

PROTOTHERIA

The sub-class Prototheria of the class Mammalia includes animals which are peculiar in having both mammalian and reptilian characters. It consists of only one order called - Monotremata divided into two families -

① Ornithorhynchidae ②

Ex - Ornithorhynchus or duck billed platypus

② Tachyglossidae - comprises two genera

- (i) Echidna
- (ii) Proechidna.

Distribution - The monotremes have a restricted distribution. They are now found in Australia and neighbouring islands of Tasmania and New Guinea.

Habit and Habitat - Nocturnal, burrowing, aquatic or terrestrial and oviparous mammals. feed mostly on insects. Echidna hibernates in winter.

3. External features - a) Body is covered with hair, Hairs on back are coarse or spine-like

b) Ear is without pinna

c) Poison spur is present in male

d) Tail may be present or absent

e) Mammary glands are without teats

f) Jaws are either beak-like or produced into a rostrum.

4. Body cavity - A muscular diaphragm is present between the thoracic cavity and abdominal cavity.

5. Skeleton - The skull cavity is large, cranial wall thin and smooth. Sutures between bones are obliterated.

c) Tympanic bone is annular and slides and does not form a bulle.

a) Lacrymal and alisphenoid are absent -

e) Malleus is large but Incus is small,

- Mandible is slender
- Vertebral are without Epiphyses
- Ribs are with capitulum only
- (i) Coracoid and epicoracoid bones are well developed.
- (ii) A-T shaped interclavicle is present -
- (iii) Acetabulum is perforated
- (iv) An epipubic bone is present -
- (5) Digestive system (i) Tongue is long and sticky (ii) Saliva is thick for capturing insects (iii) Alimentary canal ends in a cloaca.
- (7) Circulatory system (i) Four-chambered heart -
- (ii) Right auriculo ventricular valve is incomplete - and fleshy.
- (iii) Chordae tendineae are absent -
- (iv) Only left aortic arch persists -
- (v) Ribs are non-muscled
- (vi) An anterior abdominal vein is present in Ecdidae.
- (vii) Body temp. varies from 25°C to 28°C .
- (viii) Imperfectly warm-blooded.
- (8) Respiratory system - Respiration is pulmonary (= by lungs)
- (9) Nervous system (i) Brain simple (ii) Corpus callosum is absent - (iii) A large anterior commissure is present (iv) Cochlea is less coiled and possesses a lagena. (v) Cerebrum is smooth in Orthorrhynches but convoluted in Ecdidae.
- (10) Urogenital system - (i) Metanephric kidneys
- (ii) Ureters open into a Urogenital sinus
- (iii) Testes are abdominal
- (iv) In male an erectile penis, made of corpus spongiosum and corpus fibrosum, is present.
- (v) Right ovary is reduced.
- (vi) The oviducts open into the urogenital sinus in front of the ureter.
- (vii) Uterus and vagina are absent -
- (viii) Females are oviparous.

Development - (i) Fertilization is internal

(ii) Eggs have much yolk.

(iii) Egg shell is leathery and tough. (iv) cleavage is meroblastic
(v) NO uterine gestation occurs (vi) Modified sweat glands produce milk on which young ones are fed.

Affinities of Prototheria

The prototheria are primitive mammals and possess a peculiar mixture of reptilian and mammalian characters. They represent an intermediate stage between two classes of vertebrates and provide the living basis for reptilian ancestry of mammals.

Reptilian affinities - The prototherians possess a number of characters that are shared by the reptiles and are as follows:-

- (i) External pinnae absent
- (ii) Tympanic bone is annular and does not form a bulla.
- (iii) Sutures between skull bones obliterated.
- (iv) Epiphyses absent
- (v) Ribs single headed
- (vi) T-shaped interclavicle present
- (vii) Separate pterygoid
- (viii) Clavicles, coracoids and procoracoids well developed.
- (ix) Ischia and pubes form a ventral symphysis.
- (x) Acetabulum perforated
- (xi) Presence of cloaca.
- (xii) The right auricle ventricular valve is complete and fleshy
- (xiii) Corpus callosum absent
- (xiv) Taste abdominal
- (xv) Distinct vagina and uterus absent
- (xvi) Females oviparous.
- (xvii) Eggs yolk; cleavage meroblastic.
- (xviii) Development of fetal membranes of reptilian type.

Affinities with Marsupials

The prototherians share the following characters with Marsupials:-

- (i) Similar skull structures
- (ii) Marsupial bone present in both

Mandibular inflexion similar

Footes of monotremes resembles that of marsupials

Lactation is similar.

On the basis of their similarities Gregory (1947) included both the groups in a sub-class - Marsupiontia. However, the accepted view is that the prototherians originated from the main line of mammalian evolution and not from a pre-marsupial stock.

Affinities with Mammals

Though monotremes share a no. of reptilian characters yet they possess many distinctly mammalian features & follows: -

- (i) Presence of hair on the body
- (ii) Presence of a diaphragm.
- (iii) Presence of mammary glands.
- (iv) Dicondylic skull
- (v) Mandible is formed of dentary alone
- (vi) Presence of three ear ossicles
- (vii) Cervical vertebrae seven.
- (viii) Liver lobes typically mammalian.
- (ix) Heart four chambered.
- (x) Brain with four optic lobes.
- (xi) Cerebellum well developed.
- (xii) Fertilisation internal.

The mammalian features clearly indicate that monotremes are mammals though lowly organized and should be treated as a separate sub class due to presence of reptilian features in them. It is held that monotremes evolved from the early mammal like reptiles but failed to complete the evolutionary transformation of higher mammals.

The current view as to the systematic position of monotremes is that they represent the end product of a slender evolutionary line of mammal like form that originated from some different mammal like reptilian stock and not from the main stock of mammalian evolution. As such they cannot be regarded as ancestry to higher mammals.