

5) CLASS MAMMALIA

HABITAT

Mammals are mostly terrestrial, but some mammals are adapted for life at sea, in the air, in trees, underground or on two legs.

MAMMARY GLANDS

Mammals are the animals in which females nourish their babies with milk produced by mammary glands to nourish the young.

FOSSIL RECORD

Because of possessing solid and hard bones and being the most recently evolved forms, the fossil record of mammals is more continuous and complete.

EVOLUTION

Mammals are believed to be evolved from reptiles. Ancestors of mammals lived simultaneously with reptiles in Jurassic Period and are called mammal like reptiles. A fossil animal (named *Varanope*) has been recovered from Texas which has 50% mammalian characters. The ancestors of mammals were of size of mice and lived on trees. Mammals became dominant in Cenozoic Period. Today we

are living in the 'Age of Mammals'.

GENERAL CHARACTERISTICS

Following are the general characteristics of mammals:

WARM BLOODED

They are homoiothermic or warm blooded animals.

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TETRAPODS

They are air breathing, tetrapods which are mostly terrestrial.

HAIR

Their body is covered with hair which is made of keratin. These hair insulate the body and help in maintaining temperature.

^{TA}PENDACTYLE LIMBS

Mammals have two pairs of ^{TA}pendactyle limbs which are adapted for walking, running, climbing, burrowing, swimming, gliding. In aquatic orders hind limbs are absent.

SKIN

Skin is glandular with sweat glands and sebaceous glands.

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EYES

Eyes are protected by movable eyelids.

EARS

Ears have an external pinna for collection of sound waves. Internal ear contains a set of three bones viz incus, malleus and stapes which are the smallest bones of the body.

SENSES

Sense of smell, taste and touch are also well developed.

TEETH

Teeth are present in jaws which have their root in the jaws. Mammals are ~~h~~ heterodontic, meaning all their teeth are of different shapes, except those with no teeth at all. Canine, incisors, molar and premolar type teeth are found in varying numbers in mammals.

The enamel coating on the surface of a tooth consists of prisms, solid rod-like structures extending from the dentin to the tooth's surface.

MOUTH

The Buccal Cavity (the mouth) has a false palate as a roof, meaning that the

noseails do not lead directly into the mouth.

TOOTH REPLACEMENT

Teeth are replaced once or (as in toothed whales and murid rodents) not at all, rather than being replaced continually throughout life.

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FUR

The fur of mammals are used for protection, sensory purposes, waterproofing, and camouflage, with the primary usage being thermoregulation.

INTELLIGENCE

Some mammals are intelligent, with some possessing large brains, self-awareness and tool use.

COMMUNICATION

Mammals can communicate and vocalize in several different ways, including the production of ultrasound, scent-marking, alarm signals, singing, and echolocation.

VIVIPAROUS / OVIPAROUS

Most are viviparous except monotremes which are oviparous.

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THERMOREGULATION

The body is maintained at a constant temperature. They generate heat with their bodies metabolically and also have special cooling mechanisms.

INTEGUMENTARY SYSTEM

The integumentary system is made up of three layers; the outermost epidermis, the dermis and the hypodermis.

i) EPIDERMIS

The function of epidermis to provide a waterproof layer. Its outermost cells are constantly lost; its bottommost cells are constantly dividing and pushing upward.

ii) DERMIS

The middle layer, the dermis, is made up of many components, such as bony structures and blood vessels.

iii) HYPODERMIS

The hypodermis is made of adipose tissues, which stores lipids and provides cushioning and insulation.

NERVOUS SYSTEM

Brain is well developed with 2 large cerebral hemispheres and 12 pairs of cranial nerves

RESPIRATION

Respiration takes place through lungs which are spongy in texture due to the presence of air sacs. Larynx is well developed with vocal cords.

CIRCULATION

Heart is four chambered and a complete separation of oxygenated and deoxygenated blood is maintained. Only left aortic arch is present. Colour of the blood is red due to the presence of haemoglobin in biconcave, nonnucleated RBCs.

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EXCRETION

Nitrogenous wastes are ~~l~~ filtered by highly glomerular kidneys and are excreted in the form of urine.

REPRODUCTION

Sexes are separate and sexual dimorphism is prominent in most mammals. Testes of male mammals lie in scrotal sac outside the body. Males have a copulatory organ 'penis' for depositing sperms deep inside the vagina of the female. Fertilization is internal and are mostly viviparous. Embryo is kept inside the body of the female for development, the process is called gestation. To absorb nutrition from the body of

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mother a glandular tissue develops between foetus and uterine wall of the mother in the form of placenta.

