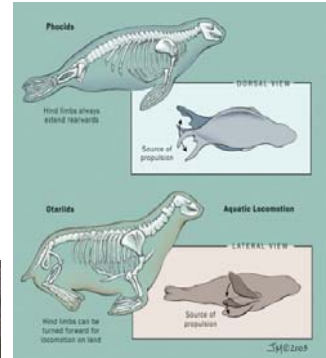
- thick skin
- males weighing up to 1,900 kg
- cold Arctic seas of the Northern Hemisphere



- *Odobenus rosmarus*

Otariidae

- feed and travel in the water
- breed and rest on land
- 150 kg to over 1000 kg
- small ears
- less adapted to the aquatic lifestyle



- *Eumetopias jubata*
- Pacific
- 2.5 m / 300 kg



Phocidae

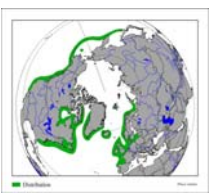


- 90 kg up to 3600 kg
- lack any external ear
- forelimbs are short
- moving by a combination of sliding and flexing their spines from side to side



Mirounga angustirostris

- *Phoca vitulina*



order: PHOLIDOTA

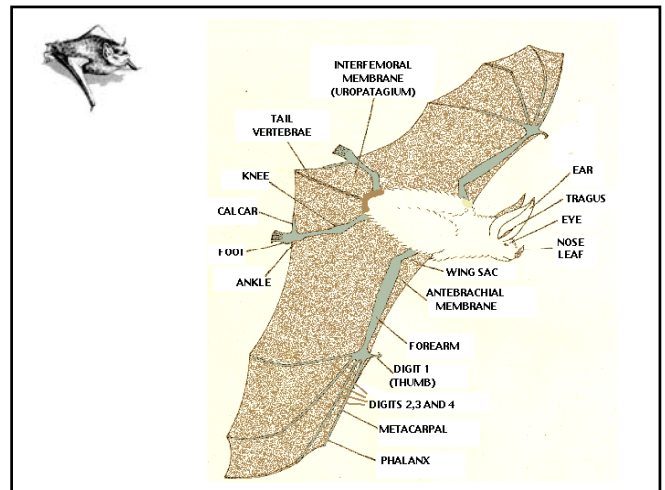
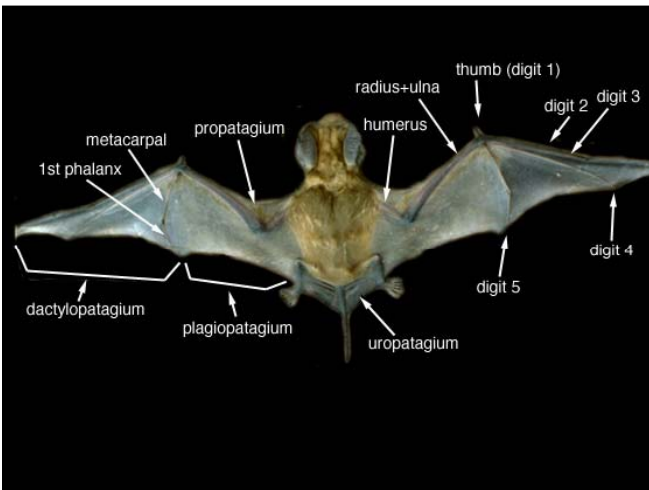
- only one extant family (**Manidae**)
- one genus (**Manis**)
- eight species
- large scales
- lack teeth
- tropical regions of Africa and Asia





order: CHIROPTERA

- forelimbs are developed as wings
- the flight membrane attaches to the hind legs
- echolocation
- 1,100 species of bats worldwide
- 70% of bats are insectivores



suborder: MEGACHIROPTERA

- do not use echolocation
- large, prominent eyes
- 6 cm – 40 cm (wingspan of 150 cm)
- frugivorous
- tropical areas of Asia, Africa and Oceania



- *Pteropus vampyrus*

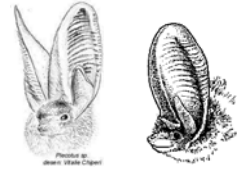
Eidolon helvum

- Africa
- 20 cm



suborder: MICROCHIROPTERA

- small (2 – 200 g)
- small eyes
- echolocation
- large, complex pinnae (external ears), including an enlarged tragus or antitragus
- lack the underfur
- mate during the fall and store the sperm over the winter, conceiving and gestating young beginning in the spring



- *Plecotus* spp.

