

# Derivatives of Integument

Both the dermis and epidermis are involved in the skin derivatives, which include several types of sense sensory structures, scales, bony plate, teeth, keratinized scales, nails, feathers and hairs etc.

The epidermal derivatives may be soft (glands sensory structures etc) and hard (feathers, hairs and nails)

## Derivatives of Integument in different groups

### ① In Cyclostoms.

Unicellular glands, secretory mucous cells, thread cells bladder cells are the only derivatives of Integument. Hard derivatives are absent, however they possess horny ectodermal teeth.

### ② In fishes.

#### Ⓐ Soft epidermal derivatives include

- (i) Mucous glands (helps the slime of surface)
- (ii) Poison glands in association with spines of the fish tails or gill covers.
- (iii) Pterygopodial glands in the claspers of male elasmobranch
- (iv) Photophores (in deep sea fishes) = modified mucous gland.

#### Ⓑ Dermal derivatives (= scales form exoskeleton + fin rays)

The scales in fishes are of following type.

- ① Placoid scales - found in elasmobranch fishes. They are minute with bony plate and the spine. The inner surface of the bony plate bears an opening which leads into a pulp cavity. The spine is composed of dentine which is coated with hard enamel. The bony plate and the dentine are derived from mesoderm while the enamel is an ectodermal derivative.
- ② Cosmoid scales - occur in coelopterygian and in the

Dipnoi. They are characterized by the presence of buds of dentinal tubules. It has an outer enamel layer below which is a layer of dentine, the cosmine, which contains dentinal tubules arising from the central pulp cavity. Below the dentine is spongy bone which is followed by lamellar bone.

(iii) Ganoid Scale - composed of bone, which is covered with a shiny substance called ganoid, without enamel; occurs in actinopterygians.

(iv) Cycloid scale - thin, rounded scales, occur in many bony fishes. These are set in pockets in the skin. Each scale has concentric lines of growth.

(v) Ctenoid scale - similar to cycloid. except they are having rows of spines at their hinder part (edges); forms the covering of many bony fishes.

Dermal fin rays are the dermal derivatives of integument which support the fins of the fishes.

(3) In Amphibia -

(a) i) Multicellular glands remain embedded in the dermis. Secrete mucus.

(ii) poison gland - also embedded in the dermis; larger than mucus glands; in toad aggregation of poison glands forms the parotid glands.

(iii) Sensory epidermal papillae - occur in most amphibians. These are formed of groups of enlarged cells associated with nerve endings.

(b) Among the dermal derivatives, they are only found in Apoda or Gymnophiona. lie embedded in the dermis.

(5) In Reptiles - <sup>scaly</sup> without glands; certain special glands occur in different reptile species.

(i) Femoral gland - found in a row along with post-ventral margin of the thigh of male lizard; becomes a sticky substance during the reproduction period and secretes

① Inframaxillary and cloacal scent glands - occur in alligator; functional during reproductive period. Hair derivatives are Keratin scales; form a continuous cover over the body.

In lizards there are two types of epidermal scales

(i) larger (ii) smaller. Some large and many small scales bear sensory structures, the papillae.

The claws of reptiles are keratinized epidermal structures helps in walking and protection.

Bony plates are the dermal derivatives.

⑥ In Birds. Uropygial gland, which opens on a papilla above tail are the only integumentary glands. Secrete a kind of oil, which is used by bird to condition the beak and feathers.

Claws are of reptilian structures. The horny beak of birds are formed of large epidermal scales, covering a the jaw bones.

Feathers are epidermal derivatives, adapted to the need to the birds. Since it is light weight and strong. They serve both as a flight-structure and as an insulator.

⑦ In Mammals

Soft epidermal derivatives of mammalian integument are.

(i) Sweat-glands - found over most of the body. They are long, coiled and tubular glands, which extend from the surface far down into the dermis. Sweat glands secrete sweat, which contains salt, urea and other waste products. It helps in temperature regulation.

(ii) wax producing gland - In mammalian ear (modified sweat gland)

(iii) Mollis gland - eyelids of mammals (modified sweat gland)

(iv) Sebaceous gland - associated with hair follicles. They are simple, branched alveolar glands. Their oily secretion (sebum) is a protection and lubricant for hair & skin

(v) Meibomian glands - associated with eyelids, similar to Sebaceous gland.

(vi) Scent-gland - found in anal region, probably derived from Sebaceous gland. They serve for recognition of partners

...ing making  
Mammary glands: Compound, tubular glands, inactive in male  
but secrete milk in females.

- (i) Hair epidermal derivations.
- (ii) Horns - found in hoofed mammals. The horn of the rhinoceros are formed of hairs which are fused together.
- (iii) Hoofs - occur in ungulate mammals which run on their toes.
- (iv) Nails and claws. - found at the ends of the fingers and toes, almost alike. Nails are broadened and flattened whereas claws are narrow and distally and curve downwards beyond the tip of the toe.
- (v) Horny epidermal seals. occur on the legs and tails of a

Variety of mammals  
(v) Hairs - characteristic feature of mammals, formed of keratinised epidermis. At the base portion - a root, which embedded in the dermis at the shaft. May modified into spines (Cactus, porcupine); the hair forms insulating device. Hair are mammalia analogue to the avian feather.

(v) Teeth. Considered to be homologous to fish scales. Some part of the tooth develops from the epidermis as seen from dentin. Enamel covering is epidermal origin, while dentine and pulp cavity - are of dermal origin.

Functions of Integument - (i) covering of the entire body (ii) protect body from injury and prevent loss of moisture. (iii) prevents entry of germs. (iv) acts as a barrier to free exchange of material with environment (v) temperature regulation (vi) skin acts as respiratory surface. (vii) function as an excretory organ (viii) seat of abundant sensory structures. (ix) cover is defense and offense like horns, plates, scales, hairs, horns, nails etc. (x) show protection. Colocation, this it protects from the sun's rays. (xi) helps in locomotion. (xii) scales, wings, tail, wings etc) (xiii) involved in formation of dermal boss.

Considering the variety of functions performed by the integument it is rightly called 'jacks of all trades'.