

## Aquarium of the Pacific



Long Beach, CA

<http://www.aquariumofpacific.org/>

- Attending Saturday:  
Meet Greg Russell at 8:45 am at the dolphin fountain in front of the aquarium
- Attending Sunday:  
Meet Kelli Elliott at 8:45 am at the dolphin fountain in front of the aquarium

Parking is \$7

Observation: kelp fish in the kelp

Aquarium “Experiment”



## Questions

- Does camouflage benefit the kelp fish?
- What happens to kelp fish during El Nino years when high ocean temperatures kill the kelp?
- How do kelp fish tell female kelp fish from male kelp fish?

## Design the experiment

- Procedures:
  - set up two tanks: one with kelp fish and kelp and kelp fish predators; one with kelp fish and their predators, but no kelp
  - Record kelp fish numbers each day over a period of one month

## Choose a testable question

- What happens to kelp fish during El Nino years when high ocean temperatures kill the kelp?

Null Hypothesis:

The removal of kelp will have no effect on kelp fish population.

Prediction:

If there is no kelp, the kelp fish's predators will find them more easily and the kelp fish population will decrease.

## Research

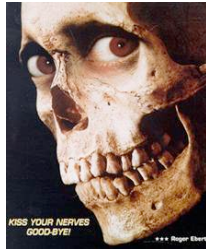
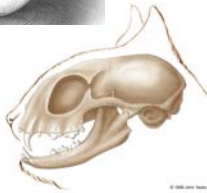
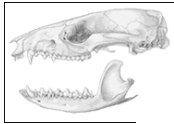
- The relationship of kelp fish and kelp
- The predators of kelp fish and how they capture the kelp fish

Cite all sources used to answer your question.

If unable to actually answer your question, what can you deduce from the information you did find?



# LAB # 9 - Comparative Tetrapoda SKULLS



## Phylum Chordata

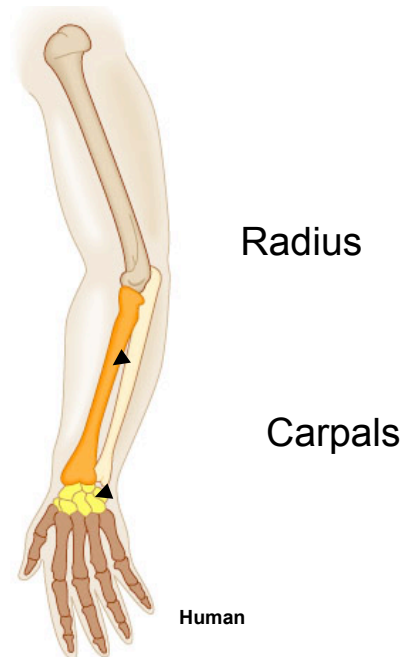
- Subphylum Urochordata – sea squirts
- Subphylum Cephalochordata - amphioxus
- Subphylum Vertebrata
  - Superclass Pices
    - Class Agnatha
    - Class Chondrichthyes
    - Class Osteichthyes
  - **Superclass Tetrapoda**
    - **Class Amphibia**

### Amniota

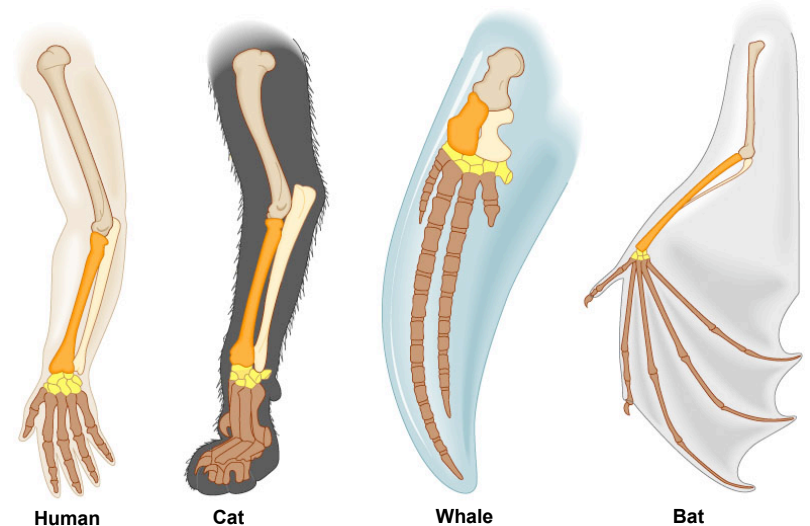
- **Anapsida – turtles**
- **Diapsida – lizards, snakes, crocodilians, birds, tuatara**
- **Synapsida – mammals**
  - Placentals
  - Marsupials
  - Monotremes

