

## Biology 17B

### Mammals

"Now then we are ambassadors for Christ." — Second Corinthians 5:20

### Mammals

1. Small class (4,200 species), but ubiquitous and diverse. Some of the largest and smallest animals; including Bats, Whales, Elephants, Shrews and man.
  - a. Vertebrates with a backbone.
  - b. Hairy skin.
  - c. Warm blooded.
  - d. Maternal birthing, all viviparous except for monotremes.
  - e. Maternal nursing with own milk.
  - f. Lungs for respiration.
  - g. Aerobic.
  - h. Four limbs- tetrapods.
2. Habitat: ubiquitous, aquatic, terrestrial and aerial
3. Organization: cells, tissues, organs, systems: circulatory, nervous, digestive, skeletal ...
4. Symmetry: bilateral
5. Integument: hairy skin
  - a. Hair: collection of dead cells, keratinized protein, produced by hair follicles
    - i. Under hair: soft, insulating fur near skin.
    - ii. Guard hair: coarser, longer hair
    - iii. Modified hairs
      1. Whiskers- enlarged hairs for detection of objects near face in dark
      2. Standing fur- dog neck hair for reflex action
      3. Quills-porcupine
      4. Purpose: 1) insulation- Beavers so thick water does not penetrate. Fluffing of hair traps air for insulation to keep warm, 2) camouflage-weasels white in winter and brown in summer
      5. Claws for ripping, climbing, digging
6. Skeleton: solid bones, and a backbone (vertebrates)
  1. Limbs
    - a. Usually two pairs of limbs for locomotion
    - b. Bats: wings and feet
    - c. Moles: digging claws and feet
    - d. Whales: swimming paddles and fluke
    - e. Kangaroo: hopping legs and two arms
    - f. Cheetah: designed to run fast. Land speed record- 60mi with four legs.
7. Musculature: striated, cardiac, and smooth
8. Movement: mobility by flight, walking, running, crawling, hopping, rolling
9. Senses/nervous: typical vertebrate- brain, spinal cord, cranial nerves, spinal nerves. Brain dominated by cerebrum.
  - a. Have all senses but some are more or less sensitive
  - b. Bats: Sonar system, very keen
  - c. Bloodhound: smell
  - d. Cerebrum: dominates the brain

10. Behavior/activity: Advanced cognitive skills
11. Nutrition
  - a. Carnivores: meat eaters
    - i. (lion, dogs): large canines for tearing
  - b. Herbivores: vegetarians
    - i. Cows, horse, giraffe have sharp incisors and large flat molars
    - ii. Mice, beavers, have large incisors for gnawing
  - c. Omnivores: both meat and plant, all teeth well developed
12. Digestion: Varied
  - a. **Teeth:** 1) incisors, flat, thin front teeth for biting 2) canines, rounded, pointed teeth near front for tearing 3) Molars, thick, squat teeth in back for grinding and chewing
  - b. Digestive organs: 1) Rumen in ruminants depending on cellulose, multi-chambered stomach and long digestive tracts, 2) Carnivores simple, one chambered stomach and shorter digestive tract
13. Respiration:
  - a. Lungs & diaphragm: ventilation, contraction of diaphragm draws air in
  - b. Larynx: voice box with vocal cords
14. Circulation:
  - a. 4-chambered heart
  - b. Endothermic: internal body heat regulation
  - c. For heat: Panting (dog), sweat glands, Elephant ears
  - d. For cold: Hibernation (reduce body T° and slows metabolism)
15. Immune system: Innate and specific. Big variation among classes.
16. Excretory: liver, bladder, intestines.
17. Reproduction/Embryology: Viviparous, some ovoviviparous
  - a. Viviparous- requires a placenta (made from both uterus and embryo), allows nutrients to pass from mother to baby, wastes passed from baby to mother, prevents mingling of blood. Umbilical cord (belly button)
  - b. Gestation: time baby spends developing inside mother. Time of gestation affects development stage when born. horse vs mice
  - c. Babies continue to be nurtured by mother. Milk differs.
    1. Cow milk very thick with fat
    2. Human milk very thin and watery
    3. Antibodies
18. Lifecycle: conception, incubation in mother's body, viviparous birth, mature to adulthood.
19. Classification: About 18 orders, classified according to differences in 1) reproduction, 2) teeth and 3) limbs.
  - 2 nonplacental orders
    - a. Order Monotremes: 1) Nonplacental, 2) The only mammals that lay eggs and incubate like birds. 3) Mammary glands secrete milk on the sides of the animal for the young to lap up. 4) Young kept in moss lined nest. 5) duck-billed platypus has a ducklike bill, flat tail, webbed & clawed feet, poison spurs
    - b. Order Marsupials: 1) Nonplacental, 2) Pouched mammals. 3) Most in Australia. 4) Semi-viviparous. Immature offspring crawl out of the mother, onto the fur, and into a pouch, and complete development. 5) E.g.'s, Opposum, Kangaroo (young called joey), Koala, Tasmanian devil (raccoon appearance), Tasmanian wolf (dog appearance)

