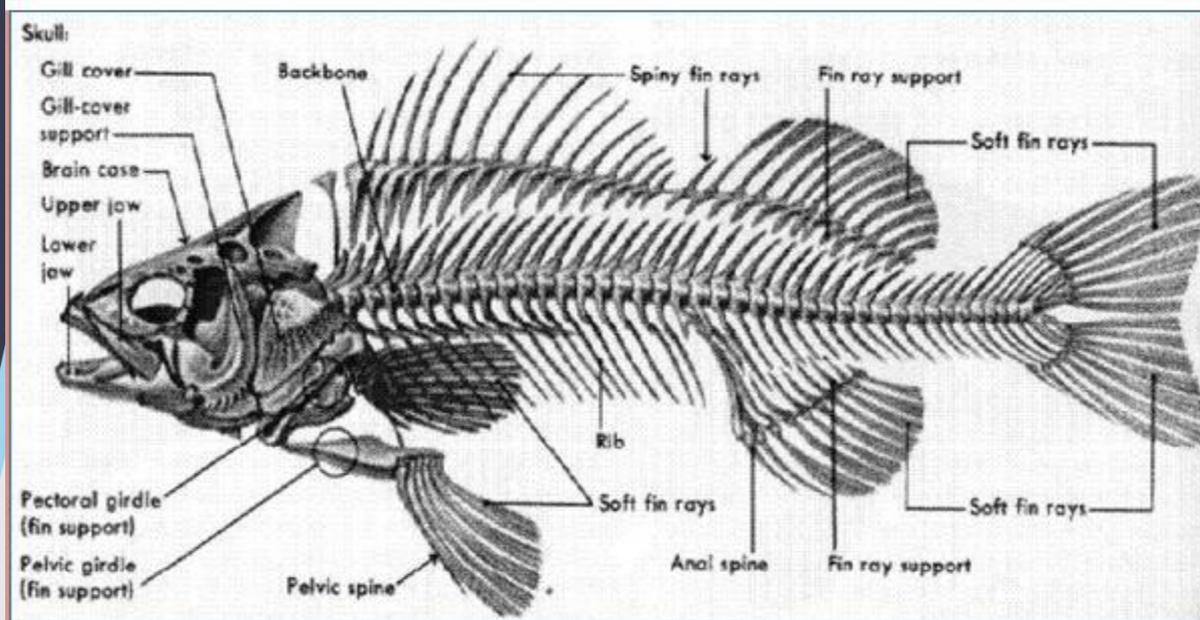




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Skeletal system of fishes

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Introduction

There are two different skeletal types: the **exoskeleton**, which is the stable outer shell of an organism, and the **endoskeleton**, which forms the support structure inside the body.

The skeleton of the fish is made of either cartilage (**cartilaginous fishes**) or bone (**bony fishes**).

Bone tissue is found only in the Subphylum Vertebrata.

As such, bone is often thought of as being typical of vertebrates.

In vertebrates, bone functions as a **supporting tissue**, a **calcium reserve** and as a **hemopoietic** (blood forming) tissue.

The skeleton is the basis of form and support of the vertebrate body.

Muscles attach to the skeleton and vital organs are surrounded and protected by skeletal elements