## Homology

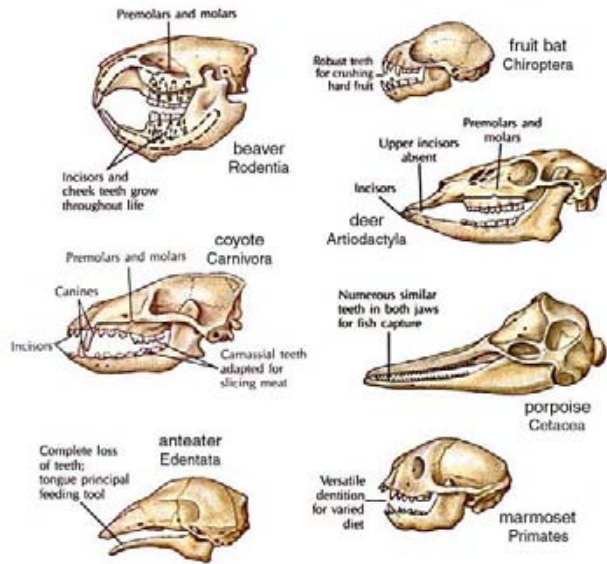
- When two structures are similar as a result of shared inheritance



## It's The Same For Skulls



# It's The Same For Skulls



# Goal For Today

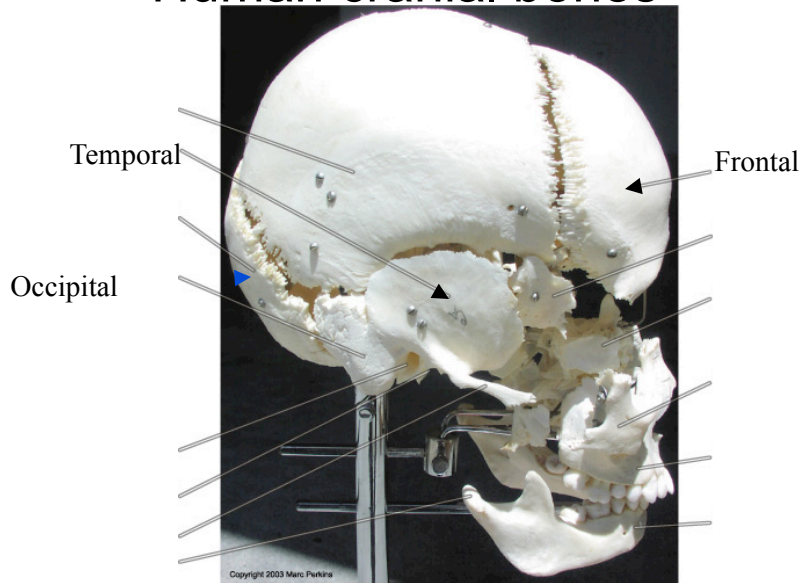
- Be most familiar with the bones of the **CAT** and **HUMAN** skull.
- Also be familiar with other skulls in lab.



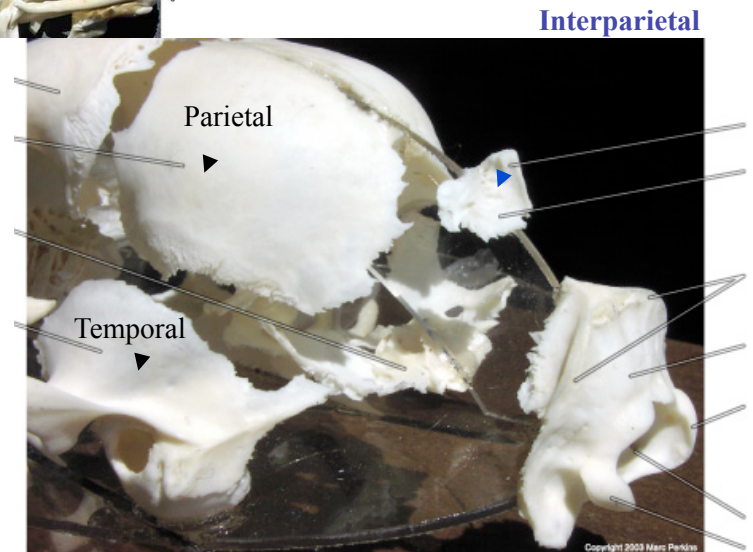
- Frog
- Turtle
- Pigeon / chicken
- And other tetrapod skulls on side tables



