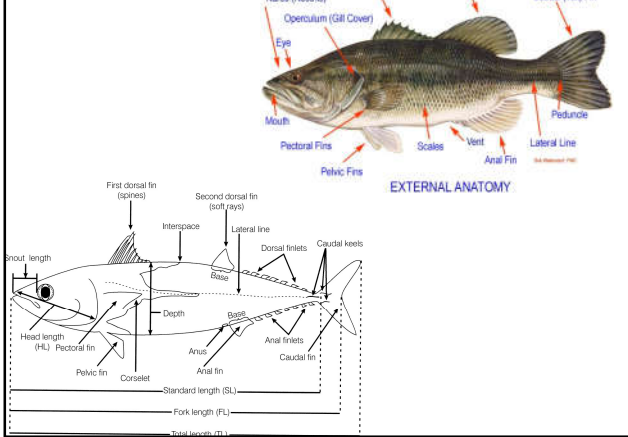
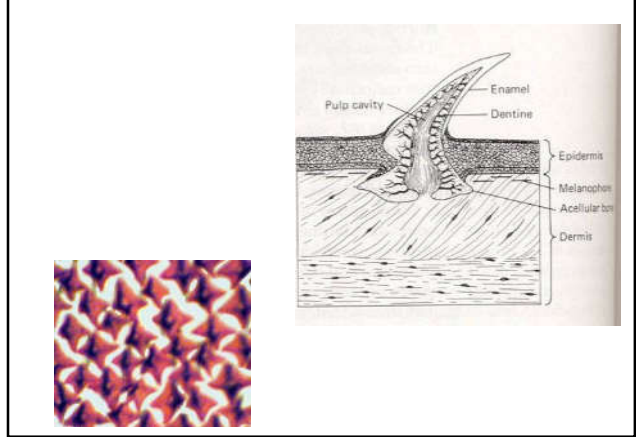


Fish External Anatomy

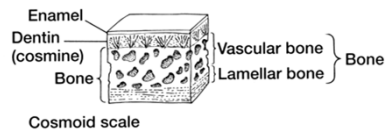


Placoid Scales

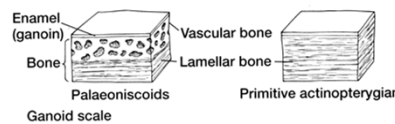


Bony Scales

- Cosmoid scales

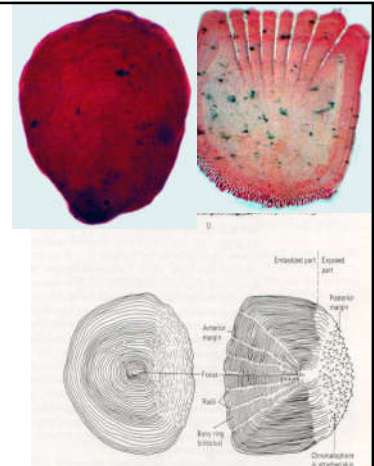


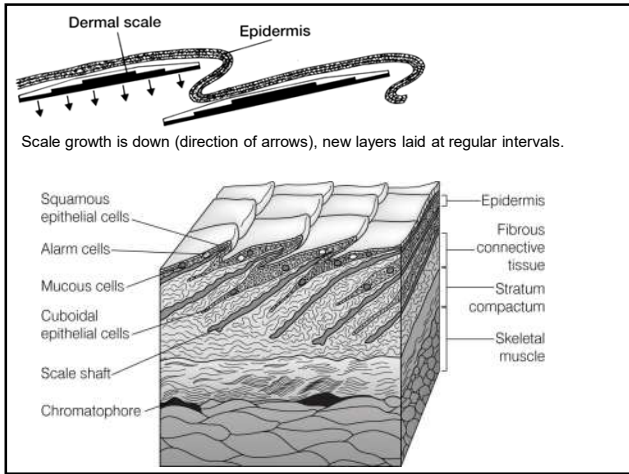
- Ganoid scales



Bony Scales

- Most teleosts, secondary loss in some eels, catfish, other taxa





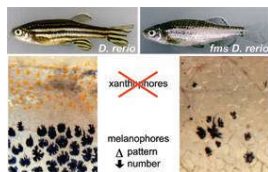
Skin Specializations

- Breeding Tubercles
- Mucus
 - Functions
- Schreckstoff – “scary stuff”