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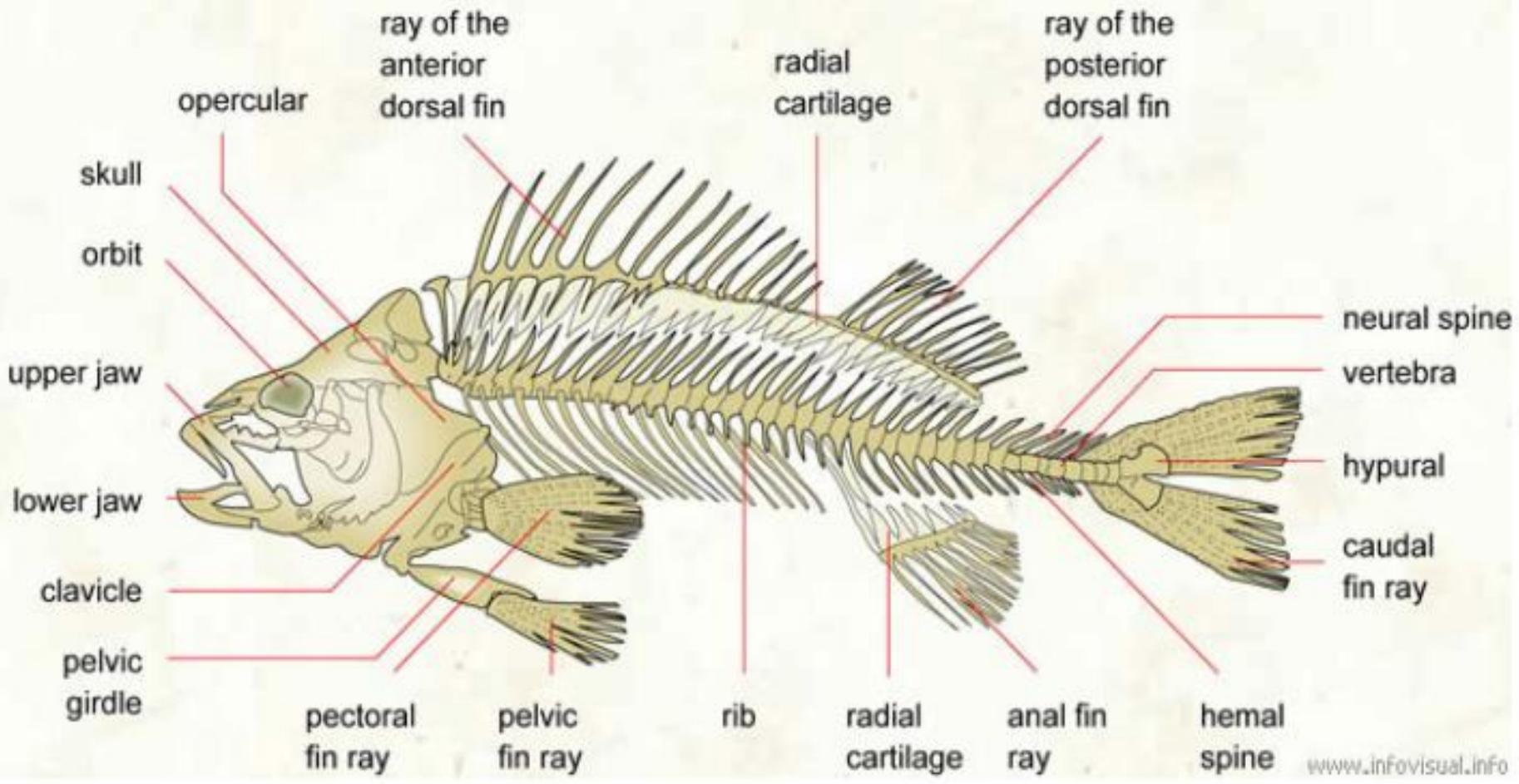
- The main features of the fish, the fins, are bony fin rays and, except for the caudal fin, have **no direct connection with the spine.**

- They are supported only by the muscles.

- The ribs attach to the spine.
- Bones are rigid organs that form part of the endoskeleton of vertebrates.
- They **function** to move, support, and protect the various organs of the body, produce red and white blood cells and store minerals.
- Bone tissue is a type of dense connective tissue.
- Bones come in a variety of shapes and have a complex internal and external structure.
- They are lightweight, yet strong and hard, in addition to fulfilling their many other functions.

Skeleton of a fish

SKELETON OF A FISH





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The skeleton of vertebrates is broadly divided into two parts:

