



✓ Fig. 3. V. S. skin of frog.

lymphoid organs like *spleen*, *thymus* and *lymph nodes* etc.

Muscular tissue and nervous tissue are the two other types of tissue. But to describe them here is beyond the scope of this book.

✓ Skin of Frog

Skin of frog is smooth, moist, slimy, fitting loosely on body and characterized by the presence of large flask-shaped mucous glands. Large subcutaneous space called *lymph space* separates the skin from body wall. The skin of dorsal surface is thicker than the ventral. Its vertical section reveals two distinct regions, an outer *epidermis* and inner *dermis* (Fig. 3).

1. Epidermis. It is the thin outer ectodermal layer of stratified squamous epithelium, 6 to 12 cells deep. One or two outermost layers of cells form *stratum corneum*. Its cells are much flattened, dead, without nuclei and their cytoplasm replaced by a horny protein, *keratin*. These cells secrete a kind of hormone which inhibits cell division in *stratum germinativum*. This horny or keratinized layer is periodically moulted or shed in large patches. With this periodic moulting, inhibiting hormones also goes off with the casted skin, and the cells of *stratum germinativum* again start multiplication. This periodic shedding of

epidermis is under the control of pituitary and thyroid gland and does not take place if either of these is removed. Deeper layers of cells are irregularly polyhedral, forming *stratum germinativum*. Its basal or innermost cells are cuboidal or columnar, with large nuclei, called *stratum Malpighi*. It rests on a *basement membrane*. Cells of Malpighian layer undergo mitosis to produce new cells of epidermis.

2. Dermis. The underlying connective tissue layer, called *corium* or *dermis*, constitutes the major part of skin. It contains *blood capillaries*, *nerve* and *muscle fibres*, vertical connective tissue fibres, pigment cells called *melanophores* or *chromatophores* and large flask-shaped *epidermal glands* embedded in it. Each pigment cell is irregular in outline with branched processes. Chromatophores have black *melanin* and yellow *Xanthine* pigments in it. They are responsible for the change of colours of skin. Colour change is produced by spreading or condensation of these pigments in these cells. This spreading and condensation of pigments is under the control of *melanophore stimulating hormone* from *posterior pituitary* and *sympathetic nervous system*. The chromatophores although present in the dermis, are in fact ectodermal derivatives. Each gland opens by a small narrow duct on the skin surface. Most

glands secrete mucus which keeps the skin surface moist and slippery. Some glands secrete unpleasant tasting poisonous substance to discourage attacks by enemies. Just beneath epidermis, dermis is made of loose connective tissue called *stratum spongiosum*. Deeper part is made of dense connective tissue with collagen fibres arranged in thick bundles, hence named *stratum compactum*.>

✓ SKIN

The skin of amphibians consists of epidermis and dermis. The epidermis consists of several layers and is renewed by ecdysis. This process of renewal is controlled by the pituitary and thyroid glands. Localised thickening in epidermis is observed in the larvae, specially in the formation of the horny larval jaws and

teeth. The warts of toad are also the instances of such thickenings. The skin of modern amphibians is naked and remains moist due to the secretion of integumentary glands. The moist skin is necessary for respiration and also possibly for temperature regulation. There are two types of skin glands in amphibians. These are : *mucous glands* and *poison glands*. The mucus secreted by the mucous glands keeps the skin moist. The poison glands are well-developed in toad and salamanders. The parotid glands of toad are the best examples of the poison glands. Most of the warts on the dorsal surface of the toad open to the exterior by a minute opening which leads into poison gland. The gland produces active toxins. The secretion is venomous and causes nausea, respiratory and cardiac dysfunctions. The toxins are isolated as the **bufogin** and **bufotalin**. The poison of *Dendrobates* acts on the nervous system. The secretion of the dorsal glands of a warty Newt (*Triturus cristatus*) is venomous. The poison glands are defensive organs. The skin of the larval amphibians is ciliated. The colour of the skin of amphibia may vary from dull to brilliant. The urodela usually shows brilliant colouration which has a protective value. The green colouration of tree-frogs is a protective device, because it harmonises with the surrounding green foliage. The spotted salamander and some frogs exhibit warning colouration. In some tree-frogs, the brightness of the body colouration may vary with the change of intensity of light. The colour change is caused by the physiological adjustment of the deep-seated melanophores, xanthophores and overlying lipophores.