

PROTOTHERIA

AND

METATHERIA.

B.SC. PART-II

PAPER - III A (Hons.)

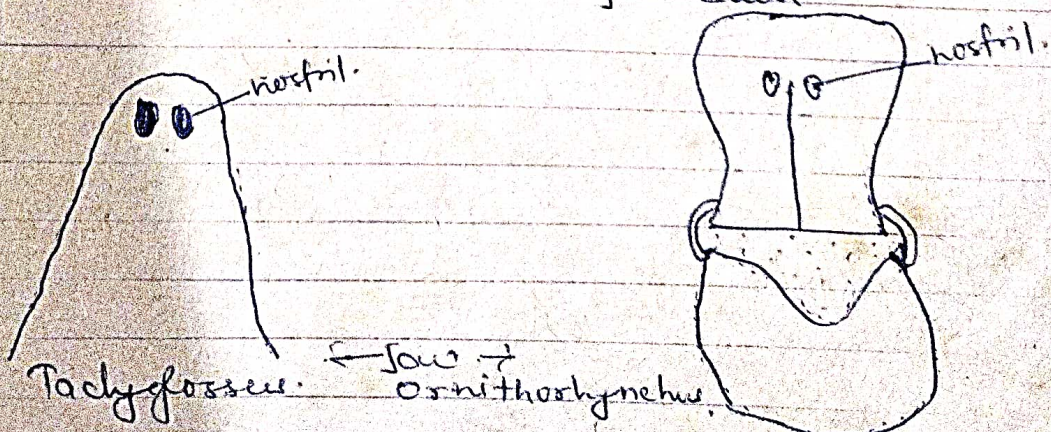
PROTOTHERIA & METATHERIA.

INTRODUCTION:- Mammals, the youngest baby of the animal family has overpowered the whole physical world by development of its brain since the time immemorial. Some of the mammals are deleterious, some are domesticated due to their helpful behaviour. But the infatuation of human being himself a mammal has crumble due to the nonsense behaviours of certain mammals. All these mammals from deleterious to the domesticated are grouped under viviparous (mammals laying the young ones) but the keenest mind of embryologist claimed that some mammals are oviparous (eggs laying mammals). All the mammals ranging from oviparous to the viviparous residing in the water, in the forests and on the ground are broadly grouped into three prototherians and Eutherians.

STRUCTURE PECULIARITIES OF PROTOTHERIA:-

External feature:-

- (i) Body small and thick covered with hairs, which are interspersed with strong pointed spines.
- (ii) The jaw form a long pointed snout or Rostrum which is tactile in nature in case of echidna, but in Ornithorhynchus the upper jaw forms a broad flat muzzle like beak of a duck.

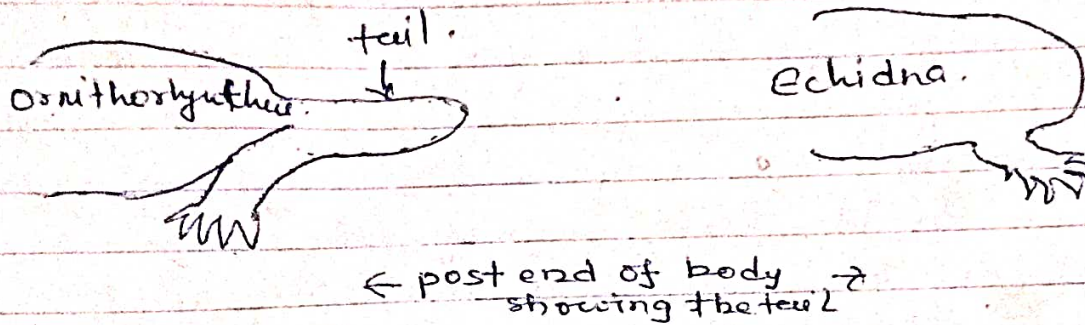


③ Ears have no external pinna.

④ Eyes are small with no nictitating membrane.

⑤ The tail is vestigial in case of Echidna, but in case of Ornithorhynchus the tail is short and broad.