Parental care is highly developed in mammals. Mammals are also amniotes. The extra embryonic membranes help in the formation of Placenta

SUBCLASSES

Mammals are divided into three subclasses:

1. Subclass Prototheria or Monotremata
2. Subclass Metatheria or marsupials
3. Subclass Eutheria or Placentalia.

1. SUBCLASS PROTOTHERIA OR MONOTREMATA

HABITAT

Prototheria are restricted to Australian region and are found in Australia, Tasmania, New Guinea and their neighbouring islands.

CHARACTERISTICS

They are insectivorous, burrowing, nocturnal animals. In adults teeth are absent and a horny beak is found.

Ovoviviparous: Producing young by means of eggs which are hatched within the body of parent.

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BODY TEMPERATURE

Their body temperature varies between $25-28^{\circ}\text{C}$.

EGG LAYING MAMMALS

They are the most primitive mammals and are also called as egg laying mammals. They have certain characters of reptiles like they lay eggs but these eggs are kept in the uterus where they are fertilized and development takes place. In these mammals there is no connection between the body of mother and foetus for transfer of nutrients.

OVO-VIVIPAROUS

These mammals are more rightly be called as ovo-viviparous. The youngs are given birth in an immature form and are nourished by the teats present on the ventral side of the body in females until they grow enough to survive and start taking their own food.

EXAMPLES

Examples of these mammals are duck billed platypus (*Ornithorhynchus*) and spiny ant eater (*Tachyglossus*)

2. SUBCLASS METATHERIA OR MARSUPIALS

HABITAT

Marsupials are confined to Australian region with the exception of only one species, American opossum.

CHARACTERISTICS

Their body is covered with hair. They are ^{HABITAT}terrestrial, ^(make hole or tunnel)burrowing or arboreal (living in trees) in habitat.

POUCHED MAMMALS

These mammals are also called pouched mammals. Females of these animals bear a pouch or marsupium on the ventral side of the belly in which young ones are kept after hatching as they are born in a very under developed and immature stage. Teats of mammary glands are present in the pouch from which the babies suckle milk.

IMMATURE BIRTH

In these animals, placenta is not formed therefore, babies come out of the body earlier in immature form.

EXAMPLES

Examples are Kangaroo, Opossum, Koala etc.

3) SUBCLASS EUTHERIA OR PLACENTALIA

TRUE MAMMALS

✧ These animals are the true mammals having the highest degree of evolution of brain and body structures.

PLACENTAL MAMMALS

✧ They are also called placental mammals as placenta of different types is formed in these mammals with the help of which the developing embryo gets nourishment and oxygen from the body of mother and removes its metabolic wastes.

DEVELOPMENT OF YOUNG ONES

✧ Young ones develop inside the uterus to a relatively mature stage.

FEEDING

✧ After birth mother feeds them on her milk produced in the mammary glands with well developed teats.

TEETH

✧ Teeth are present in jaws.

* Cloaca is absent and urino-genital duct opens independently of rectum.

TESTES

* Testes are in scrotum hanging outside the body either throughout life or at least descend to scrotum during breeding season.

ORDERS

Eutheria are divided into sixteen orders. Some important orders with examples are given below:

1. INSECTIVORA

Feed on insects, includes moles and shrews.

2. CHIROPTERA

Flying mammals like bats, flying squirrels.

3. CETACAE

Aquatic mammals e.g. whale, dolphin, porpoises, sea lion etc.

4. CARNIVORA

Flesh eating like dog, cat, lion, wolves.

5. RODENTIA

Cutting habit like rats, mice, squirrel, beavers etc.

6. EDENTATA

Adults with no or poorly developed molar teeth like South American anteater, sloths.

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7. PHOLIDOTA

Body covered with large, overlapping, horny scales e.g. Penguin.

8. PROBOSCIDEA

Have a long trunk like elephant.

9. PERISSODACTYLA

Odd-toed hoofed mammals like ~~lion~~, ~~tiger~~, ~~elephant~~ etc. ^{horse, zebra}

10. ARTIODACTYLA

Even-toed hoofed mammals like cow, goat, deer etc.

11. PRIMATES

Mammals with highest brain development like lemur, monkeys, apes, tarsiers, human beings etc.

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