Fish Color

- Pigments
 - Chromatophores –
 - Amount of color controlled by
- Named by the pigment contained within
 - melanophores –
 - erythrophores –
 - xanthophores –
 - leucophores –



Structural Colors

- Schematichromes or Iridiophores
 -
- Predator confusion –
- Crypsis –
- Color Patterns
 - Transparency
 - Countershading



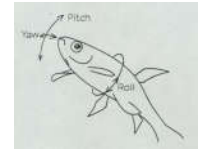
Bioluminescence

- All are marine, most deep water
- Cellular light
- Bacterial source
- Anatomy
- Functions



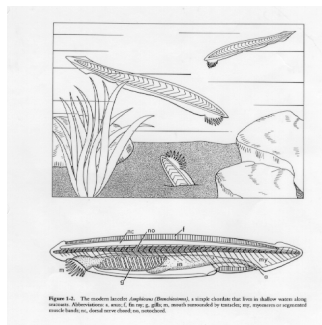
Fins and locomotion

- Advantages/disadvantages of water
- Effective movement requires
 - Propulsion (forward and/or back)
 - Guidance
 - Braking



Propulsion

- Basic fish body plan
- Early propulsion
- Fin evolution



Myomeres and Vertebrae

- Evolutionary trend towards fewer segments, more rigid body – Why?

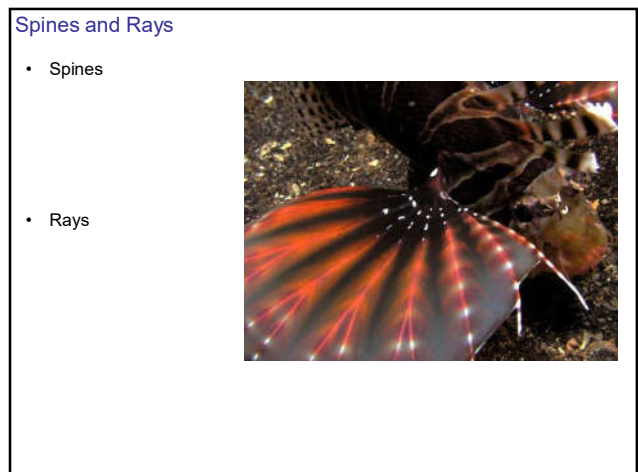
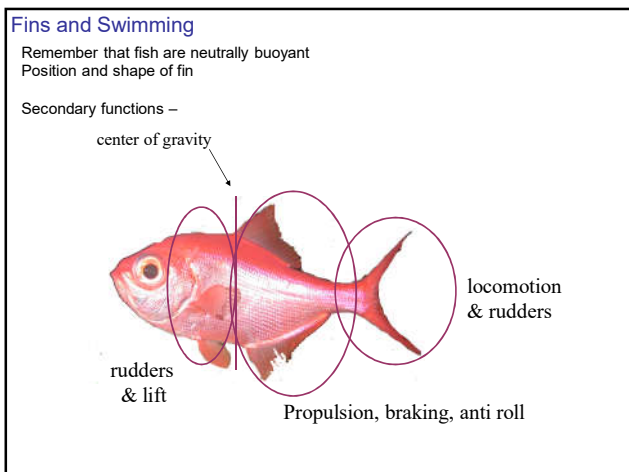
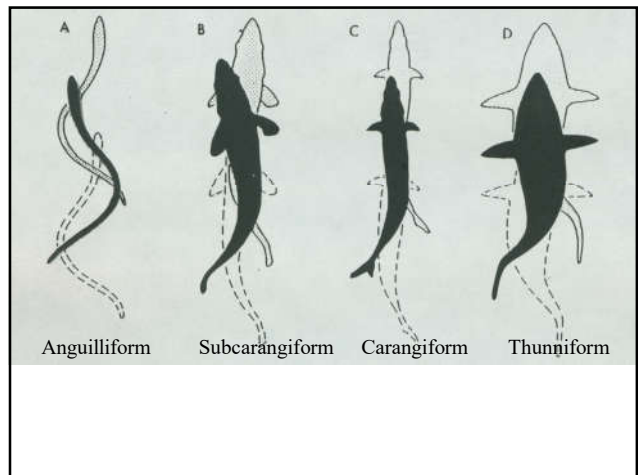
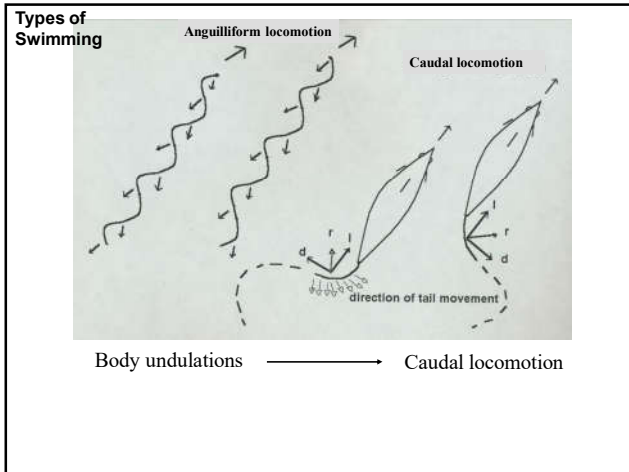
of myomeres (and vertebrae)

