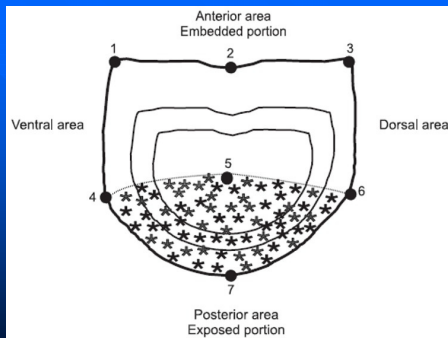


Scales



Scales

- Scales are the overlapping series of hard plates that cover a fish's body.
- Scales serve to protect the body from the outside dangers such as predators and infection.

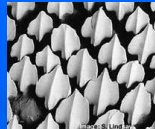


Cosmoid scales



- Cosmoid scales are found in the Lungfish (family Ceratodidae) and some fossil fishes.
- Cosmoid scales are similar to placoid scales and likely evolved from the fusion of placoid scales.
- They consist of two basal layers of bone, a layer of dentine-like cosmine, and an outer layer of vitrodentine.

Placoid Scales



- Often referred to as denticles.
- Placoid scales are found in sharks and rays.
- They do not increase in size as the fish grows (new scales are added).
- Vary greatly in external appearance.
- Flattened rectangular base plate which is embedded in the fish, spines, which project posteriorly on the surface.
- Placoid scales are composed of a vascular inner core of pulp, a middle layer of dentine and a hard enamel-like outer layer of vitrodentine.

Ganoid Scales



- Ganoid scales are found in fish like gars (Lepisosteidae), and sturgeons (Acipenseridae).
- Ganoid scales are usually rhomboid in shape and have articulating peg and socket joints between them.
- They are modified cosmoid scales which consist of a bony basal layer, a layer of dentine, and an outer layer of ganoine (an inorganic bone salt).

Elasmoid scales; Leptoid scales

- On bony fish
- Two types: Ctenoid and Cycloid
- As they grow, cycloid and ctenoid scales add concentric layers.
 - This results in a pattern of concentric growth rings on the scale, like the growth rings in the trunk of a tree.
 - These are used to determine the age of the fish.
- Cycloid and ctenoid scales have two main parts, a surface "bony" layer, composed of an organic framework with calcium based salts, and a deeper fibrous layer composed mainly of collagen.
- Cycloid and ctenoid scales are derived from ganoid scales that have lost the ganoine and thinned the bony embedded plate.

Ctenoid Scales

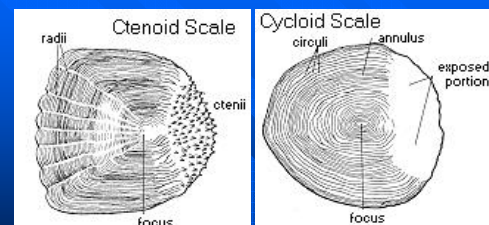


- Many bony fish.
- The anterior part of each scale is usually overlapped by the posterior portion of the scale in front. This arrangement of imbricate (overlapping) scales gives the fish greater flexibility.
- Ctenii-Spiny extensions on the posterior margin; comb-like.
 - Word "ctenoid" comes from the Greek "cteno", meaning comb

Cycloid Scales



- Cycloid scales have a smooth posterior margin lacking ctenii. The word "cycloid" comes from the Greek "cyclo", meaning circle.



How old is that fish?

- As cycloid and ctenoid scales increase in size, growth rings called **circuli** become visible.
 - The spacing between circuli are an indication of the environmental conditions present in the waterway.
 - » Large gaps in circuli indicate favorable environmental conditions and a plentiful food supply.
 - » During periods of environmental stress or decreased metabolism, fish growth will be slow and the circuli will be very close together.
 - These lines are often so close that they appear as a heavy line on the scale.
 - » These heavy lines are called **annuli** and generally occur during the winter months. During the cooler months of the year the scale grows more slowly and the circuli are closer together leaving a band called an annulus.
- By counting the annuli it is possible estimate the age of the fish.

A Diagrammatic Representation of the relationship between the annual growth of a Fish's body and of its scales.