the **axial skeleton** consisting of

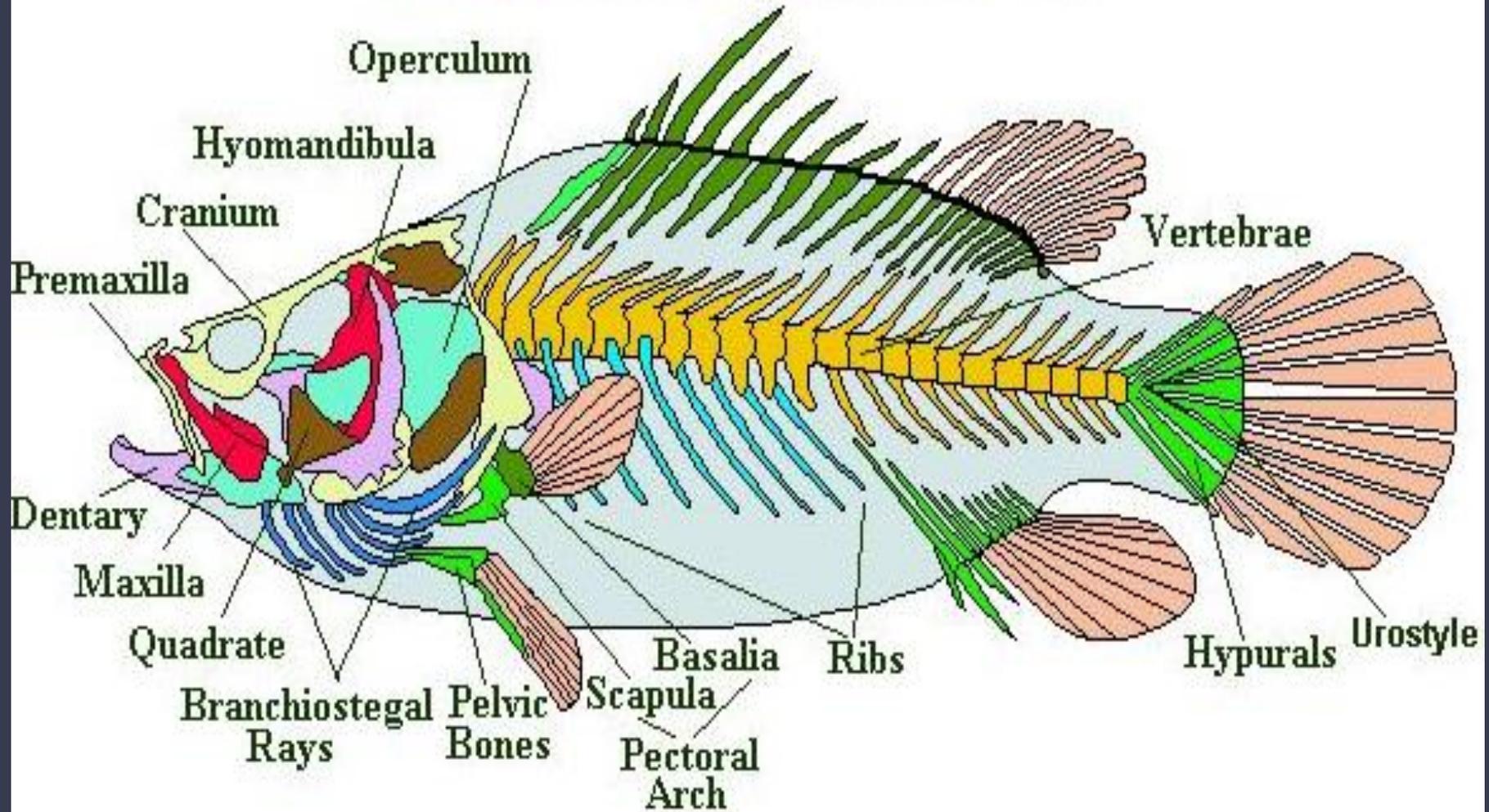
- the **skull**,
- **vertebrae** and
- **ribs**; and

the **appendicular skeleton** consisting of

- the **pectoral** and **pelvic girdles** and
- the **bones of the appendages**.



A Generalised Bony Fish Skeleton





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The Axial Skeleton

Skull

The skull of the perch is actually a double structure consisting of two “boxes” of bone, one enclosed by the other.

The outer skull is an armour of dermal bone.

Primitive extinct bony fish had dermal bony armour covering most of their bodies.

In the modern fish, the outer skull is virtually all that remains of this armour.

Dermal bone forms, as its name implies, in the dermis of the skin and is not preceded by a cartilage structure.

The inner skull is composed of endochondral bone.