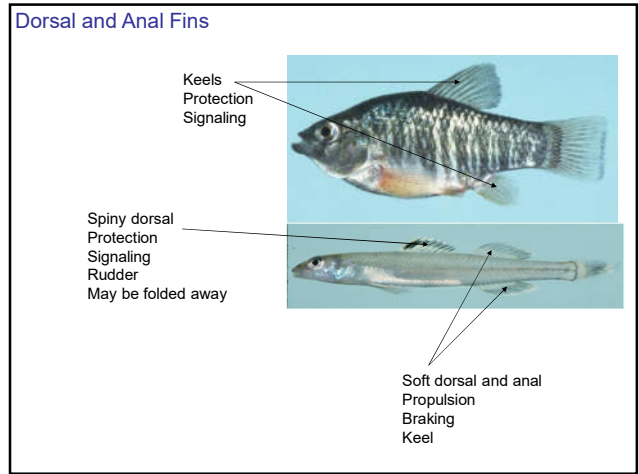
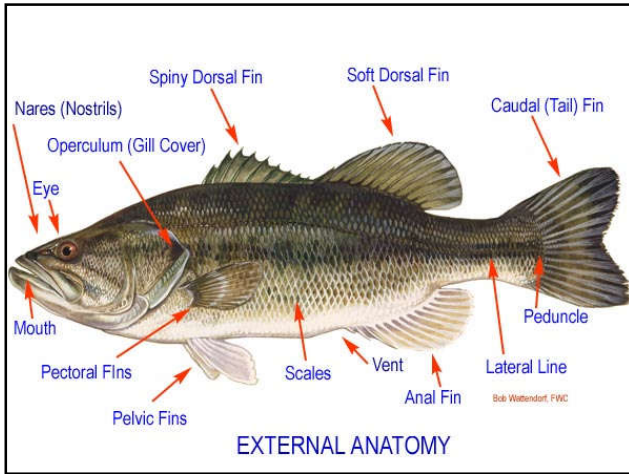