Vespertilionidae

- insect-eaters
- lack the enlarged noses
- large ears
- 3 to 13 cm in length
- Europe, North America



Myotis myotis

Europe



• *Nyctalus noctula*



Pipistrellus pipistrellus
4 - 6 g

Eptesicus serotinus



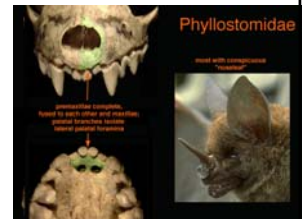
Rhinolophidae

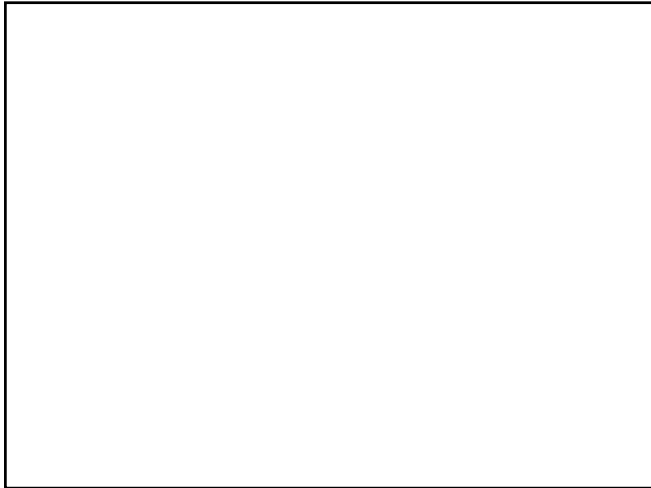
- 130 species grouped in 10 genera
- 6 to 150 g
- leaf-like protuberances on their noses
- lack a tragus
- *Rhinolophus hipposideros*



Phyllostomidae

- America
- protuberance from the nose
- carnivorous, insectivorous, fruit-, nectar- and blood-eating





- *Glossophaga soricina*



- *Vampyrum spectrum*

- Mass
170 to 180 g
(5.98 to 6.34 oz)

Wingspan
700 to 900 mm
(27.56 to 35.43 in)



- *Desmodus rotundus*
- South America



ORDER: PRIMATES

- forwardly directed orbits
- highly mobile radius and ulna in the forelimb and tibia and fibula in the hind
- opposable hallux and pollex
- pentadactyl feet
- presence of a clavicle
- first toe with a nail
- expansion of the cerebrum (especially the cerebral cortex)
- America, Asia, Africa, (Europa)



suborder: Strepsirrhini

- dog-like appearance
- wet noses
- brain's olfactory lobes are larger
- nocturnal activity
- dental comb
- toilet claw

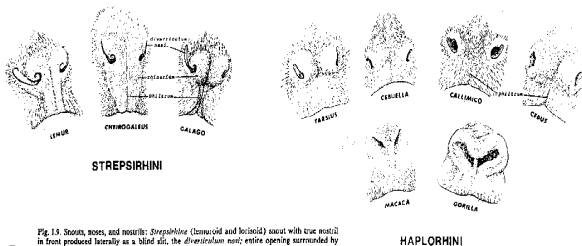
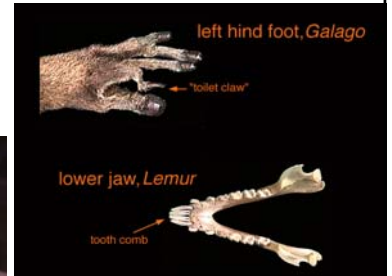


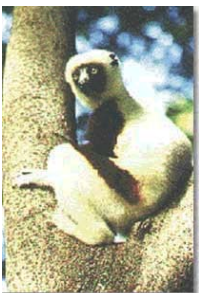
Fig. 14. Snouts, noses, and nostrils: Strepsirrhine (lemurid and leonid) snout with true nostril in front produced laterally as a bilobed slit, the *diverticulum nasi*; entire opening surrounded by the moist, mucous, glandular rhinarium with median slit; or *philtrum*. Haplorhine: nose with simple nostrils, no rhinarium, philtrum vestigial or absent; interorbital breadth wide in Tarsius and all platyrrhines (e.g., Cebus, Callithrix, Ateles), comparatively narrow in all catarrhines (e.g., Homo, Gorilla). (from Hershkovits, 1977)

