Hello and welcome to this module .I am Sheena Paul, teaching at Government college of Arts.Science and Commerce, Quepem.
Today I am dealing with a module on types of scale which is module number nine of this unit. The outline of this module is an introduction to scales, cosmoid scale, ganoid scale, bony ridge scales and placoid scales. As a part of the learning outcomes of this module, the students will be able to understand the structure of a primitive scale, differentiate scales based on modes of origin, list out scales based on structure and describe the structure of different scales along with their examples. In case of fishes the body is covered by an exoskeletal covering of scales which are derived from the dermis region of the skin and is protective in function Scales are small thin cornified calcareous or bony plates which either fit together closely or are placed in an overlapping manner. Scales vary in shape and size in different species of fishes. It covers the entire body of almost all groups of fishes except in cylinder and a few bottom dwellers wherein there are no scales at all present covering the body whereas in some fishes such as the chimaera scales are not visible externally because they are present in localized regions in the dermis region of the skin. The study of scales of fishes is termed as squamatology
A primitive scale consists of four layers: an innermost layer of compact bone called as isopedine, a middle layer of spongy vascular bone with pulp cavities containing odontoblast cells, a third layer of hard compact cosmic and an outermost layer of vitrodentine or enamel. According to the modes of origin scales can be differentiated into two types.The first one is placoid scales which is formed both by the epidermal and dermal region of the skin whereas the second type of scales are the non-placoid scales which are formed only by the dermis region of the skin. Structurally scales can be classified into cosmoid scales, ganoid placoid and bony ridge scale.The first type of scales that we take up today are the cosmoid scales they are found in extinct Sarcopterygii ,Crossopterygii and Dipnoans it has four layers the lowest layer being isopedine or dentine the next layer is of spongy bone with vascular spaces containing pulp cavities a third layer of hard compact cosmin with canaliculi and an outermost layer of vitrodentine an example of fishes which show this type of scales is the latimeria. The slide on the left hand side shows a diagrammatic representation of the cosmoid scale and on the right hand is the image of the fish latimeria which shows this type of scale The next type of scales are the ganoid scale. It is a characteristic scale seen in primitive Actinopterygii. They differ in form and structure from one species to the next. It is basically a derivation of the cosmoid scale wherein it has got a hard layer of ganoin, a middle layer of cosmine and an innermost layer of isopedine, the spongy bone layer which are seen in the cosmoid scale is lost completely. The ganoid scales are generally rhomboid in shape and can be differentiated into two types palaeoniscoid scales and lepisostoid scales. The palaeoniscoid scale is made up of three layers. It's got a lower layer of isopaddin a middle layer of reduced cosmic and an outermost layer of ganoin. it's found in primitive and extinct actinopterygians as well as the living chondrosteans. Polypterus is an example which shows the palaeoniscoid type of scale The second type of ganoid scale is called as the lepisosteoid scales it's made up of two layers an out lower layer of isopedine and an upper layer of ganon here the cosmine layer is completely lost lepidosteus is a fish which shows this kind of a scale The upper two diagrams are the representations of the lepisosteoid scale and the palaeoniscoid scale whereas the lower two are images of the lepisosteus which shows the lepisosteoid scale and polypterus which shows the palaeoniscoid scale the next type of scales that we touch upon today is the bony ridge scales which are also termed as leptoid scales there are two types of leptoid scales the cycloid and the ctenoid. cycloid scales are characteristic of soft rayed teleost fishes and the lobe-finned fishes whereas the ctenoid scales are characteristic of the spiny ray teleosts these scales are made up of an upper layer of isopedine and a lower layer of fibrous connective tissue these scales show the presence of ridges and grooves on the surface in the form of concentric rings.The cycloid scales are thin flexible translucent plates which are circular in outline, thicker in the center and thin towards the edges they are placed in an overlapping manner embedded into the dermis region of the skin the posterior part of the scale shows indistinct circular or ridges similarly concentric lines of growth are also seen carps and cods are fishes which show the cycloid scales. The top diagram is a diagrammatic representation of the cycloid scheme followed by an image of a cycloid scale under the microscope.Carp is the fish which shows the cycloid scales on its surface. Ctenoid scales are very similar to cycloid scales, circular in outline thick in the center and thin towards the edges They can be distinguished from the cycloid scales in having a serrated free edge and also on the posterior margin they show the presence of spines or cteni. Flounders are a group of fishes which show both scales ctenoid on the dorsal side of the body and cycloid scales are present ventrally. A fish which shows ctenoid scales as its outermost covering is the yellow perch. The upper diagram is a diagrammatic representation of the ctenoid scale followed by an image of a ctenoid scale under the microscope. Yellow perch is the fish which shows the presence of ctenoid scales. The last type of scale that we need to touch upon today are the placoid scales which are also called as dermal denticles. They are characteristic scales seen in the elasmobranch fishes. Each placoid scale is made up of two parts: a rhomboid basal plate embedded in the dermis and a vertical trident spine. These plates are placed close together but they do not overlap. The basal plate of the placoid scale is made up of calcified tissue and attached to the dermis by Sharpley's fibers. The trident spine which is vertical, arising from the basal plate is curved and directed backwards and comprises of an inner layer of dentine covered over by vitrodentine the dentine layer encloses a pulp cavity which opens below the basal plate through which blood vessels and nerves enter into the pulp cavity which contains odontoblast cells. Two fishes which show this kind of placoid scales are sharks and rays. The upper picture is a diagrammatic representation of the placoid scale whereas the lower is an image of the placoid scale which has been mounted under a microscope. To the right is the image of the shark which shows placoid scales as its outermost body covering. These are the references that I have used for the making of this module. Thank you