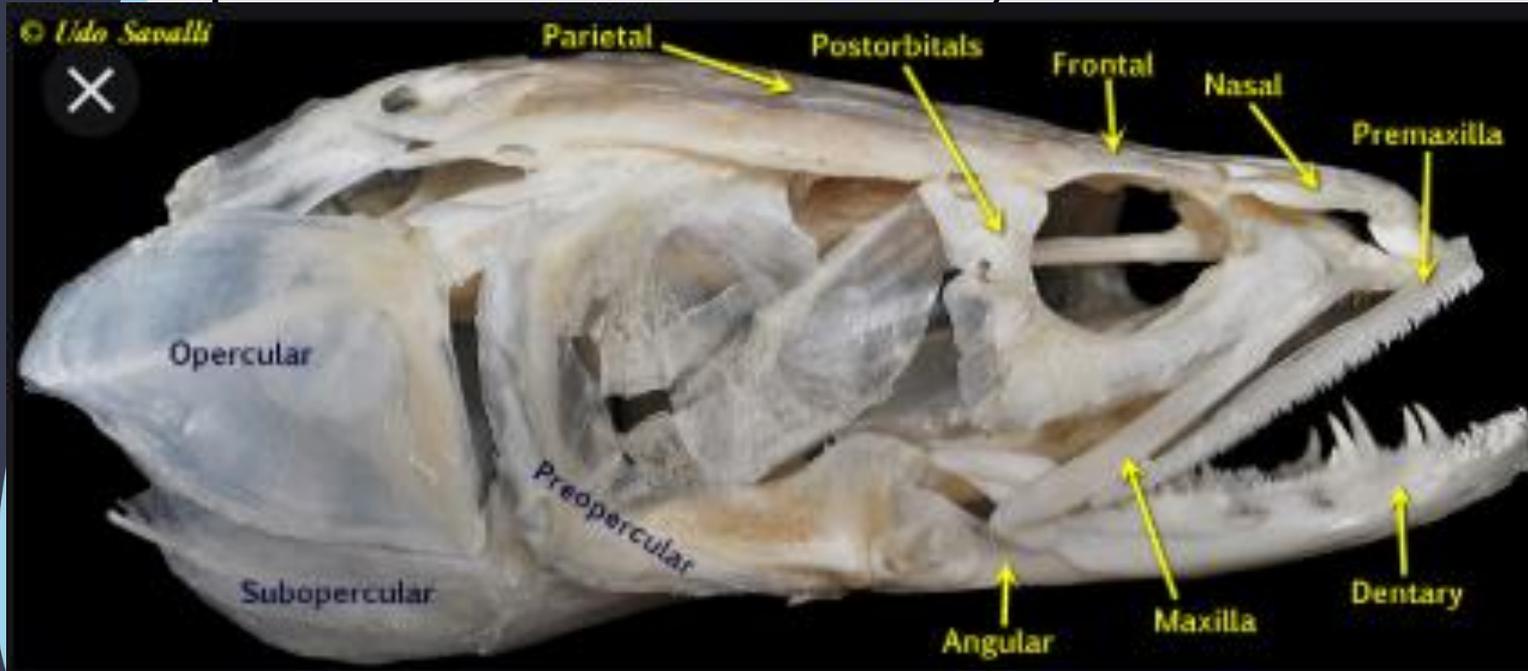


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Endochondral bone develops under the dermis and replaces existing cartilaginous structures.