- *Lemur catta*
- Madagascar



- *Indri indri*
- Madagascar

Tarsius spectrum



Galago senegalensis
Africa



suborder: Haplorrhini

- "dry-nosed" primates
- upper lip is not directly connected to their nose or gum
- the brain to body ratio is significantly greater
- diurnal
- single chambered uterus



Platyrrhines

- outwardly directed nasal openings
- 3 premolars
- New World

Cebidae

- long limbs
- digits with curved nails
- long and well-furred tails
- pollex not opposable
hallux large and strongly opposable
- America



- *Cebus capucinus*

Atelidae

- larger monkeys
- nails on their fingers and toes
- hairless prehensile tails with a sensitive tactile pad
- South America



- *Alouata seniculus*

Catarrhini

- paired downwardly directed nasal openings
- 2 premolars
- Asia, Africa

Cercopithecidae

- 1.5 kg to over 50 kg
- have tails
- nose faces downwards
- all digits have nails



- *Cercopithecus*
- Africa


- *Macaca mulatta*
- Asia




- *Macaca sylvanus*



- **Papio**
- Africa, Asia




- **Colobus**
- Africa



Hominidae

- 48 kg to 270 kg
- well-developed forearms
- pollex and hallux are opposable
- digits have flattened nails
- no hominid has a tail
- large braincase
- dental formula: 2/2, 1/1, 2/2, 3/3 = 32



- Subfamily **Ponginae**
 - Genus **Pongo**
 - **Bornean Orangutan**, *Pongo pygmaeus*
 - *Pongo pygmaeus pygmaeus*
 - *Pongo pygmaeus morio*
 - *Pongo pygmaeus wurmbii*
 - **Sumatran Orangutan**, *Pongo abelii*
- Subfamily **Homininae**
 - Tribe **Gorillini**
 - Genus **Gorilla**
 - **Western Gorilla**, *Gorilla gorilla*
 - » **Western Lowland Gorilla**, *Gorilla gorilla gorilla*
 - » **Cross River Gorilla**, *Gorilla gorilla diehli*
 - **Eastern Gorilla**, *Gorilla beringei*
 - » **Mountain Gorilla**, *Gorilla beringei beringei*
 - » **Eastern Lowland Gorilla**, *Gorilla beringei graueri*
 - Tribe **Hominini**
 - Genus **Pan**
 - **Common Chimpanzees**, *Pan troglodytes*
 - » Central Chimpanzee, *Pan troglodytes troglodytes*
 - » West African Chimpanzee, *Pan troglodytes verus*
 - » Nigerian Chimpanzee, *Pan troglodytes vellerosus*
 - » Eastern Chimpanzee, *Pan troglodytes schweinfurthii*
 - **Bonobo** (Pygmy Chimpanzee), *Pan paniscus*
 - Genus **Homo**
 - **Human**, *Homo sapiens sapiens*

- **Gorilla gorilla**




- **Pan troglodytes**




Pongo pygmaeus
Sumatra, Borneo

- **Pan paniscus**




ORDER DERMOPTERA

- 35 to 40 cm
- arboreal gliding mammals
- patagium
- herbivores
- two species each in its own genus
- South-east Asia

ORDER SCANDENTIA

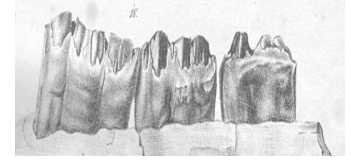
- long and heavily furred tail
- omnivorous
- arboreal
- Southeast Asia



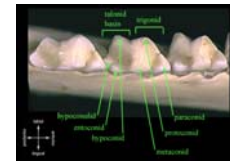
- *Tupaia tana*

TEETH

- **hypsodont**
- **high-crowned teeth** (herbivores)

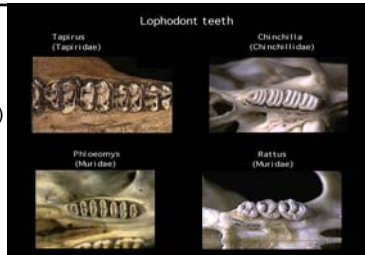


- **brachydont**
- **low-crowned teeth** (human)