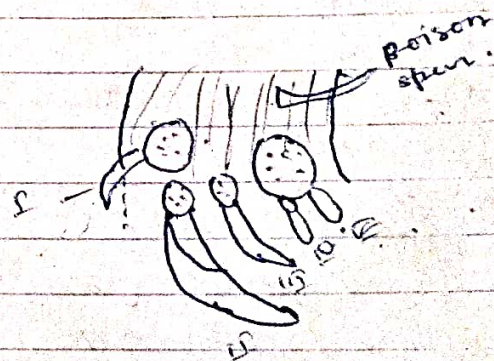
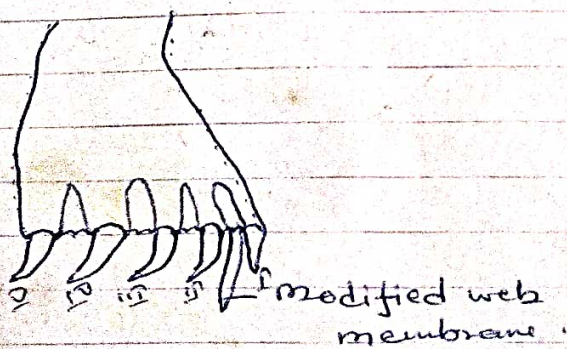
⑥



⑥ In case of Ornithorhynchus beyond the claws of forelimb is a web having leathery extension. The web is used for swimming.

⑦ In case of hind limb of Echidna the second digit has a long-curved toilet claw to clean the spines and hairs. In Ornithorhynchus the foot has a smaller web below the first digit the web forms a curious pointed prolongation.

⑧ In the hind limb of male there is a horny spur on the inner side of tarsus and a duct from a poison gland is the thigh opens into the spur. It is more developed in Ornithorhynchus than Echidna.



Ornithorhynchus ← post leg → Echidna

- ① Mammary glands are without nipples. The male also has mammary glands and secretes milk. This condition is known as lynxcomastism in which both parents share in feeding the young.

Body Cavity:-

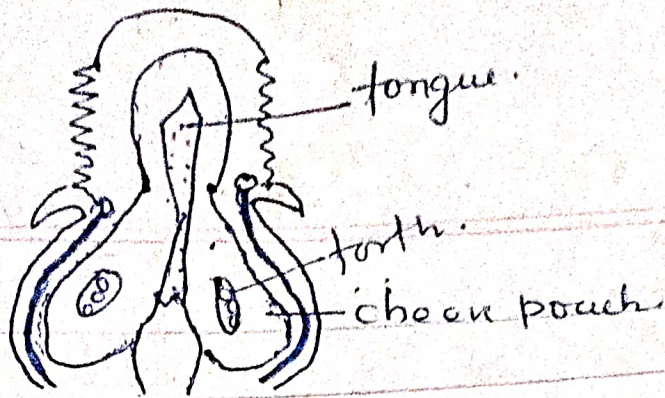
The body cavity is divided into the dorsal thoracic cavity and the ventral abdominal cavity by a horizontal muscular partition, the diaphragm.

Endoskeleton:-

- ① The skull is dicondylic and structures between the bones are not distinct.
- ② The alisphenoid bone is absent but ectopterygoid bone is present.
- ③ The tympanic bulla is absent and the malleus and ~~incus~~ are comparatively larger than ~~lower~~.
- ④ Each mandible is formed of a single dentary bone.
- ⑤ The vertebrae are without epiphysis and the ribs are single headed.
- ⑥ T-shaped interclavicle is present.
- ⑦ The pelvic girdle has an additional epipubic bone. Acetabulum is perforated and the ischia and pubis are fused at a ventral symphysis.

Digestive System:-

- ① Teeth are absent at any stage in echidna but in Ornithorhynchus the young ones bear the teeth and the adults possess epidermal plates which assist the process of mastication.
- ② Muzzle is used for capturing worms and molluscs from mud of river beds which can be in cheek pouches. Tongue is long.



Buccal apparatus to show cheek pouch.

- ③ In echidna there is a long protrusible tongue and large salivary gland. The posterior surface of the tongue has horny serrations which grind the insects. The saliva neutralizes the formic acid of the ants.

Circulatory System:-

- ① The heart is four chambered but the auriculo ventricular valve is incomplete and muscular.
- ② chordae - tendinae are absent.
- ③ only left aortic arch persists in the adults.
- ④ The R.B.C is non nucleated.

Nervous System:-

- ① Brain is poorly developed.
- ② The Corpus callosum is absent, but the anterior commissure is large
- ③ The Cochlea is less coiled.