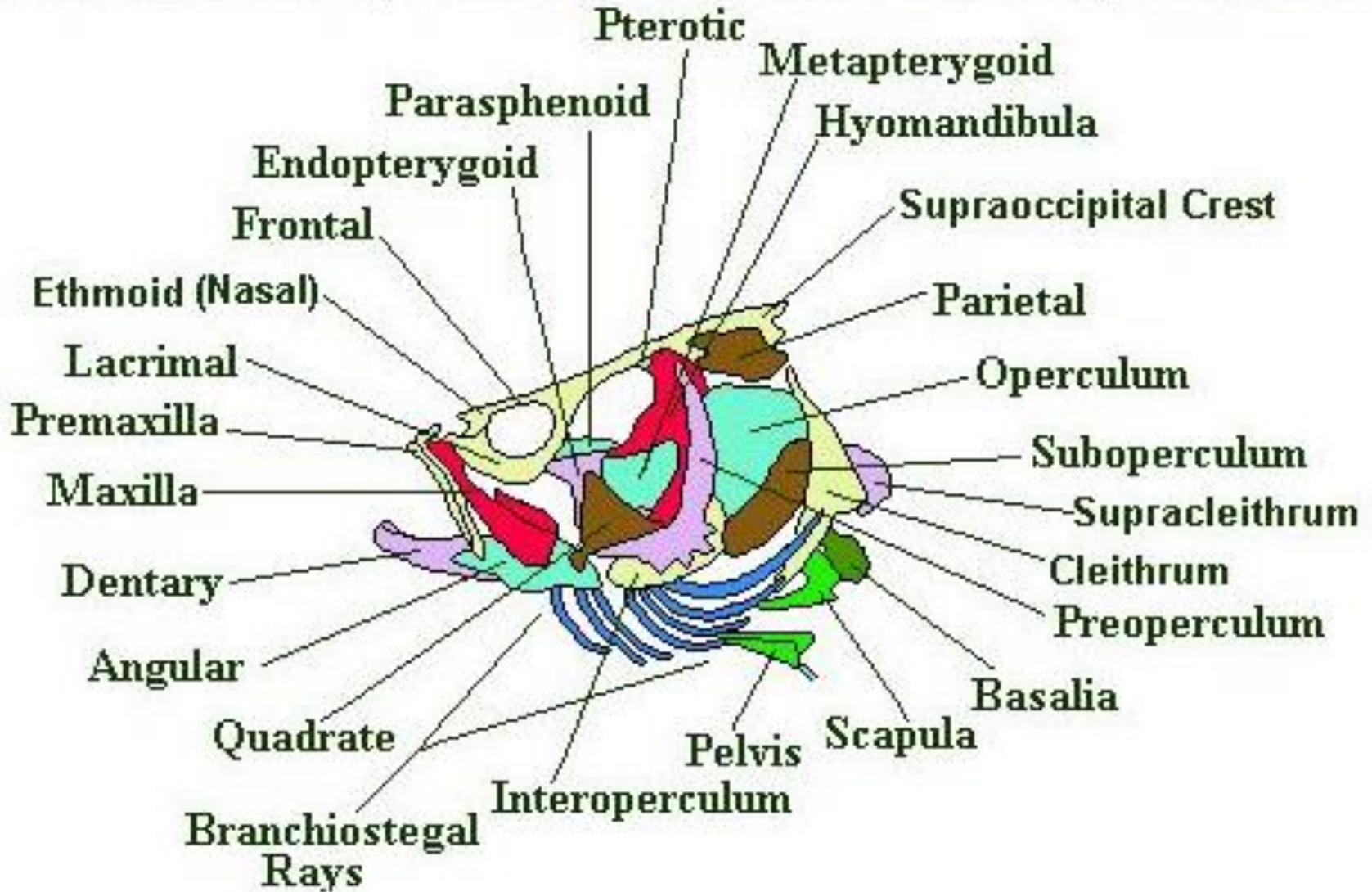
Hence the name “endochondral” denotes the bony tissue develops “within” existing cartilage structures.

- Elements of the inner skull form the **cranium** or brain case.
- The perch skull consists of many small bones.





A Generalised Representation of the Skull of a Ray-finned Fish





Vertebral Column

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A series of endochondral bones called vertebrae form the vertebral column.

Vertebrae have several common features.

The large spool-shaped central portion of each is the **centrum**.

Extending through the middle of each centrum is a canal for the passage of the **notochord**.

As mentioned previously, many fish retain a notochord throughout life.





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Above the centrum, an arch of bone surrounds and protects the spinal cord.

A dorsal projection, the neural spine, extends outward from the vertebral column.

The fish vertebral column is divided into two subdivisions: **the trunk and the tail (caudal).**

