

DII / Paper IVth ①

EPIDERMAL DERIVATIVES OF INTEGUMENT

The integument is the covering of the body. The term integument includes the skin and its derivatives. Since the integument lies in direct contact with the external environment, it is modified in various ways in different groups of vertebrates. In all groups of vertebrates the integument consists of two layers - an outer epidermis and deep lying dermis or corium. Both the dermis and epidermis are involved in the skin derivatives which includes several types of glands, sensory structures, scales, bony plates, teeth, keratinized scales, nails, feathers and hairs etc.

The epidermal derivatives may be divided into soft (eg. gland, sensory structures etc.) and hard derivatives (eg. feathers, hairs, nails etc.).

The derivatives of integument in different groups of vertebrates are as follows:

IN CYCLOSTOMES:

- i) Unicellular glands such as mucous cells, thread cells, bladder cells are the only derivatives of integument.
- ii) Hard epidermal or dermal derivatives such as scales are absent in this group. They, however, possess ^{horny} ectodermal teeth within the oral hood.

IN FISHES:

- The epidermal derivatives of fish include:
- i) Mucous gland → It is unicellular or multicellular gland, the secretion of which furnishes the slime on surface.
 - ii) Poison glands: It is associated with spines of the fins, tail or gill covers.
 - iii) Parathyroid glands: found in clasper of male elasmobranch.
 - iv) Photophores or luminous glands: It is modified mucous gland and found in deep sea fish.

IN AMPHIBIA:

- In Amphibia the soft epidermal derivative includes:
- i) Multicellular mucous glands: Multicellular glands remain embedded in dermis. They secrete mucous which is

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released to the outside through pore on the skin.
ii) Poison glands: poison glands also lie embedded in the dermis and are larger than the mucous glands. However, these are fewer in number. They function as a predation deterrent. In toads the accumulation of poison glands form the parotid glands.

IN REPTILES:

The reptiles are without epidermal glands. However, certain special glands occur in reptiles such as

i) Femoral glands: These glands are found in a row along the postero-ventral margin of the thigh of male lizard. These glands function during the reproductive period and secrete a sticky substance.

ii) Inframandibular and cloacal scent glands:

These occur in alligator. These also become functional during reproductive period.

Hard Epidermal derivative of reptiles:

i) Hard epidermal derivative of integument of reptiles are the keratin scales. The epidermal scales form a continuous cover over the body but become thinner in the grooves between the scales.

ii) In lizards there are two types of scales. Large and small. Some large and many small scales bearing sensory structure, the paratrich, which is supposed to be precursor of mammalian hairs.

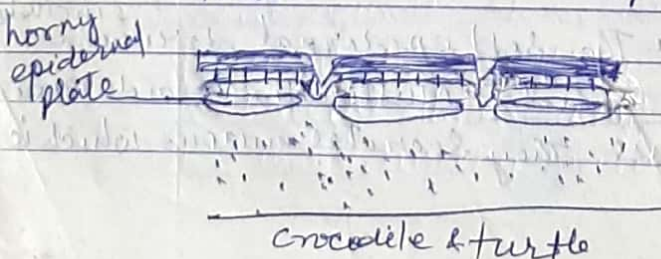
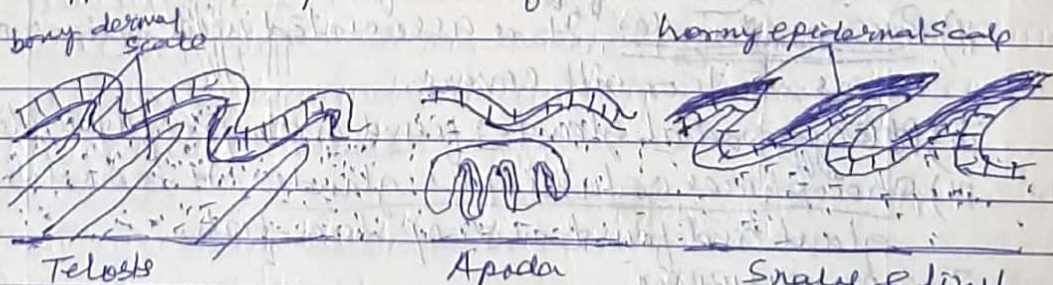


Fig - V.S. through skin showing epidermal scales in vertebrates

IN BIRDS:

i) The epidermal glands of birds includes uropygial glands which open on the papilla above the tail. These glands secrete a kind of oil which is used by the birds to condition the beak and feathers.

ii) In birds, the epidermal scales are found on their claws and feet. These claws are typically reptilian in construction and help during walking and perching. The horny beaks of birds are formed of large epidermal scales which form a hard covering on the jaw bones.

iii) The feathers are another very important epidermal derivative of birds. It is light, warm and strong, it is adapted to the needs of birds. They serve both as flight structures and as an insulator. Feathers are modified reptilian scales.



