

INTRODUCTION TO PRIMATES

PRIMATES (OUR CLOSEST RELATIVES)

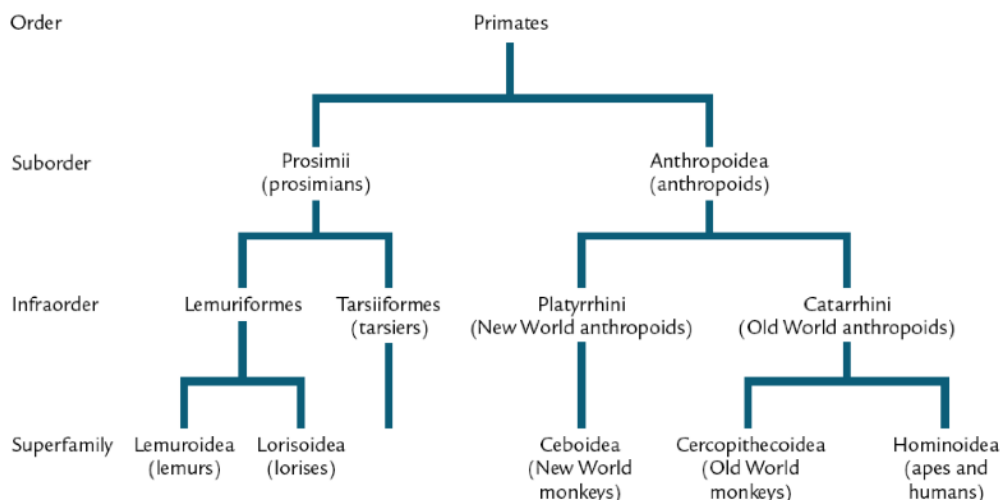
- Primates gives us information about the **ancestry of our own species**.
 - Chimpanzee's shared 98.5% of human DNA as our common ancestor shared those traits.
- Two reasons to study primates (help us to understand human evolution):
 - Reasoning by homology:
 - **Closely related species** tend to be **similar morphologically** because they share traits acquired through descent from a common ancestor.
 - These similarities gives us insight into the anatomy and behaviour of our ancestors.
 - Reasoning by analogy:
 - Natural selection leads to **similar organisms in similar environments**.
 - Assessing different behaviours and morphology in relation to environments allows us to see how **evolution shapes adaptation due to different selective pressures**.
- Behavioural traits humans share with primates:
 - **Warfare**: characterises humans however chimpanzees sometimes go to war to defend boundaries of their territories from intruders where they often attack and kill.
 - **Culture and Traditions**: culture is the transmission of traits and knowledge through social learning. For example: the way we eat differs where westerners use knives and forks to eat but asians use chopsticks. Chimps use stones to crack open hard nut shells.
 - **Fairness**: Humans act out of self interest however, they can sometimes care about the welfare of others. Such affection is also seen between many primates and their group mates.

SELECTION & ADAPTATION





- Primates arose 50 to 60 million years ago. It is a **"clade" that radiated from a single ancestry**.
 - **Ancestral**: retained form **ancestral groups**.
 - **Derived**: **newly arising traits** in focal taxon.
- They geographically spread due to the separation of continents where they under-went **adaptive radiation**.
- The **environments** acted as **strong selective pressures** for changes in their morphology and behaviour.
- **Mosaic nature of evolution**: **different traits evolve at different times and rates** so selection can be strong or weak resulting in many or very few variations within a population.
- Primates used to be restricted to tropical areas, below the equator. There have never been any primates known to exist in Australia except humans. Over time, some have colonised to cold climate temperatures.

CLASSIFICATION OF PRIMATES

- There are 380 primate species recognised.
- Sets of traits distinguish primates from others. We use these similarities for taxonomical classification.
- Clusters of same species are considered to be members of the same clade as they share a common ancestor.
- Primates are classified into two major groups: **prosimians (primitive** with less fully developed characteristics) and **anthropoids (more developed** characteristics).