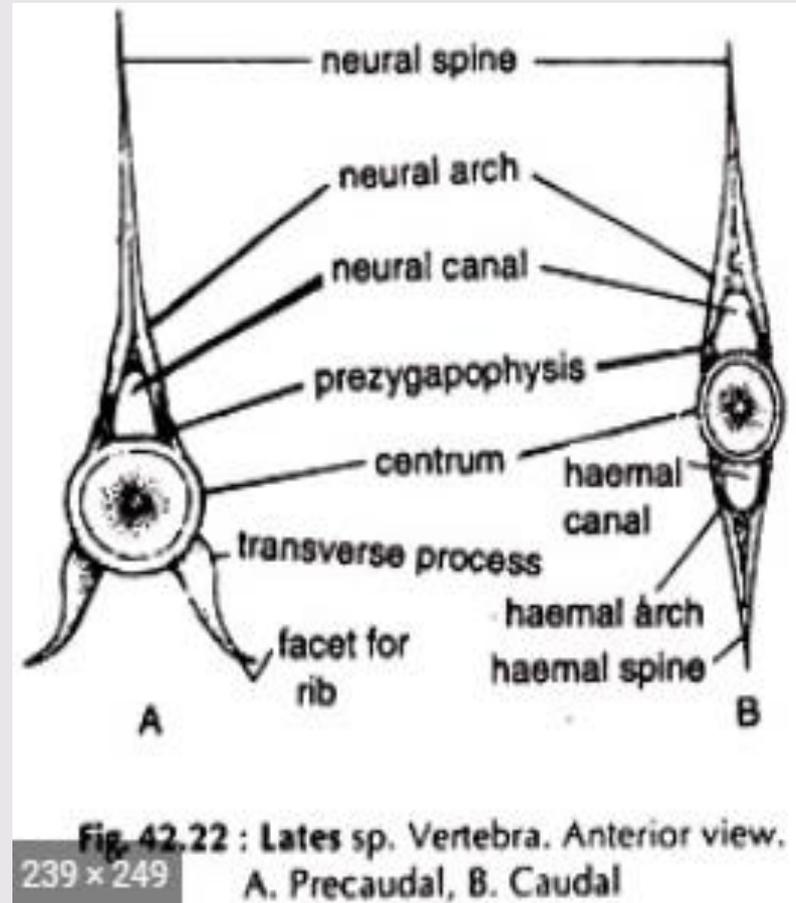


Fig. 42.22 : *Lates* sp. Vertebra. Anterior view.
239 × 249 A. Precaudal, B. Caudal



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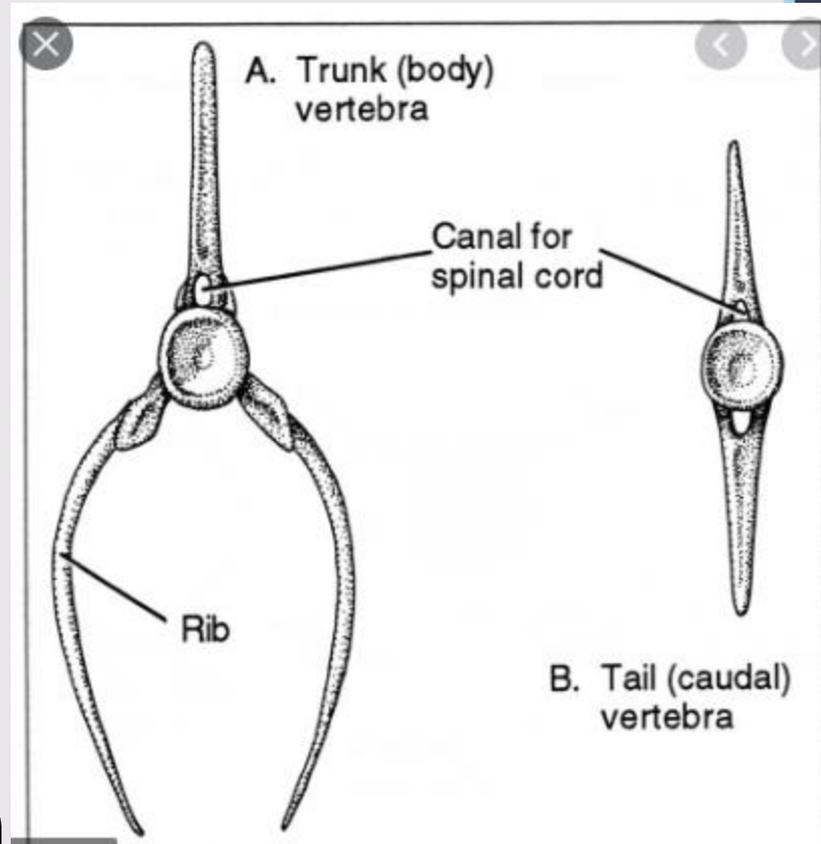
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Although fish do not have a neck, the first two trunk vertebrae are modified.

These vertebrae lack ribs.

The rest of the trunk vertebrae possess ribs.