16 - Molidae






600 - Nemichthyidae





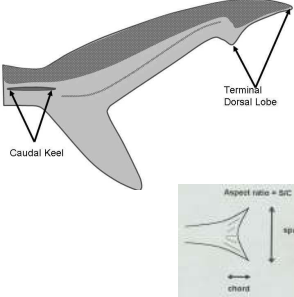

Paired Fins

- Pectoral, Pelvic serve to guide, steer and in some cases propel
- More maneuverability
- Other modifications

Caudal Fin

- Homocercal vs. heterocercal
- Aspect ratio
- In faster swimming fishes

Bony elements in tail

- Hypural plate

TAIL TYPES



HETEROCERCAL

A caudal fin in which the vertebral column extends to the tip of the upper lobe, which is usually bigger than the lobe

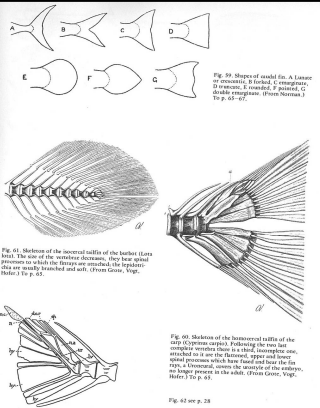
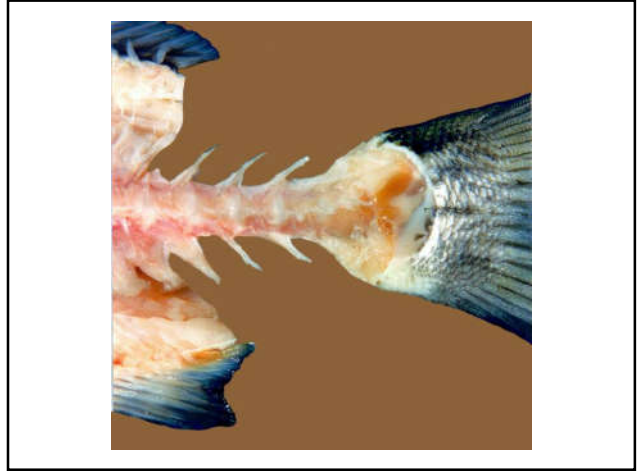


Fig. 60. Skeleton of the caudal fin of the barbel Horn shark. The fin of the caudal fin is shown in black. The fin is shown in black. The fin is shown in black. The fin is shown in black.

Fig. 61. Skeleton of the heterocercal caudal fin of the spotted sea bream. The fin is shown in black. The fin is shown in black. The fin is shown in black. The fin is shown in black.

Fig. 62. Skeleton of the heterocercal caudal fin of the spotted sea bream. The fin is shown in black. The fin is shown in black. The fin is shown in black. The fin is shown in black.



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2247

LOCOMOTION IN SCOMBRID FISHES: MORPHOLOGY AND KINEMATICS OF THE FINLETS OF THE CHUB MACKEREL *SCOMBER JAPONICUS*

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Fig. 12. A variety enhancement hypothesis of finlet function during locomotion. (A) dorsal view; (B) lateral view. The mackerel body outline is shown in grey and the finlets are shown in black (following the convention of Fig. 10). One possible path of water flow over the finlets is indicated in blue. Both views show the tail at the time it is decelerating towards the end of a beat to the fish's right. Water flowing over the caudal peduncle may be directed by finlets into the developing vortex V_1 . Addition of laterally high-velocity flow to the vortex would enhance velocity and circulation and, hence, enhance thrust V_1 shed vortex.

Fig. 13. A lateral view of the dorsal and ventral finlets (dorsal, posterior and ventral) of a chub mackerel (*Scomber japonicus*). (A) dorsal view and (B) ventral view. The finlets are labeled A through H. The dorsal finlet is labeled D and the ventral finlet is labeled V. The finlets are shown in black and the body outline is shown in grey.

Evolutionary trends

- Less anguilliform and more caudal swimming
- Reduction of bony elements in tail
- For increased speed
- Accessory functions of spines