- **lophodont**

- elongated oriented antero-posteriorly (rodents, tapirus)



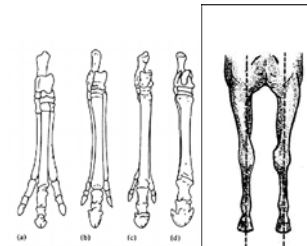
- **selenodont**

- elongate the primary cusps in an anterior-posterior direction (deer, cattle)



ORDER PERISSODACTYLA

- the plane of symmetry of the foot passes through middle toe
- middle toe is larger
- horses, tapirs, rhinos



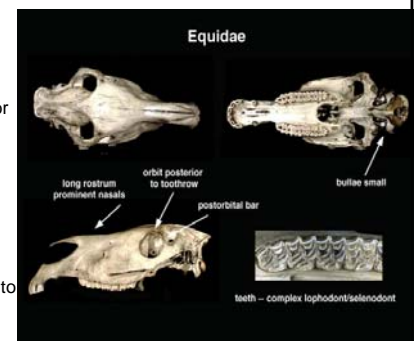
- the skull is elongated
- lophodont teeth
- simple stomach
- cecum is enlarged and sacculate
- herbivorous
- lost clavicle

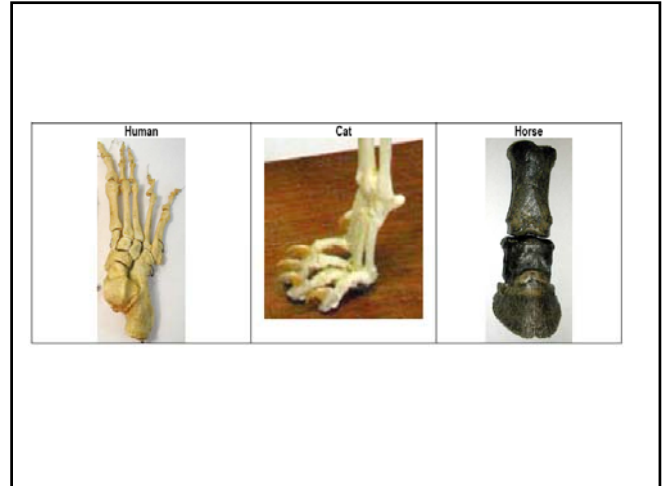
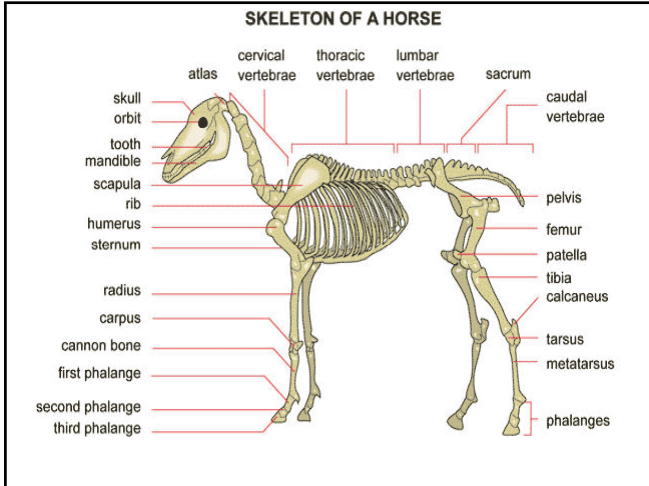


- Family [Equidae](#)
- Family [Tapiridae](#)
- Family [Rhinocerotidae](#)

Equidae

- 140 kg to over 1000 kg
- maned
- unguligrade - walk on the tips of their toes
- the canines are vestigial or absent in females
- hypsodont molares
- **dental formula** 3/3, 1/1, 3-4/3, 3/3 (40-42)
- gestation period of 11-13 months
- East Africa, the Near East to Mongolia (wild equids)