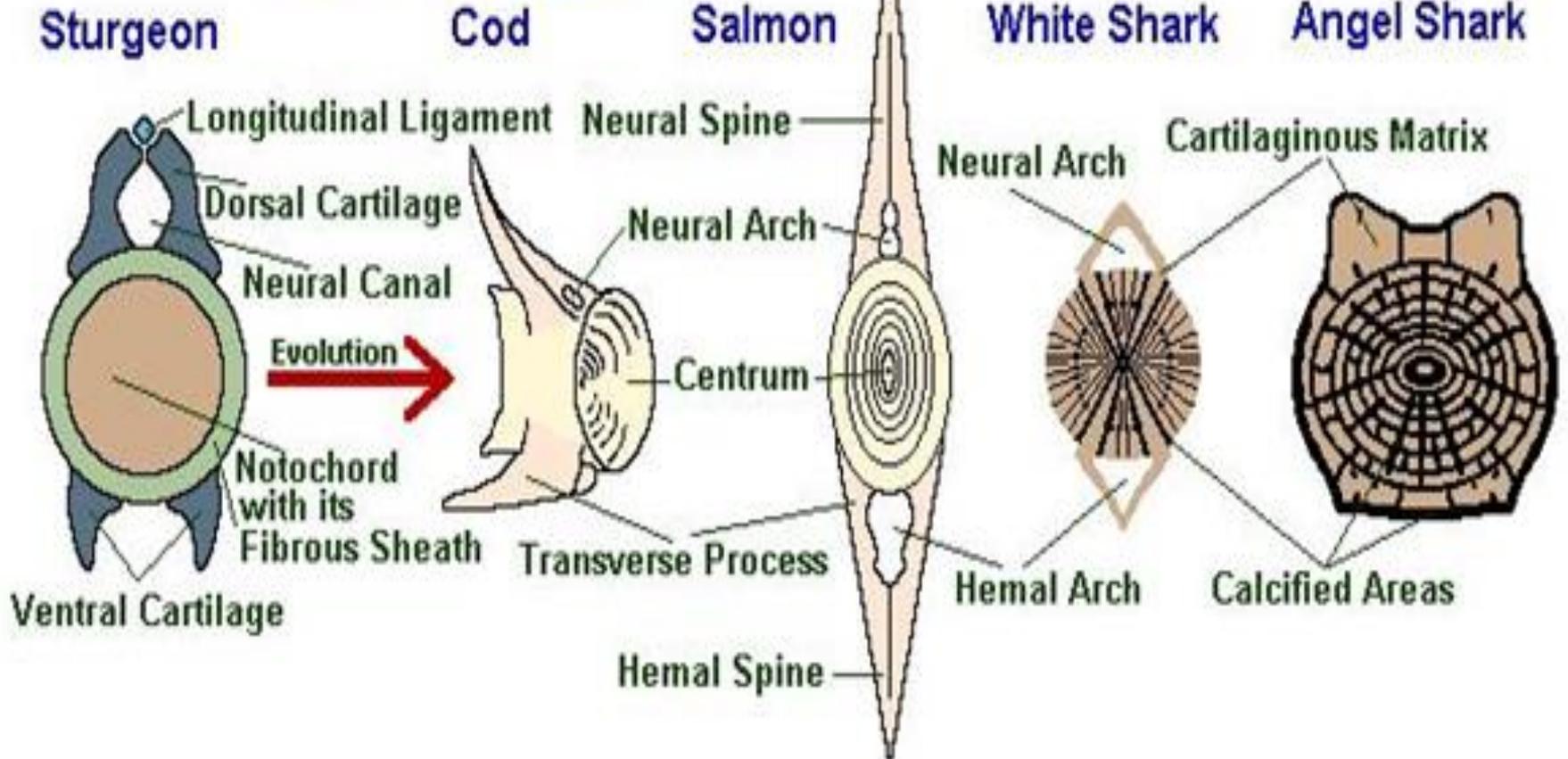
Caudal (tail) vertebrae possess a ventral portion which forms a **hemal arch** which surrounds blood vessels.

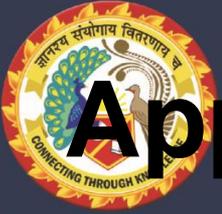




Fish Vertebrae

Shark Vertebrae





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Appendicular Skeleton and Fins

Median Fins

The dorsal fins of the perch have fin rays for support.

The anterior dorsal fin has **ossified** fin rays which provide stiff support(spiny), while the fin rays of the posterior dorsal fin are not **ossified** and are flexible(soft).

Only the first two fin rays of the anal fin are ossified.

The caudal fin is composed entirely of soft, unossified fin rays.



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Pectoral Girdle and Fins

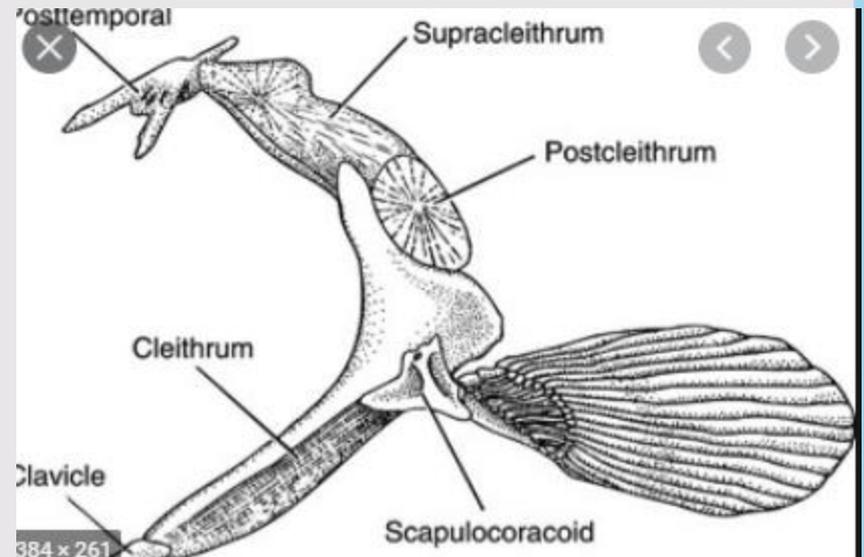
The pectoral fins are attached to a **bony girdle**, the **pectoral girdle**.

