

INTEGUMENT (= skin or cutis)

The integument is the covering of body. It lies in direct contact with the external environment. Hence, it is modified in various ways in different groups of vertebrates.

It consists of

- 1) Epidermis - outer layer
- 2) Dermis - deep-lying layer.

Both epidermis and dermis may be involved in the skin derivations such as scales, hairs, feathers, bony plates, various glands etc.

General structure of Skin

- 1) Epidermis - Outer, thin layer, of ectodermal origin which forms a continuous epithelium over the entire body. This layer may contain sensory cells, light-organ etc.

Divided into two sub layers.

- a) an outermost layer of dead cells called stratum corneum
- b) inner layer is Malpighian layer of stratum germinativum

The cells of Malpighian layer give rise to the cells of epidermis. The epidermis usually does not have blood and nerve supply.

- 2) Dermis - lies immediately beneath the epidermis. It is largely composed of fibrous connective tissue and contains different varieties of cell elements. The dermis is richly supplied with blood vessels, lymphatics and nerves.

Integument - in different groups of vertebrates

The integument presents many different conditions in different groups of vertebrates -

In Cyclostomes . (lamprey and hag fishes)

Integument is many layered. The innermost layer is the malpighian layer which rests upon a thin basement membrane.

In lamprey - the outermost layer of the epidermis is thin cuticle. Epidermis contains sensory granular and club-shaped secretory cells. The upper layers of the epidermal cells below the cuticle is modified into calcareous cells.

In Myxine - epidermis contains bladder cells. The outermost layer of the epidermis is that of mucous slime. Dermis is lamprey's stratified into outer thick and inner thin layer of prism cells.

(2) In fishes - The skin of fishes is rich in mucous glands which form a protective mucus coat over the skin. Some elasmobranchs and a number of teleosts have poison glands usually associated with the fish spines of the fins. Light producing organ photophores may also be present, particularly in deep sea dwelling fishes. Stratum corneum is absent in fish.

a) In elasmobranchs - epidermis is composed of many layers of epithelial cells, interspersed mucous gland. The tips of the placoid scales extend out throughout the epidermis.

Dermis has following three layers.

(i) Stratum laxum - outer layer below the epidermis, free from fibres.

(ii) Stratum compactum - Middle layer of the dermis, consists of laminated fibres.

(iii) Subcutaneous layer - Innermost layer, contains a network of fine fibres.

In teleosts - Epidermis is stratified and contains abundant mucous glands. It may be unicellular or multicellular. Granule secreting and club cells are also found in epidermis. The granule cells originate a large Leydig's cell in club cells from the intercellular matrix of the matrix of the epidermis. The epidermis is dotted by sensory organs called feel organs.

Dermis is composed of fibrous connective tissue and contains network of blood capillaries. It can be divided into outer and inner layer. Outer is composed of loose areolar tissue and contains the scales or scum by scattered fat cells and pigment cells. Inner layer is densely fibrous. The dermis of bony fishes encloses the scales lodged in pouches.

The dermis of many bony fishes contains sensory colour of chromatophores and granules containing iridocytes (responsible for the silver color of many fishes).

③ In Amphibians - Moist and frequently slimy skin. Stratum corneum, firmly apposed in the group. It is apparently due to tanninoid material.

The epidermis has many layers of cells.

Innermost - stratum germinativum

Outer most - stratum corneum.

In total stratum corneum is thicker. It may be in the epidermis possess sensory papillae. Below the epidermis is a thin basement membrane.

Dermis, relatively thin and is made up of two layers - upper loose - spongy spongy and inner compact stratum compactum.

The pigment cells of chromatophores are found in the upper portion of the dermis. Besides in the dermis are found mucous and poison glands which are epidermal.

feiratives. The dermis is richly supplied with blood vessels. The integument of amphibians does not have scales except in the Gymnophions, where skin is thick and contains groups of dermal scales.

④ In Reptiles - It's thick, dry and covered with keratinized epidermal scales or bony plates of dermal origin. It has almost no glands.

The epidermis is many layered with well developed stratum corneum. The epidermal glands occur only in a few cases such as femoral glands in lizards and cloacal scent glands in alligators.

epidermal covering is periodically shed (ecdysis) in lizards and snakes.

Dermis is thick and has an upper and lower layer. The upper layer contains abundant chromatophores in snakes and lizards. Lower layer is composed of connective tissue fibres.

⑤ In Birds - It's thin, dry, loose fitting, devoid of glands. The only glands are uropygial glands, just above the tail. The skin is covered with feathers.

The epidermis has a basal malpighian layer and an outer stratum corneum. It's delicate, except on shanks and feet where it's thick and forms epidermal scales. Epidermis has great ability to produce keratin, responsible for the formation of feathers and scales.

Dermis is compact and is made up of connective tissue, muscle fibres, nerve fibres, blood capillaries and hair cells. No pigment cells. Pigment occurs only in feathers and scales.

⑥ In Mammals - Thick, elastic and waterproof. It has an outer layer of flattened keratinized dead cells, the stratum corneum. The sequence of cell layers in epidermis is as follows: _____

- (i) Basal, stratum germinativum, which rests upon a basement-membrane.
- (ii) stratum spinosum (iii) stratum granulosum
- (iv) stratum lucidum (v) stratum corneum - outer layer of dead keratinized cells.

Mucus glands are absent in the epidermis of mammals. The dermis is greatly developed in mammals. It is made up of loose connective tissue, blood vessels and nerves.

The upper part of the dermis just below the epidermis contains dense mat. of fibres parallel to the surface. This layer is called papillary layer.

In the dermis the following structures of epidermal origin are found.

- (1) Hair follicle - formed by the penetration of epidermis into dermis. It lodges the hair papilla from which emerges the hair.
- (2) Sebaceous gland - flask shaped gland which opens into the hair follicle. These secrete only an oily substance, Sebum.
- (3) Sweat gland - these are coiled coiled tube like glands which open through pores on the surface of the skin.
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