Urogenital system:-

- ① The kidneys are metanephric and ureters open into urogenital sinus which does not traverse the penis.
- ② The testes are abdominal.
- ③ Penis consists of a spongy corpus spongiosum and corpus fibrosum and bears a groove for transmitting spermatozoa but not the urine.
- ④ Right ovary is reduced.
- ⑤ The oviducts open separately into the cloaca.
- ⑥ The vagina and uterus are absent.

STRUCTURE PECULIARITIES OF METATHERIA:-

External features:-

- ① Body is enclosed in a furry integument.
- ② The pinna is present.
- ③ Tail is long and prehensile. It acts as a balancing while running and also takes a firm hold of twigs etc.
- ④ Locomotion is bipedal with modifications in ilia and thigh muscles the kangaroo moves rapidly by long, erect springs of over 35 ft. by jumping the tail is used for balancing.
- ⑤ Hind limbs are long and powerful, the foot has four digits the hallux being absent. Second and third metatarsals and digits are thin and small these two digits are united together by integument so that the foot appears three-toed. The fourth metatarsal and digit are very large with a strong claw which is used in fighting the fifth toe is small.
- ⑥ In female the abdomen possesses a sac like structure the marsupium which carries under developed young.
- ⑦ Marsupium encloses the nipples of the mammary glands to feet the young ones.

Endoskeleton:-

- ① The skull is dicondylic and the structures are distinct. Alisphenoid bone is present.
- ② Tympanic bulla is formed by alisphenoid bone.
- ③ vertebrae have prominent anca, there are no cervical ribs sacrum is formed of a single vertebra.
- ④ pectoral girdle has large scapula with a spine coracoid is reduced, clavicles are large but there is no interclavicle.
- ⑤ Epipubic bones in the pelvic girdle are present.
- ⑥ Ischium and pubis are fused at the ventral symphysis.

Digestive System:-

- ① Teeth are peculiar in being monophodont and heterodont.
- ② Teeth are numerous in number with 3 incisor in each upper jaw and 3 in the lower jaw, there are 3 premolars, and 4 molars in each half of the each jaw molars have grinding surfaces.

Circulatory System:-

- ① The heart is completely divided into four chambers and the auriculo-ventricular valve is membranous.
- ② Each superior vena cava receives an azygous vein.

Nervous System:-

- ① The olfactory lobes are comparatively larger.
- ② The cerebral hemispheres are small and do not extend posteriorly over the cerebellum.
- ③ A corpus callosum is absent, but the anterior commissure is well developed.
- ④ The cochlea of internal ear is very much coiled.

Urinogenital System:-

- ① The kidneys are metanephric.
- ② The both sexes are ureter pairs between the genital ducts.
- ③ The testes are extra abdominal and lie in the scrotum in front of the penis.
- ④ The female possesses two vaginae and two uteri. which one is primitive? - Having a birds eye view on above mentioned accounts regarding the structural peculiarities of prototheria and metatheria it can be undoubtedly said that prototheria is more primitive than the metatheria on the basis of the following characters:-

slit on the body of echidna traversed by the
spines.

- ② Poison spur present on the hind leg.
- ③ Pinnae at the external ear are absent.
- ④ Structures in the skull bone are indistinct.
- ⑤ Tympanic bulla is absent.
- ⑥ vertebrae devoid of epiphyses.
- ⑦ Absence of uterus and vagina in the female.
- ⑧ Eggs laying in nature.
- ⑨ Absence of nipples in the mammary glands.
- ⑩ Cloaca is present.
- ⑪ Auriculo ventricular valve is incomplete and muscular.

Affinity with Prototheria - The developed characters are
having much similarities with Prototheria these
are given below.

- ① Cloaca is found.
- ② Corpus Callosum is absent.
- ③ Large olfactory lobes are found.
- ④ Epipubic bones are found in girdle.
- ⑤ Clavicle is found in pectoral girdle.
- ⑥ Similarities with Eutheria
 - ① There are no paracous; egg laying in nature.
 - ② Nipples found if mammary gland.
 - ③ Yolk is absent.
 - ④ cleavage is of holoblastic type.
 - ⑤ Pinna Present.
 - ⑥ Heterodont teeth are found.
 - ⑦ Lacrimal gland absent.
 - ⑧ Placenta are found.
 - ⑨ Uterus & vagina is also found.