Ancestral Traits Related to Primates	
<ul style="list-style-type: none"> - Vertebrae. - Homeothermic (unable to control our body temperatures including birds and mammals), - Hair and mammary glands - Arboreal and nocturnal. 	
Derived (Newly Arising in Taxon) Traits Related to Primates	
Prehensile (Grasping) Hands and Feet	<ul style="list-style-type: none"> - Grasping allows adaptation to arboreal lifestyle (hang from branches). - Humans don't have prehensile feet as we are bipedal so have lost some of this ability.
Opposable Big Toe	<ul style="list-style-type: none"> - Humans have lost this as we have become bipedal (walk on two feet).
Highly Developed, Stereoscopic Vision (Forward Facing Orbits)	<ul style="list-style-type: none"> - Binocular vision: fields of both eyes overlap (perceive same image). - Stereoscopic vision: each eye sends a signal to both hemispheres in the brain to create an image allowing us to judge depth and distance (3D vision). - Diurnal primates have colour vision, however nocturnal primates don't. - Bony socket forms around the eye over time (supports forward facing eyes).
Olfaction (Smell) Reliance is Reduced	<ul style="list-style-type: none"> - Decreased reliance on smell, reduction in sensory areas of brain and snout especially in diurnal primates. Now, they're more reliant on vision.
Nails (Replaced Claws)	<ul style="list-style-type: none"> - A claw is wrapped around a tissue whereas the nail sit on the top of the nail-bed. - Nails serve to protect sensitive skin at ends of fingers and toes. - They also have sensitive tactile pads on fingers and toes (can manipulate objects) which allows good contact with branches when they are locomoting on trees.
Unspecialised Teeth	<ul style="list-style-type: none"> - Teeth are used for processing food but also weapons in conflicts. - Teeth are hard and preserve well so allows us to make inferences about life history and behaviour of species that no longer live. - Dental formulas: number of each kind of teeth on the top over the number on the bottom. Humans have a 2123/2123 dental formula. - Size of canines have reduced over time (no longer required as weapons).
Larger Brain (relative to body size)	<ul style="list-style-type: none"> - Brain size increases with increase in body size. - We have developed these large brains because of the complexities of social life, ecological challenges faced and to avoid predators.
Number of Offspring	<ul style="list-style-type: none"> - Most primates only have one offspring at a time.
Prolonged Dependency of Young (Childhood)	<ul style="list-style-type: none"> - Most primates have offspring that require nurturing and caring for a longer period of time and therefore do not mature until later on (longer childhood).

Modes of Locomotion			
			
Vertical Clinging & Leaping (Tarsiers)	Quadrupedalism (Gorillas & Apes)	Brachiation (Early Anthropoids)	Bipedalism (Hominids)

Anthropoids		
General Characteristics	Catarrhini (Narrow Nose) Old world monkeys that live in Africa and Asia.	
<ul style="list-style-type: none"> - Nails (no grooming claws). Some nails look like claws. - Do not have a Tapetum Lucidum as they they are all diurnal (expect the owl monkey). - Fused mandible (lower jaw). - Short snout due to their reduced reliance on olfaction. - Continuous hairy, dry upper lip. - Fully formed post-orbital plate & bar. - Larger relative brain size than prosimians. 	Cercopithecoidea <ul style="list-style-type: none"> - Narrow, downward facing nostrils. - Dental formula is 2123/2123. - Bilophodont molars (4 cusps). - Tough skin at the end of their tail (ischial callosities) to prevent the nerves from being damaged. - Tails are never prehensile. - Females have sexual swellings which signify fertility. 	
Platyrrhini (Flat Nose) New world monkeys that live in South America.	Cercopithecine (Baboon & Macaque)	<ul style="list-style-type: none"> - Fruit eating & variable in size. - They live in large bisexual groups.
	Colobine	<ul style="list-style-type: none"> - Leaf eating with complex stomachs. - They lead an arboreal lifestyle.
Callitrichidae <ul style="list-style-type: none"> - Sexes monomorphic. - Live in small family groups of 5 to 10. - Most produce twins (have help from other family members to raise the child). - Molar reduction by one. Dental formula is 2132/2132. - Have claw like nails. 	Hominoidea	
Ceboidea <ul style="list-style-type: none"> - Prehensile tails so they can hang on branches to support their weight (unusual adaptation). - Dental formula is 2133/2133. - Have round, side-ways facing nostrils. - Capuchin monkeys use tools & have social conventions (traditions). 	<ul style="list-style-type: none"> - Large bodies with no tails (locomote using upper body). - Longer forelimbs than hind-limbs for brachiation. - Shallow chest, shoulder rotation and wrist joint flexibility. - Relatively larger brains. - Y-5 molar pattern. - Prolonged dependency on young (slow child development). 	
	Hylobatidae (Gibbons & Siamangs)	<ul style="list-style-type: none"> - Brachiators (swinging). - Monomorphic in size. - Dichromatism (colours vary). - East mostly fruit. - Monogamous (one male-female relationship). - Territorial; protect using vocal duets.
	Pongidae (Gorillas, Chimpanzees & Orangutans)	<ul style="list-style-type: none"> - Quadumanous; use hands and feet. - Cheek flanges (sexually selected). - Diurnal and arboreal. - Gorillas knuckle walk. They are terrestrial and feed on leaves. Western gorillas eat fruits. - Chimpanzees hunt other primates. They live in large mixed sex communities in small groups.
	Hominid (Apes & Humans)	<ul style="list-style-type: none"> - Bipedal locomotion. - Larger brain & central foreman magnum.