The pectoral girdle is composed of a number of fused elements.

The girdle is also fused to the skull

(the head and trunk of the perch move as a unit).

The fins are supported by soft fin rays.





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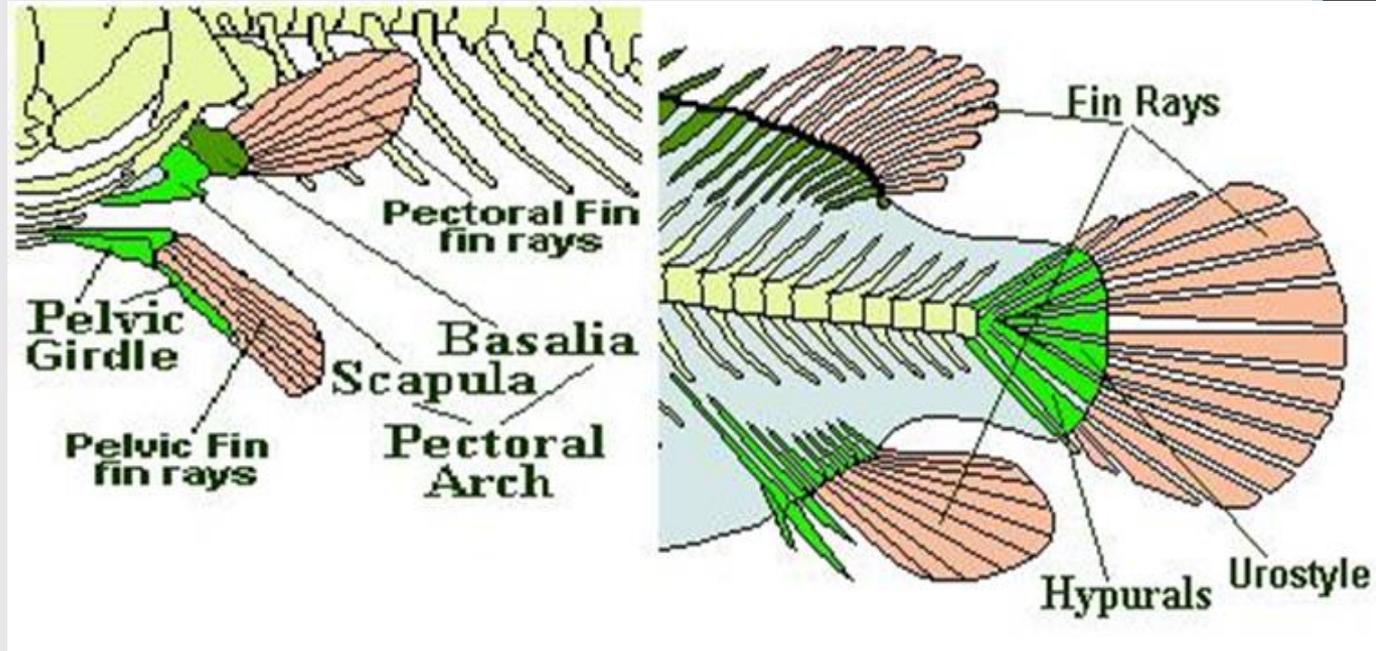
Pelvic Girdle and Fins

The pelvic fins are attached to the pelvic girdle, which is composed of two bony pelvic plates.

The plates may be fused along the midline.

The pelvic girdle is not attached to the vertebral column nor to the pectoral girdle, but is free-floating (embedded in muscle only).

Only the **medial fin rays are bony**, the rest are the typical soft unossified type.





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<https://www.youtube.com/watch?v=9JtevuaiNp4>

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