ORDER ARTIODACTYLA

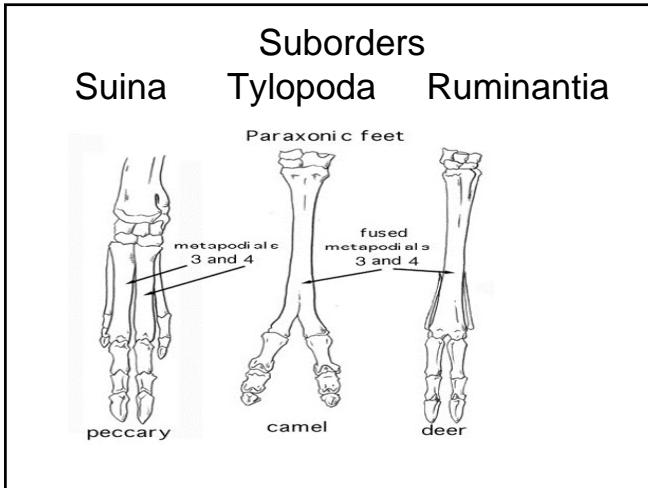
- 220 living species placed in 10 families
- paraxonic - the plane of symmetry of each foot passes between the third and fourth digits
- the loss of the first digit
- modified stomachs (one – four chambered)

- postorbital bar or process

- selenodont molars

Suborder Suina

- complete teeth
- the lower incisors – tusk like
- bunodont molars
- one or three chambered stomach
- do not ruminate
- the feet are usually 4-toed



- Family [Suidae](#): pigs
- Family [Hippopotamidae](#): hippos
- Family [Tayassuidae](#): peccaries

Suidae

- barrel-like body
- 500-1900 mm
- mobile snout with cartilaginous disk
- the upper canines curved tusks

Suidae
Babyrousa, Phacochoerus

- *Sus scrofa*

- *S. scrofa domestica*

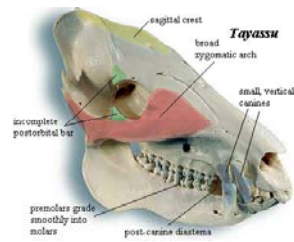
Hippopotamidae

- huge heads
- round or barrel-shaped bodies
- short, stumpy legs
- two species survive today
- *Hippopotamus amphibius*
- up to 3600 kg
- *Choeropsis liberiensis*
- around 250 kg.



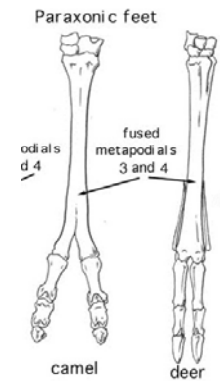
Tayassuidae

- between 90 and 130 cm in length
- North America, Central and South America



Suborder Tylopoda

- herbivorous
- 3-chambered, ruminating stomach
- third and fourth metapodials forming a Y-shaped cannon bone

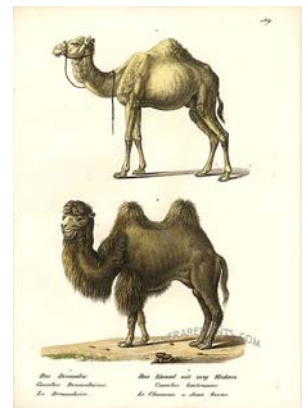


Camelidae

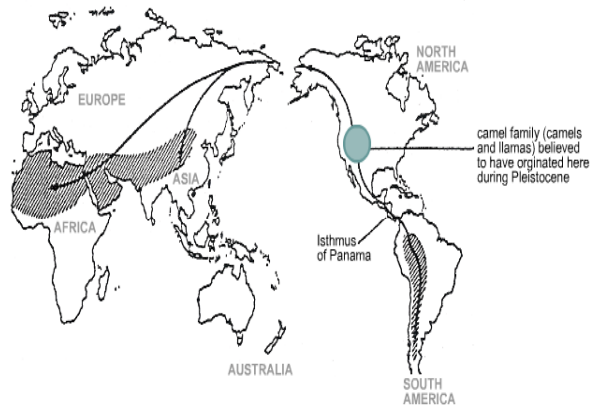
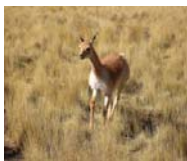
- an upper lip is split in two
- elliptical red blood cell
- two-toed foot with toenails and a soft footpad
- adapted to drink [brackish water](#)



- *Camelus dromedarius*
- [Dromedary](#)
- northern [Africa](#) and south-west Asia
- *Camelus bactrianus*
- [Bactrian Camel](#)
- eastern Asia

