Lecture 5 & 6 → Primates & Basics of Primate Behaviour

Chapter 6: An Overview of the Primates & Chapter 7: Primate Behaviour

Definitions

- ***Primatology*** → The study of *non-human* primate *biology* AND *behaviour***
- ***Analogies*** → Structures that are superficially similar
  - Share a similar function, but not similar ancestry
  - Built from different parts
  - Do not pass through similar stages during embryonic development
- ***Homologies*** → Structures possessed by 2 different organisms that arise in a similar fashion
  - May not have the same function, but stem from common ancestry
  - Pass through similar stages during embryonic development

Primate Characteristics

- Traits primates **SHARE** with other mammals:
  - Body hair
  - Long gestations followed by live birth
  - Mammary gland
  - Different types of teeth (incisors, canines, premolars, and molars)
  - *Endothermy* → Ability to maintain a constant internal body temperature through physiological means
  - Increased brain size
  - Capacity for learning and behavioural flexibility
- Traits **UNIQUE** to primates:
  - Arboreal (able to live in trees)
  - ***Stereoscopic vision*** → 3-D vision; allows for depth perception
  - Eyes placed toward the front of the face (not to the sides)
    - Provides for ***binocular vision*** → overlapping visual fields, allowing depth perception
  - Colour vision
    - Nocturnal primates don't have colour vision
  - Fovea Centralis (pit in the middle of the retina that allows you to focus on an object and while you maintain this acuity, it allows you to maintain peripheral vision, allowing depth perception; also enhances colour vision)
  - Highly developed sense of touch (tactile pads enriched with sensory nerve fibres at the ends of digits)
  - Enlarged, complex brain (encephalization)
  - Retention of less specialized dentition (variety of things to eat)
  - Unique dental formula

        - 2.1.2.3 (upper)
          2.1.2.3 (lower)
        - 2 incisors, 1 canine, 2 premolars, 3 molars
        - This is for humans, apes, OWM
        - NWM has 2.1.3.3 – extra premolar
    - Primate Skeleton
        - High vaulted cranium (cranial vault is just the top of the head); rounded or globular cranial vault
        - Forward shifted foramen (hole) magnum (head); where the spine attached to the bottom of your head
            - Explains tendency toward upright posture
        - *Generalized* limb structure, allowing for various locomotor behaviours
        - Clavicle has been retained – allows for full range of motion
            - Brachiation
        - Reduced snout due to decreased reliance on sense of smell
        - Post orbital bar (enclosed eye socket)
        - Prehensibility (the ability to grasp)
        - Pentadactyly (5 digits on the hands and feet)
            - Opposable thumb (and usually an opposable big toe)
        - Nails instead of claws
    - Maturation, learning, and behaviour
        - Able to breed throughout the year
        - Reduced numbers of offspring born at one time
        - Delayed maturation (longer period of infant dependency on the mother)
        - Greater dependence on flexible, learned behaviour (as opposed to innate behaviour)

Kingdom: Animalia → Phylum: Chordata → Subphylum: Vertebrata → Class: Mammalia → Order: Primate

- Suborder: *Strepsirhini*
    - Most primitive (non-derived) primates
    - Developed olfactory system
        - Rhinarium – wet pad at the end of nose
        - Long snout because many are largely nocturnal
    - Eyes placed at the side of the face
    - Dental comb (front lower incisors stick out like a comb)
    - Grooming claw (elongated pointed finger)
    - VCL = leaping and clinging
    - Shorter gestations and maturation periods
    - Infraorder: *Lemuriformes* (All lemurs and lorises)

- Superfamily: *Lemuroidea* (Lemurs)
  - Madagascar
  - Diversified into numerous ecological niches without competition
  - Body length range from mouse lemur (5 inches) to the indri (2-3 feet)
  - Larger lemurs are diurnal and eat a variety of foods
  - Mouse and dwarf lemurs are nocturnal and insectivorous
  - Mostly arboreal (ring-tailed lemurs are terrestrial)
  - Mostly quadrupeds (sifakas and indris are VCL)
  - Many species live in groups of 10-25
  - Indris live in "family" units with a mated pair
- Superfamily: *Lorisoidea* (Lorises)
  - Africa, South and East Asia
  - Nocturnal
  - Slow, cautious climbing form of quadrupedalism
  - Some insectivorous, some eat fruits, leaves, and other plants
  - Usually forage alone; females leave infants behind when they forage