## Placental orders

- a. Order Rodentia:
  - 1) gnawing mammals, 2) largest order of mammals, 3) Squirrels, rats mice, porcupines, 4) Large incisors: grow throughout life time, allowing it to gnaw continuously. Soft on the back of teeth to keep it sharp, 5) Most are defenseless, 6) Survive by proliferation (Large numbers & quick development), Capable of producing offspring every 7 weeks. 7) Field mice mature at 6 weeks old, 8) Meadow mice can produce up to 17 litters in one year (75 offspring.yr), 9) Source of much disease (carriers of black plague), property damage (gnaw holes in homes), and food spoilage (eat and spoil grains)
- b. Order Carnivora: 1) animal (meat) eaters, 2) Canine fangs and sharp molars, 3) require skills to approach, catch and kill prey, 4) includes Bears, dogs, lion, cats, seals, etc.
- c. Aquatic mammals
  - 1) Live in the water, 2) Flippers, dorsal fins, and horizontal tail fins (fish have vertical), 3) Includes Porpoises and Whales: largest (blue whale), Killer whale: bites whales, break through ice to attack
- d. Order Primates
  1. Includes Apes, monkeys
  2. Free moving arms and legs, large hands and feet
  3. Thumb and big toe opposable
  4. Finger nails and toe nails
  5. Eyes on front of face
  6. Poor smell
  7. Mostly in trees
  8. Mostly vegetarian
- e. Two orders of Hoofed mammals
  1. **Order Perissodactyla**: 1) odd-toed hoofed mammals: 1 or 3 hoofed toes, 2) simple stomach, 3) includes horses, rhinoceros, zebras
  2. **Order Artiodactyla**: 1) even-toed hoofed mammals: 2 or 4 hoofed toes. 2) simple stomach like pigs and hippos or 3) multi-chambered stomach, ruminants like cows, deer, camels

## 20. Interesting facts

- a. The blue whale 105 feet in length weighing over 200 tons (330,000 pounds) is the largest animal known to ever exist.
- b. African elephants 13 feet tall at the shoulder weighing up to 14,000 pounds is the largest land animal.
- c. The capybara grows up to 4¼ feet weighing as much as 145 pounds is the largest living rodent.
- d. Bumblebee bat (Kitti's hog-nosed bat) about 1 to 1.3 inches weighing 2 grams.
- e. Pygmy jerboa: body is about 2 inches weighing 3 grams.
- f. Pygmy possum, 2-4 inches; 10 to 45 grams. Live on fat in tails during winter hibernation.
- g. Etruscan shrew body is about 1.5 to 2 inches weighing about 2 grams. Eats as much as twice its own body weight every day. Heart rate, beating up to 1,500 beats per minute.
- h. Giraffes reach 19 feet and have a tongue that is 18 inches long. Sleep less than 2 hours a day.