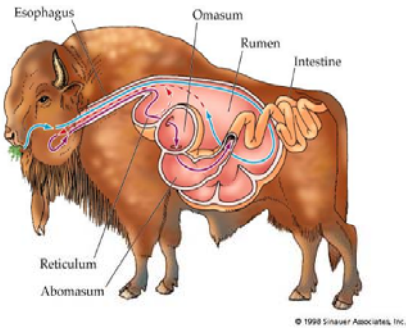
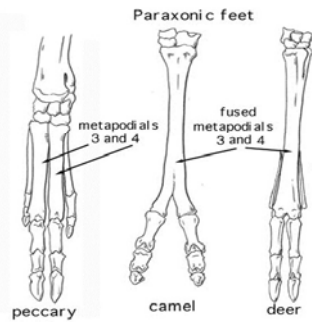


- *Llama* (*Lama glama*)
- *Alpaca* (*Vicugna pacos*)
- *Guanaco* (*Lama guanicoe*)
- *Vicuña* (*Vicugna vicugna*)



Suborder Ruminantia

- third and fourth metapodials usually partially or completely fused
- having fused naviculars and cuboids



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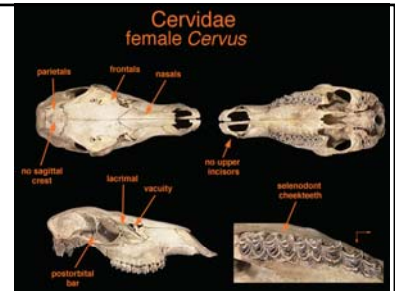
- 3 or 4-chambered stomach

- missing upper incisors
- often (but not always) reduced or absent upper canines
- selenodont cheek teeth



Cervidae

- upper incisors are absent
- in the lower jaw, three incisors are present on each side of the jaw and are joined by an incisor-like canine
- gap or opening between the nasal, frontal and the lacrimal
- lacrimal duct with two openings

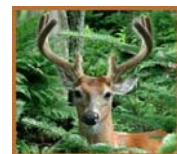


Antlers, unlike horns, must be regrown each year. The White-tailed Deer's antlers begin growing in the spring and reach their peak by autumn. The "velvet" - bristly skin with a rich network of blood vessels - provides the nourishment to produce these fast-growing, bony growths.



After the summer, the blood supply to the growing antlers is cut off and antler growth ceases. Then the velvet covering dries up and peels. Once the buck (name for male deer) rubs off the dried skin, its antlers are ready for battle.


Despite common belief, bucks cannot be aged by counting their points on a set of antlers. Nutrition determines the size and number of points a buck produces after its first year.



- **Moschus**
- males lack antlers - instead they have large canines
- Asia

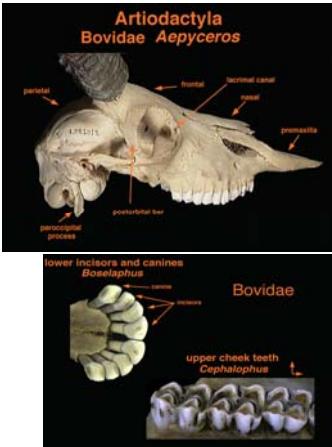


- *Capreolus capreolus*
- *Cervus elaphus*




Bovidae

- 3 kg to over 1300 kg
- upper incisors are absent
- canine teeth are missing
- selenodont cheek teeth
- two-toed hoof




- all males (and many females) have **horns** on their frontals
- composed of a bony core
- covered with a sheath of keratin
- never branched
- never stop growing



- **Family Bovidae**
- Subfamily **Bovinae**: cattle and spiral-horned antelopes, 24 species in 9 genera
- Subfamily **Cephalophinae**: duikers, 19 species in 2 genera
- Subfamily **Hippotraginae**: grazing antelopes, 6 species in 5 genera
- Subfamily **Antilopinae**: gazelles, dwarf antelopes and the saiga, 38 species in 14 genera
- Subfamily **Caprinae**: sheep, goats, 26 species in 12 genera
- Subfamily **Reduncinae**: reedbucks, lechwe, 8 species in 2 genera
- Subfamily **Aepycerotinae**: impala, 1 species in 1 genus
- Subfamily **Peleinae**: rhebok, 1 species in 1 genus
- Subfamily **Alcelaphinae**: wildebeest, topi/tsessebe, 7 species in 4 genera
- Subfamily **Panthalopinae**: Chi

subfamily: Bovinae

- medium-sized to large
- cloven hoof
- at least one of the sexes of a species having a true horn
- no scent glands
- 4 nipples
- **Tribe Bovini** (*Bos*, *Bison*)
- **Tribe Strepsicerotini** (*Tragelaphus*)