- Suborder: *Haplorhini*
  - Generall larger body size
  - Larger brain
  - Rounded skull
  - Eyes rotated to the front
  - Bony plate at the bck of eye orbit**
  - No rhinarium**
  - Chisel like incisors
  - Fusion of the 2 sides of the mandible at the midline to form one bone
  - Increased parental care and maturation
  - More mutual grooming
  - Infraorder: *Tarsiiformes* (Tarsiers)
    - Southeast Asia
    - Tarsier is a prosimian, prosimian = tarsier, lemur, or loris
      - Happlorrhine that is most like the lemur
    - Primitive features:
      - Small body, large ears
      - Grooming claw
      - Unfused mandible
      - Nocturnal insectivore

- Stable pair bonds; basic social unit is a mated pair and their young
- Haplorrhine features:
  - No rhinarium
  - Eye sockets enclosed in bone
  - 2.1.3.3 dental formula
- Unique features:
  - Enormous eyes (almost as large as their brains);immobile in their sockets
  - Rotate head 180 degrees
  - Elongated tarsal bone to leap

- **Infraorder:** *Anthropoidea* (All monkeys, apes, and humans)
  - Parvorder: *Platyrrhini* (New World monkeys)
    - Platy = flat, rhini = nose
    - South & Central America
    - Wide range of size, diet, ecological adaptation
    - Broad flaring noses with outward nostrils
    - Almost exclusively arboreal
    - Long prehensile tails (swing through trees with them)
    - Diurnal (except the owl monkey)
    - 3 premolars → 2.1.3.3 dental formula (All catarrhini have 2.1.2.3)
    - Marmosets and tamarins
      - Smallest of all monkeys
      - Claws instead of nails
      - Usually give birth to twins
      - Live in social groups with a mated pair, or a female and 2 males and offspring
      - Males are extensively involved in infant care
    - Superfamily: *Ateloidea* (NWM)
  - Parvorder: *Catarrhini* (All Old World monkeys, apes, and humans)
    - Superfamily: *Cercopithecoidea* (OWM)
      - Africa, South Asia
      - Downward nostrils
      - No prehensile tail
      - Quadrupedal, mostly arboreal
      - Ischial callosity (a thickened piece of skin on the butt)
      - Good manual dexterity
      - Tail: balance and communication
      - Females have changes of external genetalia during estrus
    - Superfamily: *Hominoidea* (Apes and humans)

- Generally larger body size
- No tail
- Shortened trunk
- Changed anatomy of shoulder joint
- Complex behaviour & enhanced cognition
- Increased infant dependency
- Family: *Hylobatidae* (Gibbons and Siamangs)
  - Lesser apes; Southeast Asia
  - Smallest of apes
  - TRUE brachiators
  - Monogomous; males involved in rearing of young
  - Territorial: alarm calls
- Family: *Hominidae* (Great apes and Humans)
  - Subfamily: *Ponginae* (Orangutans)
    - Indonesia
    - Large sexual dimorphism
    - Frugivorous
    - Arboreal, quadrupedal on ground
      - FIST walkers
    - Largely solitary? → More dispersed
    - Primarily frugivorous
  - Subfamily: *Gorillinae* (Gorillas)
    - Central Africa
    - Large sexual dimorphism
    - Largely terrestrial
    - Knuckle walkers
    - Shy, gentle vegetarians
    - One male type of social organization; 1 male per troop
  - Subfamily: *Homininae* (Chimpanzees, Bonobos, and Humans)
    - Tribe: *Panini* (Chimpanzees & Bonobos)
      - Africa
      - Knuckle walkers
      - Less sexual dimorphism
      - Omnivorous
      - Large fluid communities
      - Complex social behaviour
      - Bonobos have female dominated hierarchy; Chimp communities are centered around males