Quill Feather



Filoplume



Down Feather

Fig - Different types of feathers

THE PANCREAS

The pancreas is a large, elongated, glandular organ situated in the abdominal cavity. It is the only gland in the body that produces both digestive enzymes and hormones. The pancreas is divided into three main parts: the head, the body, and the tail. The head is the largest part and is located near the duodenum. The body is the middle part and is located in the center of the abdominal cavity. The tail is the smallest part and is located at the end of the pancreas. The pancreas is surrounded by a layer of connective tissue called the capsule. The capsule is made up of two layers: an outer layer and an inner layer. The outer layer is made up of fibrous tissue and the inner layer is made up of epithelial tissue. The pancreas is supplied with blood by the pancreaticoduodenal artery and the splenic artery. The pancreaticoduodenal artery branches into the superior pancreaticoduodenal artery and the inferior pancreaticoduodenal artery. The splenic artery branches into the splenic artery proper and the pancreatic artery. The pancreatic artery supplies the pancreas with blood. The pancreas is also supplied with lymph by the pancreaticoduodenal lymphatic vessels and the splenic lymphatic vessels. The pancreas is innervated by the vagus nerve and the splanchnic nerves. The vagus nerve supplies the pancreas with parasympathetic innervation and the splanchnic nerves supply the pancreas with sympathetic innervation. The pancreas is a vital organ and its dysfunction can lead to serious health problems. The most common pancreatic disease is pancreatic cancer, which is a leading cause of death. Other pancreatic diseases include pancreatitis, pancreatic cysts, and pancreatic islet cell tumors. The pancreas is a complex organ with many functions and it is important to understand its anatomy and physiology in order to diagnose and treat pancreatic diseases.

- I) Exocrine glands: In the majority of the pancreas, the acinar cells are arranged in a grape-like cluster and secrete digestive enzymes into the duodenum through the pancreatic duct.
- II) Endocrine glands: A small group of cells called the islets of Langerhans are scattered throughout the pancreas. These cells secrete hormones directly into the bloodstream.
- III) Islets of Langerhans: These are small, rounded clusters of cells that are located within the pancreas. They are named after the German physician and pathologist, Paul Langerhans, who discovered them in 1869. The islets are composed of several types of cells, including endocrine cells that secrete hormones and exocrine cells that secrete digestive enzymes. The islets are surrounded by a layer of connective tissue called the capsule. The islets are supplied with blood by the pancreaticoduodenal artery and the splenic artery. The islets are innervated by the vagus nerve and the splanchnic nerves. The islets are a vital part of the pancreas and their dysfunction can lead to serious health problems. The most common islet cell tumor is insulinoma, which is a benign tumor that secretes insulin. Other islet cell tumors include glucagonoma, somatostatinoma, and VIPoma. The islets are a complex organ with many functions and it is important to understand their anatomy and physiology in order to diagnose and treat islet cell tumors.
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vii) Mammary glands:

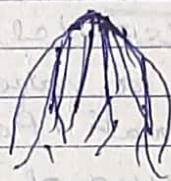
i) These are compound, tubular glands, inactive in male but secrete milk in females. ~~They are thought to be specialized sweat glands.~~

ii) In monotremes, the mammary glands lack nipple or teat. In other mammals they possess nipple and are modified sebaceous glands.

iii) Nipple or teat may be true teat (man, apes) in which ducts of mammary glands open separately on the nipple. In false teats (ungulates) all ducts empty into one cisterna from which a single tube leads to the tip of nipple.



Mammary pocket
(Echidna)



True teat



Primary or pseudoteat

Fig - Types of mammary glands.

③ Hard epidermal derivatives of mammalian integument

(i) Horns:

The horns are found in hoofed mammals. The horn of the hippopotamus are formed of hairs which are fused together.

(ii) Hoofs:

The hoof occurs in ungulate mammals which are found on the toes.

(iii) Nails and claws:

These are found at the ends of the end of the fingers and toes. Nails and claws are striking alike except in form.

The claw is narrow distally and curved downwards beyond the tip of the toe. The nail is broadened and flattened claw.

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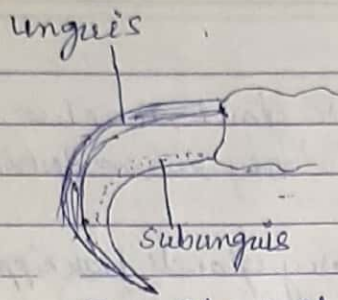


Fig. Claw of Eagle.

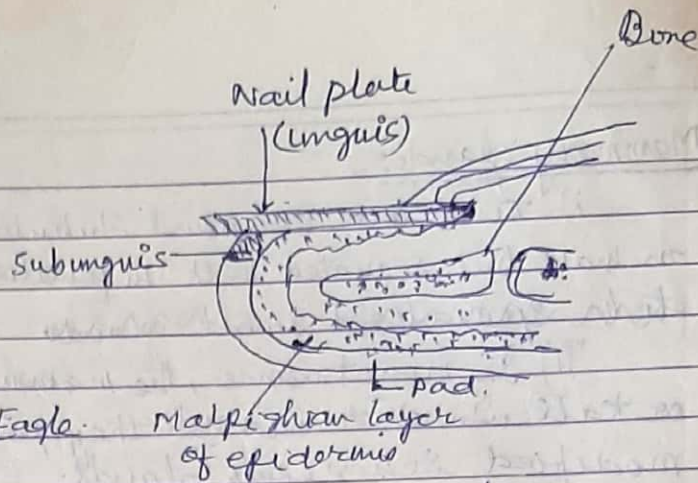


Fig. Section of finger of man.

~~sub shown~~

The horn, hoofs, nails and claws are formed by the stratum-corneum.

(v) Horny epidermal scales:

Like reptiles, these occur on the legs and tail of a variety of mammals. Among mammals, Pangolin has a complete body covering of large horny scales.

(vi) Hairs:

Hairs are characteristics of mammals. They are formed of Keratinized epidermis. They generally cover the whole body but certain mammals eg. whale, seal etc. have only a few hairs, restricted to snout.

A hair has two parts - a root which lies embedded in the dermis and the projecting shaft. Hairs may be modified into spines as in Echinodna, hedgehog, etc. The hairs serve as insulator device.

Conclusion:

From the above discussion it has been observed that, skin itself is relatively simple but its derivatives are numerous and complex.