Bison bison

Tragelaphus strepsiceros - Kudu

subfamily: Hippotraginae

- *Hippotragus equinus*
- Africa



- *Hippotragus niger*
- south-east Africa



subfamily: Antilopinae

- long legs
- long neck
- Africa, Asia



- *Gazella dama*
- Sahara
- *Gazella granti*



subfamily: Caprinae

- similarities on skull construction (solid os frontale, curved horns, teeth)
- scent glands
- vertical cleft
- two nipples

*Capra*

- males have a beard
- (males) sex glands
- herd animals

*Ovis*

- preorbital glands
- glands between the two main toes of the foot
- males have not any beard



Domestication of cattle

Bos primigenius

Asia, north Africa, Europa
last 1627 Poland



Hungarian Grey



Andalusian Black



Giraffidae

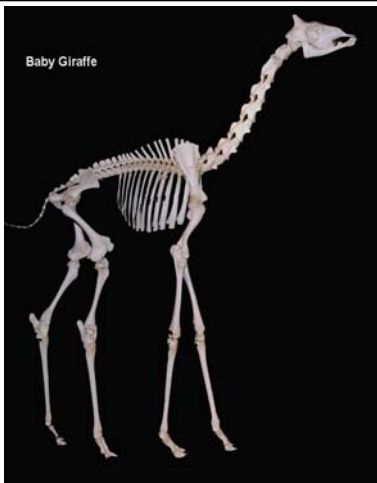
- prehensile tongues
- feet lack lateral digits
- third and fourth metapodials fuse to form cannon bones
- upper incisors and canines are absent
- four-chambered, ruminating stomach



Okapia johnstoni (okapi)



- **third horn** - rough, thickened areas near the junction of the nasals and frontals



ORDER CETACEA

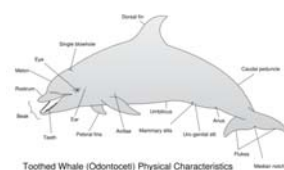
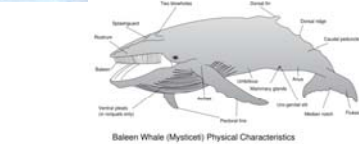
- largest living animal, at up to 30 m (93ft) long and 180 tons
- paddle-shaped the forelimbs
- blubber - vascularized layer of fat (an energy reservoir, insulation)
- breathe through blowholes
- unique respiratory system
- hydrophilic properties of the skin



The V-shaped double blowhole of a grey whale



- Mysticeti (baleen whales)
- baleen
- Odontoceti (toothed whales)
- teeth and prey on fish, squid, or both
- echolocation



ORDER: PROBOSCIDEA

- long, muscular trunk that functions almost as a fifth limb
- males have a pair of huge tusks
- [cheek teeth](#) are uniquely adapted to their highly abrasive diet
- chew with a fore and aft motion of the jaw, grinding the food across the loph
- herbivores (require over 400 kg per individual per day)
- gestation period is 22 months



three living species:

- the [African Bush Elephant](#),
- the [African Forest Elephant](#) (until recently known collectively as the [African Elephant](#))
- the [Asian Elephant](#) (also known as the Indian Elephant).

ORDER: SIRENIA

- fully-aquatic marine mammals (sea cows)
- mainly herbivores
- a mean mass of 410-545kg (900-1200lb), and mean length of 2.7-3m (9-10ft), with maximums of 3.6m and 1775kg
- inhabit the shallow, marshy coastal areas and rivers of the [Caribbean Sea](#) and the Gulf of Mexico (*T. manatus*, West Indian manatee), the [Amazon basin](#) (*T. inunguis*, Amazonian manatee), and [West Africa](#) (*T. senegalensis*, African manatee).



T. manatus

ORDER: HYRACOIDEA

- **closest living relative of the elephant**
- **features with elephants:**
 - herbivorous
 - toenails
 - excellent hearing
 - sensitive pads on their feet
 - small tusks
 - good memory
 - high brain functions compared to other similar mammals
 - shape of some of their bones
- four species
- [Africa](#) and the [Middle East](#).



Heterohyrax brucei