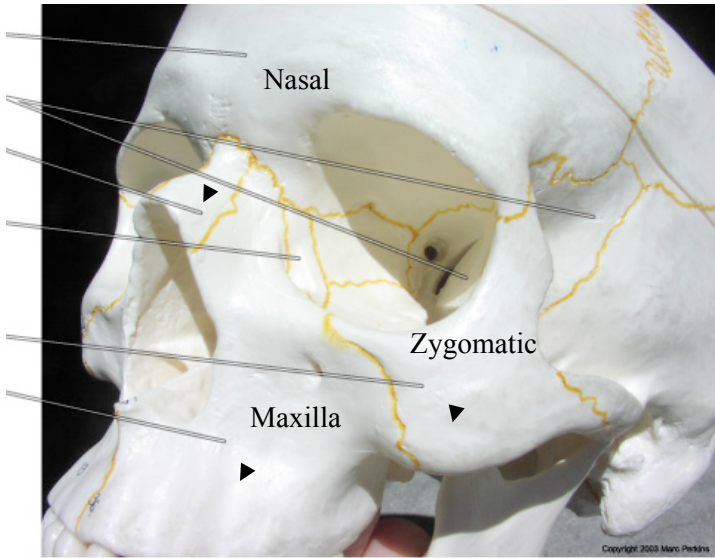
## Human cranial bones



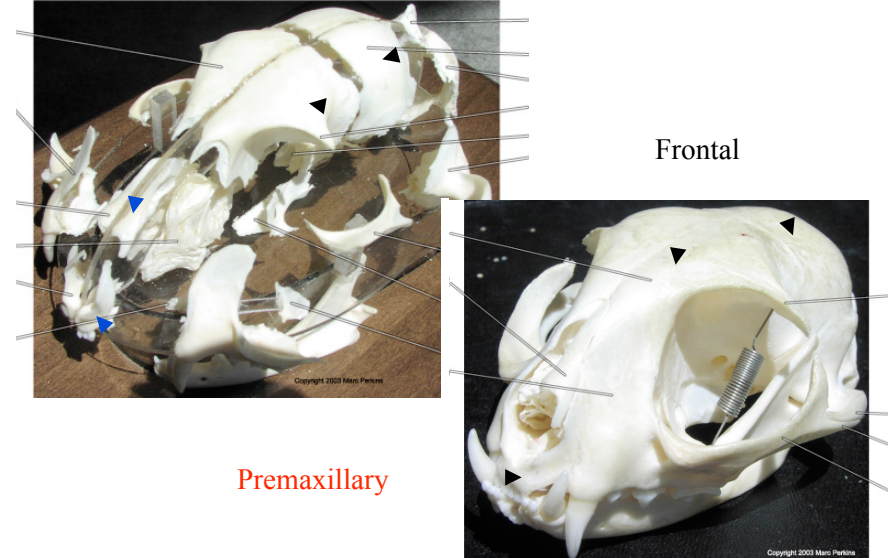
## Cat cranial bones



# Human facial bones

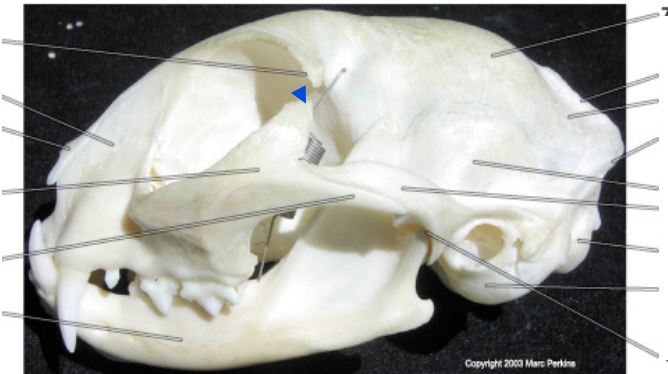


# Cat facial bones

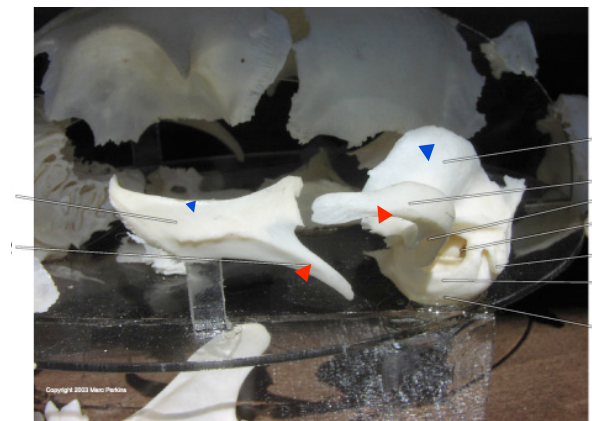


# Zygomatic & Temporal bones

## Zygomatic Arch



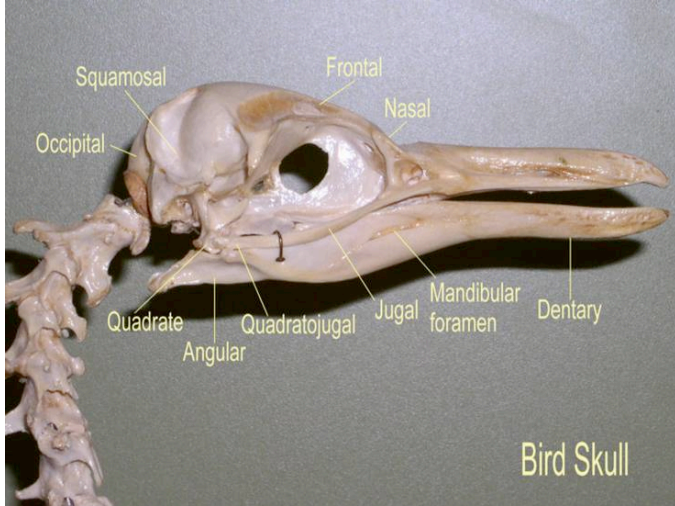
# Zygomatic & Temporal bones



Temporal Process on Zygomatic

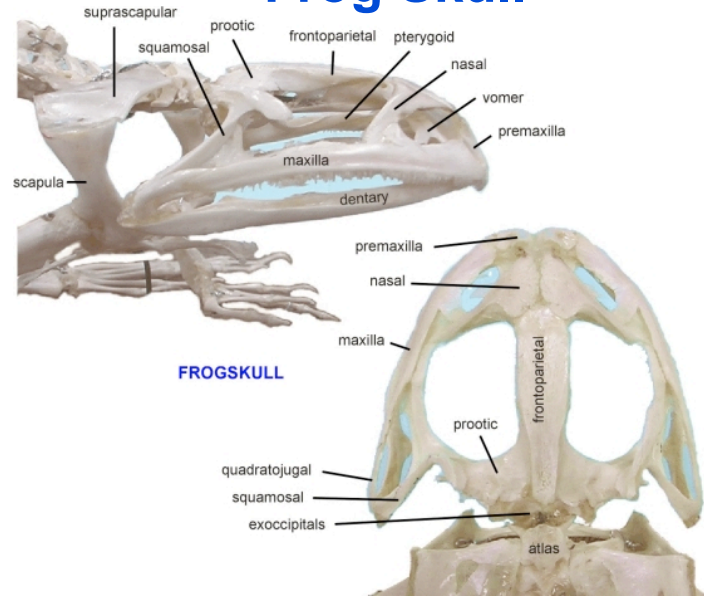
Zygomatic Process on Temporal

## Bird Skull

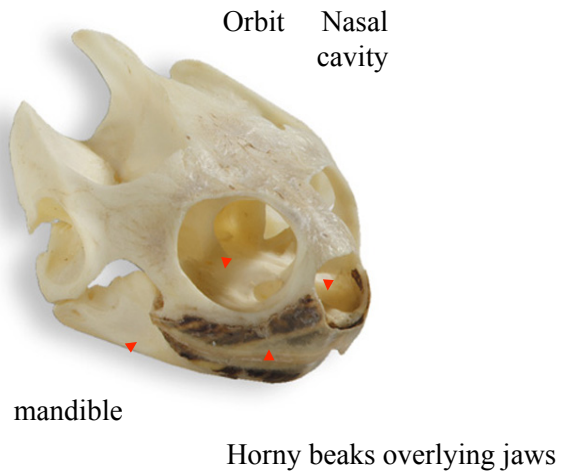


academic.emporia.edu/.../verstruc/BIRDHEAD.HTM

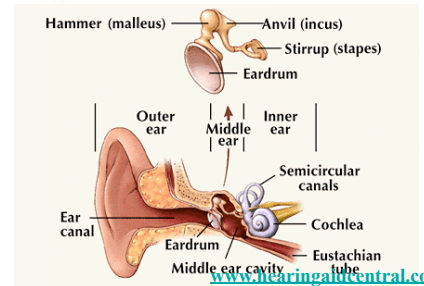
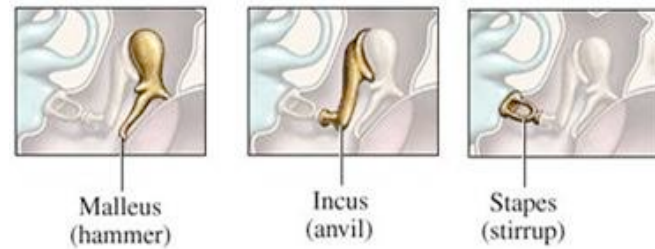
