LABORATORY 2 - TEETH

TOOTH PARTS AND COMPOSITION
Tooth parts (Fig. 3-24)
1. **Crown**—above the alveolus
2. **Root**—in alveolus, below the gum line

Tooth Composition (Fig. 3-24)
1. **Enamel**
2. **Dentine**
3. **Cementum**

KINDS OF TEETH
A. **heterodont**: only mammals have several forms of teeth differentiated along the jaw
   1. **incisors**: upper incisors are on the premaxilla
   2. **canines**: post-canine teeth
   3. **premolars**: have deciduous predecessors (milk dentition)
   4. **molars**
B. **homodont**: cheek teeth are more-or-less alike.
C. **edentulous**: without permanent teeth

EVOLUTION OF MULTICUSPED TOOTH PATTERN (cheek teeth)
1. **tribosphenic** tooth (Figs. 3-21, 3-22, 3-26A,B)
   A. occurs in primitive placental and marsupial mammals.
   B. upper molars with three prominent cusps (trigon)
      a. trigon—triangle formed by the paracone, metacone, and protocone
   C. lower molars with three prominent cusps (trigonid) plus basin (talonid)
      a. trigonid—a triangle formed by the paraconid, metaconid, and the labial protoconid
      b. talonid—a posterior extension of lower tooth that accommodates the protocone.
         Formed by the hypoconid and entoconid
Modifications of the Tribosphenic Pattern [Figs. 3-25, 3-26C, D]

A. many mammals have a square molariform tooth that results from the addition of a hypocone to the trigon

![Diagram of tooth structures](image)

a. quadritubercular--4 main cusps (eg. humans, pigs)
b. **bunodont**--rounded cusps, typical of omnivores
c. **selenodont**--occlusal surface of cusps are crescent shaped lophs
d. **lophodont**--occlusal surface pattern consists of a series of lophs (ridges) formed by cusps running together

![Diagram showing different types of teeth](image)

B. **Sectorial** (secodont) - shearing or cutting edge resulting from fusion of cusps.
a. **Carnassial** teeth--specialized pair of teeth the Order Carnivora. The last upper premolar and the first lower molar are blade-like teeth that occlude (close) with a scissor-like action, thus shearing and shredding meat.

![Diagram of carnassial teeth](image)

C. Other terms
a. **Brachydont**: Low-crowned teeth. Enamel above the gum line. Always closed-rooted
b. **Hypsodont**: High-crowned teeth. Enamel above and below the gum line, can be open-rooted and ever-growing. Characteristic of cheek-teeth of grazers and incisors of rodents and rabbits.
c. **diastema** -gap in the tooth row
DENTAL FORMULAE

A. Because teeth are so important, mammalogists have devised a notation to indicate the number of each kind of tooth

1. Teeth are listed and counted in the order they occur in each half (quadrant) the of the upper and lower jaw; upper jaw is listed over lower.
   a. The dental formula of *Homo sapiens* is
      \[
      \text{I}_2 \text{C}_1 \text{P}_2 \text{M}_3 \quad \text{OR} \quad 2-1-2-3 \quad \text{OR} \quad 2/2 1/1 2/2 3/3
      \]
      \[
      \text{i}_2 \text{c}_1 \text{p}_2 \text{m}_3 \quad 2-1-2-3
      \]

2. Primitive dental formula
   a. placental mammals
      (a) 3/3 1/1 4/4 3/3 = 44 total teeth
   b. marsupial mammals
      (a) 5/4 1/1 3/3 4/4 = 50 total teeth

B. Mammals with specialized dentitions usually have fewer than the primitive number. In terrestrial species, only the bat-eared fox, giant anteater, and marsupial numbat exceed the primitive number

a. e.g., 3/2 1/1 2-3/3 3/3 = 36 or 38 total teeth
b. e.g., 1/1 0/0 2/2 3/3 indicates no canines
c. P$_3$ or P$^3$ indicates the third lower or upper premolars
d. p$_3$ or P$^3$ indicates the third lower or upper premolars
e. 1/1 0/0 4/4 means the post-canine teeth are lumped together
DENTAL FORMULAS: SOME RULES OF THUMB

In most mammals, other than carnivorans, when teeth are lost, they are usually the anterior premolars. Count the cheek teeth. E.g., if there are five upper cheek teeth and four lower cheek, that means two are missing from the top and three are missing from the bottom (a placental mammal can usually have up to four premolars and three molars). In this case the dental formula for the cheek teeth is probably P2/1, M3/3. The premolars that are present are P3, P4, and p4.

If the mammal is a member of the order Carnivora, try and locate the carnassial pair. The upper carnassial is the P4, any teeth behind it are molars. Teeth between it and the canine are premolars. The bottom carnassial is the m1. If 3 cheek teeth are ahead of the upper carnassial and one behind and 2 ahead and none behind the lower carnassial, the cheek teeth dental formula is P 4/2 M 1/1.

Remember a placental mammal can only have 3 incisors. If it looks like 4 incisors are present and it is a placental mammal the fourth tooth is actually a canine that looks like an incisor (an incisor-form canine).
DESCRIPTIVE TERMINOLOGY OF TOOTH SHAPE AND PATTERN
a. Heterodont
b. Homodont
c. edentulous
d. Tribosphenic
e. Quadritubercular
f. Bunodont
g. Lophodont
h. Selenodont
i. Sectorial
j. Brachyodont
k. Hypsodont
l. Ever-growing tooth

TERMS APPLIED TO DIET
a. Herbivore (plants in general)
b. Grazer (grasses/forbs)
c. Browser (terrestrial leaf/wood)
d. Folivore (arboreal leaf eater)
e. Frugivore (fruit)
f. Nectivore (nectar)
g. Granivore (seeds)
h. Carnivore (meat)
i. Piscivore (fish)
j. Molluscivore (shellfish)
k. Omnivore (whatever)
l. Insectivore (invertebrates in general)
m. Myrmecophage (ants and termites)
n. Sanguivore (blood)

For the following species
• Determine the dental formula for the following 5 (they follow the above rules of thumb)
• Apply two or three of the shape and pattern terms, as appropriate, to the dentitions
• What diet term can be inferred from the dentition? EXPLAIN WHY!!

1. Didelphis virginiana

2. Pecari tajacu

3. Odocoileus virginianus

4. Canis latrans

5. Myocastor

6. Macropus

8. What is the dental formula of *Tursiops truncatus*?

9. For the remaining skulls out for you to study, which is an example of a
   A. lophodont grazer ______________________
   B. lophodont browser _____________________
   C. selenodont browser ____________________
   D. frugivore ____________________________
   E. piscovore ____________________________
   F. molluscivore __________________________
   G. myrmecophage __________________________
   H. selenodont, hypsodont herbivore ______________