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ANT-A-2-CC-4-TH, Unit I : FUNDAMENTALS OF HUMAN ORIGIN AND EVOLUTION (Living Primates)

1.Living Primaters:

Introduction:

Monkeys, lemurs and apes are our cousins, and we all have evolved from a common ancestor over the last 60 million years. Because primates are related, they are genetically similar. Human DNA is, on average, 96% identical to the DNA of our most distant primate relatives, and nearly 99% identical to our closest relatives, chimpanzees and bonobos.

What do most living primates have in common?

- Large brains (in relation to body size)
- Vision more important than sense of smell
- Hands adapted for grasping
- Long life spans and slow growth
- Few offspring, usually one at a time
- Complex social groups

a.Definition of a primate

- Like many definition, the definition of what makes a primate (as opposed to a rodent, or a carnivore etc.) is complex. There is little argument as to the core groups of animals today that are primates as I will be illustrating later, but as one goes back in the fossil record, there is more dissension. Still, a purely descriptive definition is needed as a starting point:
- *Unguiculate, clavicate, placental mammals, with orbits encircled by bone; three kinds of teeth, at least at one time of life; brain always with a posterior lobe and calcarine fissure; the innermost digit of at least one pair of extremities opposable; hallux with a flat nail or none; a well developed caecum; penis pendulous; testes scrotal; always two pectoral mammae.* (Mivart 1873)
- Unguiculate - possessing nails, hooves or claws
- Clavicate - possessing a clavicle (collar bone)

- This has been brought up to date with little change by Le Gros Clark 1959:

b. General Characteristic of Primates:

Primates are an extremely diverse group of between 190 and 350 living species, depending on different taxonomic structures, and exhibit a wide range of characteristic features that help distinguish them from other mammals. They range in size from the 2-ounce pygmy mouse lemur to the 440-pound wild gorilla. Humans share many traits with the other primates in the group.

Hands and Feet

Almost all living primates have prehensile hands and feet, and most have five digits on these appendages, including opposable thumbs. With their hands and feet, many primates are able to perform different types of grips, whether holding food, or grabbing onto branches or trunks to hold on. Humans are the exception as their feet, while still pentadactyl, are not prehensile. The hands are particularly sensitive, adding to the sense of touch. Like many of the other defining characteristics of primates, these features add to the ability to live in trees successfully and efficiently.

Shoulders and Hips

Unlike many other mammals, primates have particularly flexible and limber shoulders and hip joints. The shoulders help them to have overarm movement, ideal for swinging through trees and being able to climb up and down quickly. Their hips are just as mobile, allowing them greater range of motion in their legs. These characteristics also evolved to aid in the primates' primarily arboreal lifestyle.

Brain

The brains of primates often is one of the most distinguishable characteristics from other types of mammals or animals. The olfactory region in primates has been reduced greatly in most species, such as humans, and the cerebrum expanded to accept the order's increasing reliance on sight and social behaviors. The areas of the brain that correlate with eye-hand coordination and stereoscopic vision are particularly large compared to other mammals.

Other Characteristics

Other primate characteristics include having a nail on the first digit although, in many cases, each digit has a nail instead of a claw. Primates also possess a clavicle, or collarbone. All primates exhibit the tendency to be erect; this trait is visible when even quadrupedal primates sit or stand. Most species also occasionally exhibit bipedalism, or standing on the two hind legs like humans.

movement ideal for brachiation(swinging movements).An adaptation to aid in primates' primary arboreal life. Reduced thumb for brachiation for most primates

Improved vision: Which is explained by the arboreal theory and visual predation theories. Large eye sockets placed forwards. Overlapping visual fields(binocular vision). Showing stereoscopic vision (depth perception) and colour vision.

Deemphasis on smell : The olfactory region in the brain and nose sizes(except lemurs) has been reduced greatly in most species and the cerebrum expanded to accept the increasing reliance on sight and social behaviors □ This gives primates a lesser prognathic jaw and flatter face.

Primate brain areas involving **eye-hand coordination**, stereoscopic vision and manual dexterity have expanded more. Bigger brains compared to all other mammals with more folds (gyri and sulci)

Lengthening of prenatal and postnatal cycles. : This improves gestational nourishment, there is reduction of litter with longer periods of learning. These periods are longer compared with other mammals. e.g Mouse lemurs -60 days compared to rodent mouse 20 days. This is for offsprings to be more mature for better survival. Long natural life spans. Baboons can live for upto 30 years. Chimpanzees can live for upto 50-75+ years with good medical care. This is due to the slower metabolic rates associated with slower rates of growth, aging and reproduction

Dental specialization: primates possess various sets of well formed and differentiated teeth which include Incisors, Canines, Premolars and molars for diet and nutritional efficiency . Decreased no. of teeth probably due to decrease in size of face and jaw. Primitive mammals dental formula 3.1.4.3 =44 teeth

Increased behaviour complexity: Social grouping Rhythmical sexual cycle Tendency to have erect bodies. This trait is visible when in primates sitting and standing postures. Most species exhibit bipedalism.