## Frog Skull



## Turtle Skull



## Human middle ear bones

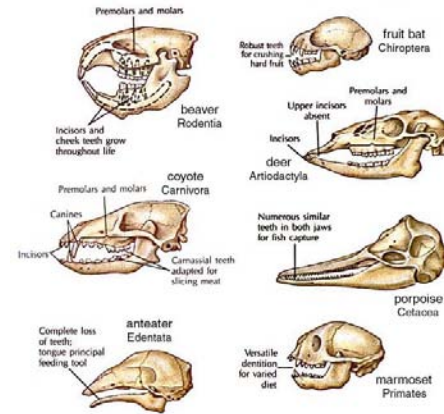


# Mammal Skulls:

- Observe 6 different mammal skulls
- Fill out the table in the handout

## Filling out the table ...

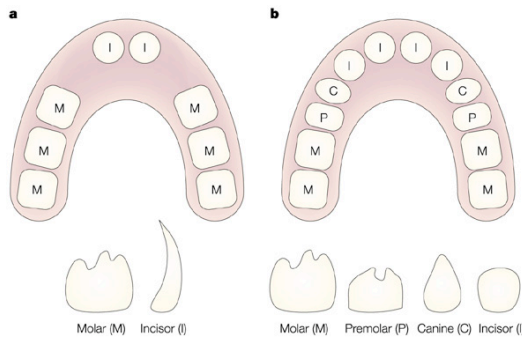
- Dental formula
  - Count only half the jaw
  - # of teeth on top / # of teeth on bottom
  - E.g. **Incisor: 3/3** **Canine: 1/0** **Cheek Teeth: 3/4**



▪ Watch out for missing teeth from damaged skulls

## Filling out the table ...

- Dental formula
  - Count only half the jaw
  - # of teeth on top / # of teeth on bottom
  - E.g. **Incisor: 1/1** **Canine: 0/0** **Cheek Teeth: 3/3**
