

Hello students in this unit integumentary system, we're going to discuss the introduction to integument derivatives under module number 5.

The outline is we're going to discuss the derivatives of integument and its types on the basis of their origin. The student will be able to understand the concept of derivatives of integument and differentiate between the epidermal and dermal derivatives and also the soft and hard derivatives of epidermis.

Integument is a complex structure comprising of two layers, the epidermis and the dermis. These layers take part into formation of derivatives of various forms and complexity.

Integumentary derivatives are the structures that arise from the epidermis and the dermis. To be specific, they arise from the stratum corneum and the stratum germinativum of epidermis. They play various roles in the body, such as to protect the body from various kind of damages such as mechanical injuries or entry of pathogen into the skin or the impact. Various colorations to the skin, such as warning colorations, or camouflage.

Depending upon the layer of origin they are divided into epidermal and dermal derivatives. They can be of various types such as soft derivatives and hard derivatives, epidermal derivatives, maybe of both the types. They can be soft or they can be hard, whereas the dermal derivatives are exclusively hard derivatives. The soft derivatives include the epidermal glands and the hard derivatives include keratinized derivatives of epidermis and the dermal hard derivatives. The epidermal soft derivatives are the integumentary glands or the epidermal glands which arise from the active layer of the epidermis, which is known as stratum germinativum, also known as the malpighian layer. This active layer helps glands to remain active and also adds to its secretory value. The glands are located in the epidermis or the dermis, though they arise from the epidermal part. They reside deep into the deeper layers of the dermis, and this is because the dermis has a rich supply of blood vessels which provide raw materials for the secretions.

The glands are further classified into various types, on the basis of their structure and functions. The epidermal hard derivatives that are hard by the virtue of the keratinized nature. Keratin is a waterproof protein that deposits onto the cells during a process known as keratinization. This keratinization forms a cornified layer known as the stratum corneum onto the epidermis, which gives rise to the keratinized hard integumentary derivatives. The hard horny structures can be of following types.

Epidermal scales.

The epidermal scales are found in reptiles such as lizards, snakes, turtles and crocodiles. First picture shows a picture of epidermal scales on a turtle carapace. For example, in a bird, beak is an organ of feeding. There are modifications of beaks seen according to their feeding habit. For example, in this picture the tip of the beak is curved. It is having a curvature that is to fit the requirements of the bird. Feeding requirements of the bird. In this case it is a carnivorous bird, so tearing off the flesh pieces from the prey becomes easier due to this kind of a beak.

Horns, horns, a keratinized structure found mostly in the ungulates such as cows or deers etc. These horns are borne on the head and they are mostly used for defence purposes.

And during sexual courtship behavior, they are used as displays for mate attraction also.

Digital cornifications include the nails, hooves and claws.

In this picture we can see the claws of a bird. The claws are a curved digital cornification that covers the digital parts of the forelimb or hindlimb. The claws help the bird to capture prey and to even grab certain substratum.

Nails are of letter counterpart of the claws which help in picking up food or picking any other thing through digital tips. Who gives a slight, slightly modified version of the other two digital qualifications? That is the hooves. Encase the entire digital end of the limbs. The hooves are specific to ungulate, such as cows, sheeps, or pigs.

The hooves also maintain a weight balance and because most of them are heavy weighted organisms, they also balance their body posture. The hooves are also known to maintain to absorb the impact which is caused due to running or walking in the ungulates.

Feather and hair are the keratinized structures that form a coat over the body surface. These structures are there on the body surface to impart protection from water loss or water gain, or even temperature alterations. Basically, they provide an insulation from cold and heat and also protect from injury. To be specific, feathers are a characteristic feature of birds and feathers, as seen can be of variable colorations, and most of the times the male of the birds are variably colored, and that is used during displays for courtship behavior.

Dermal derivatives, as the name suggests, that arise from the dermis. And the dermal derivatives can be comprising of dermal, Bony scales of fishes and amphibians. In fish is as we have seen. Most of the fish is are covered with scales all over their body and that too in overlapping fashion. The scales can be placoid, cycloid or ctenoid type, and they impart protection from pathogens, attack or even they impart hydrodynamic advantages to the fish.

The scales of amphibians are restricted only to limbless amphibians and their embedded into the deeper parts of the dermis. The scales or osteosclerites or the dermal scales. In reptiles for example the carapace of turtle is a bony derivative of the dermis, and the bony part epidermal scales are present. This bony carapace is fused with the vertebral column and imparts a lot of protection to the soft body of the turtle.

A classic example of dermal scales of mammals is this picture that is of an armadillo. The armadillo has a bony armor around its body, which helps, which gives it a lot of protection.

Antlers. Antlers are a type of horn, but they are dermal derivatives or a dermal extension of the frontal bone.

The frontal bone outgrowth. These are often branched and it is found that the number of branches increases with the age of the animal.

They are found in the giraffe and the deer, but in the giraffe that permanent outgrowths and they are found in both the sexes. But in the deer they found only in the male, as in this picture. This is a male deer.

They are shared periodically and in both the giraffe and the deer. During mating season, they act as a secondary sexual character and are displayed beautifully to attract a female. Also, the Bony core of hollow horns of cows are dermal ossifications.

This references can be used for further reading. Thank you.