Midterm 2

Taxonomy and Cladistics:

Taxonomy —> Taxis = arrangement Nomia = distribution

Linnaean Hierarchy: Kingdom —> Phylum —> Class —> Order —> Family —> Tribe —> Genus —> Species

Definitions:

- Biological Species Definition (Ernst Mayr) "Reproductive community of populations that occupy a specific niche in nature"
- Genus "aggregate of species sharing joint properties"
- Order "subdivision of class necessary to avoid placing together"

Cladistics - taxonomic system in which the common origin of taxa is determined by the presence of shared derived traits

(synapomorphies) uses data from morphology, genetics, and behavior to derive clades

- Homologies - similar development and form that indicate a close evolutionary relationship
- Homoplasies - similarities due to parallel evolution
- Analogies - functional similarity due to convergent evolution
- Apomorphies - derived traits
- Plesiomorphies - primitive traits
- Synapomorphy - shared derived trait —> key to cladistic taxonomy, indicates closer relationship
- Autamorphy - unique derived trait
- Symplesiomorphy - shared primitive traits

Parsimony - most parsimonious solution to a cladogram has the fewest homoplasies

Why Study Primates:

Primate Traits:

- petrosal bulla
- clavicle well-developed
- pentadactyly (5 digits on hands and feet)
- plantigrade feet (feet flat on ground)

- nails on hands rather than claws
- prehensile hands and feet (ability to grab)
- opposable toes and thumbs
- frontation and convergence of orbits (eyes)
- bony enclosure of orbits
- olfaction reduction
- enlarged brain / plasticity of behavior (thoughts and planning)
- altricial young (dependent young)

3 Primate Characteristics —> Social Behavior:

1. Enlarged Brain
2. Behavioral Plasticity
3. Altricial Young

Potential Models for Hominin Behavior:

- foragers (hunters-gatherers),
    - Australian aborigines & KhoiSan
    - have been pushed to marginal environments = not good model
- chimps
    - share genes, morphology, ability to learn
    - we have evolved in one direction and chimps in another
    - geographically and ecologically restricted unlike our ancestors
- other primates? (baboons, etc.)

Causes of Primate Social Groupings: phylogeny (evolutionary history), environment (food, sleeping sites, predator protection), recent history

Types of Primate Social Groupings:

- solitary but social (nocturnal prosimians Galago, orangutans Pongo)
- pair bonds (gibbons Hylobatinae, marmoset Callithricinae)
- one-male (Colobus, Patas)
- multi-male multi-female —> most common, dominant male (Vervet, baboons, lemurs, cebids, gorillas)
- cooperative polyandrous —> communal breeding with one active female at a time (tamarins)
- fission fusion —> big group together at night and smaller groups during day (baboons, spider monkeys, chimps seasonally)

Primate Taxonomy:

Taxonomic Classification Based On:

- homologies - similarities shared due to common ancestry
- analogies - similarities shared due to convergent evolution
- shared derived traits - traits shared by 2 or more taxa and their most recent common ancestor

1. Kingdom - animal

2. Phylum - chordata
    - animals possessing a notochord, a hollow dorsal nerve cord, pharyngeal slits, an endostyle, and a post-anal tail for at least some period of their life cycles

3. Class - mammal
    - endothermic - internally regulate body temp. by shivering and metabolism
    - possess hair
    - heterodont dentition - different types of specialized teeth that support diverse diets
    - mammary glands - allows females to secrete milk (lactate)

4. Order - primates
    - eutherian - give birth to live young
    - relatively large brains for body size
    - slow life histories:
        - longer gestation periods
        - slower rates of postnatal development
        - delayed ages of first reproduction
        - longer inter birth intervals and generation lengths
        - longer lifespans
        - altricial (underdeveloped at birth)
    - morphological (neural and sensory):
        - rely less on smell and more on vision, better visual acuity (exemplified by small snouts, flat faces, and forward facing eyes)
        - postorbital bar - bony ring around each eye facing forward (convergent eye orbits) allow for stereoscopic vision (accurate depth perception
    - feeding (teeth):
        - front teeth are incisors
        - canines are next to incisors and can be quite large
        - premolars are behind the canines
        - molars are in back of mouth behind the premolars
        - ancestors have a dental formula of 3-1-4-3
    - locomotor (hands, feet, and digits):
        - nails instead of claws