  - E.g. **Incisor: 2/2** **Canine: 1/1** **Cheek Teeth: 3/3**



▪ Watch out for missing teeth from damaged skulls

## Filling out the table ...

**Teeth**  
Heterodont  
Homodont

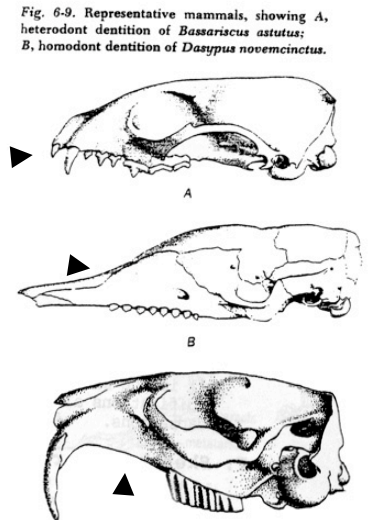
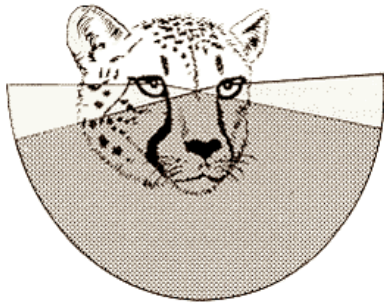


Fig. 6-9. Representative mammals, showing A, heterodont dentition of *Basariscus astutus*; B, homodont dentition of *Dasypus novemcinctus*.

**Canines absent;**  
**Teeth separated**  
**by DIASTEMA**

## Filling out the table ...

Eyes in front



Binocular vision

Eyes on the sides



Monocular vision

## Diet Group:

What do you think the animal eats based on the skull and teeth characteristics?

**Herbivore**

**Omnivore**

**Carnivore**