    - Bonobos don't have sex just for reproduction, it's frequent
    - Chimps are mostly closely related to humans; only diverged 5-6 mya
- **Tribe:** *Hominini* (Humans & our ancestors)
    - Habitual bipedalism
    - Reduced canine size
    - Enlarged brain relative to body size → encephalization
    - Relaxed estrus (conceal ovulation)
    - Modification of environment
    - Language
    - Dependent on culture
    - Sexual division of labour

General Primate Social Behaviour

- Social groups
- Dominance
- Grooming
- Reproduction
- Mother-infant relationships

Primate Social Behaviour

- Social Groups
    - A major characteristic of all primates
        - One-male—multifemale groups (ex. Gorilla, some baboons)
        - Multimale/Multifemale groups (ex. Chimpanzee, Bonobos, OWM)
        - Matrilines (group consisting of a female, her daughters, and their offspring) in Macaques
        - Monogamous pairs (ex. Gibbons & Siamangs)
        - Female with one or two males (ex. Marmosets & Tamarins)
        - Solitary (ex. Orangutans)
- Dominance
    - Most primate societies are organized into dominance hierarchies
    - Function:
        - To impose order within groups by establishing parameters
        - Reduce physical violence
    - Rank may change throughout life
    - All primates *learn* their position in the hierarchy
    - Ritualized behaviour:

        - Behaviour removed from its original context and sometimes exaggerated to convey information
            - Mounting & presenting
                - May be used to express dominance or defuse tense situations
                - Present their hindquarters toward and animals they want to appease
            - Staring
                - Indicates a mild threat
            - Displacement
- Grooming
    - Functions:
        - Hygiene
        - Social significance
            - **Reinforce bonds**
- Reproduction
    - Sexual behaviour tied to female estrus
        - Behavioural changes
        - Visual cues
        - No fixed breeding season
- Mother-Infant Relationships
    - Forms the basic social unit
    - Harlow & Harlow (1961)
        - Investigates mother's role in infant development
        - Raised infant macaques with a surrogate mother made either of cloth with no food source, or metal with a milk food source
            - Most macaques chose the cloth mom over the metal one
            - No macaque raised without a mother achieved normal sexual behaviour in adulthood
            - Monkeys reared in isolation were denied opportunities to *learn* the rules of social and maternal behaviour
    - Alloparenting (Aunt behaviour)
        - Common behaviour in many primate species whereby individuals other than the parent hold, carry, groom and generally ineract with infants
        - Creates social bond between females in a troop
        - Allows mothers to search for food, copulatory experience, and other social bonding
        - Serves as good practice for younger females
        - If the mother dies, the alloparent will take over care for the infant

Some Factors That Influence Social Structure

- Body size
  - Larger animals need fewer calories per unit of weight and retain heat better
- Basal metabolic rate
  - Smaller animals have a higher BMR so they need an energy-rich diet
- Diet
- Distribution of resources
  - Leaves are abundant so they support large groups
  - Insects are scattered, so animals feed alone or with only one or two others
  - Fruits, nuts, and berries in dispersed trees occur in clumps, so best for smaller animals groups or subunits of larger groups
- Predation
  - Where predation is high and body size is small, large groups are better
- Relationships with other, non-predatory species
- Dispersal
- Life histories
  - Characteristics and developmental stages that influence reproductive rates
- Activity patterns
- Human activities

Primate Conservation

- Three basic reasons for the worldwide depletion of nonhumans primates:
  - Habitat destruction
    - Forest cleared for agriculture, pasture, lumber, mining
    - Demand for tropical hardwoods
  - Human hunting
    - Poaching, civil war, land clearing
    - Killed for bushmeat
  - Live capture for export and trade
    - Exotic pet trade, zoos, biomedical research
    - Primate body parts in traditional medicine
- One major underlying factor is unprecedented human population growth
- With increasing population, the demand for these products increases
- Conservation groups:
  - Conservation International
  - World Wildlife Fund
  - Jane Goodall Institute
- Solutions?
  - National parks and wildlife reserves (Ex. Jane Goodall reserve)
  - CITES
  - Education
  - Economic alternative

- Breeding colonies