Quadrant II – Transcript and Related Materials

Programme: Bachelor of Science (Second Year)

Subject: Zoology

Paper Code: ZOC-103

Paper Title: Anatomy of Animal Body Systems

Unit: 02

Module Name: Jaw suspensorium- Part I

Module No: 25

Name of the Presenter: Ms. Andrea D'Souza

Notes

Jaw suspension or suspensoria

Probably one of the greatest advancement to take place in the evolution of the skull was the formation of jaws form the gill arch.

The anterior visceral arches may border the mouth, support soft tissue, and bear teeth.

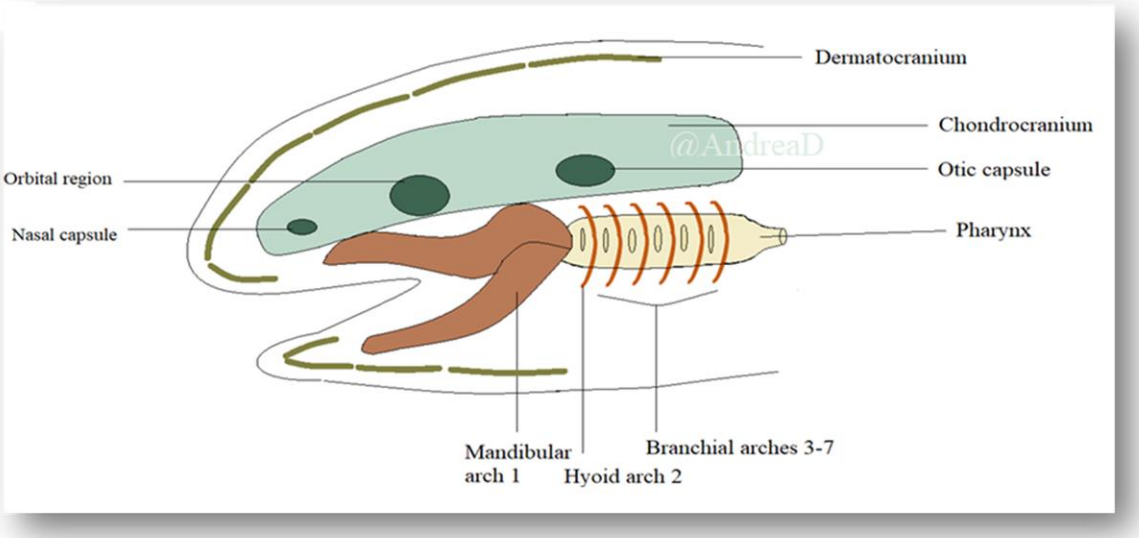
Jaw suspension or suspensorium is the method by which the upper and lower jaws are suspended or attached from the chondrocranium for efficient biting and chewing.

The first fully functional arch of the jaw is the mandibular arch, the largest and most anterior of the modified series of arches. The mandibular arch is composed of the palatoquadrate dorsally, forming the upper jaw and Meckel's cartilage(mandibular cartilage) ventrally forms the lower jaw.

The second – hyoid arch, consists of a dorsal hyomandibular supporting and suspending the jaws with the cranium and a ventral hyoid, follows the mandibular arch.

The remaining visceral arches support the gills and are, hence, branchial arches.

The splanchnocranium thus forms the jaws and suspends them with the chondrocranium.



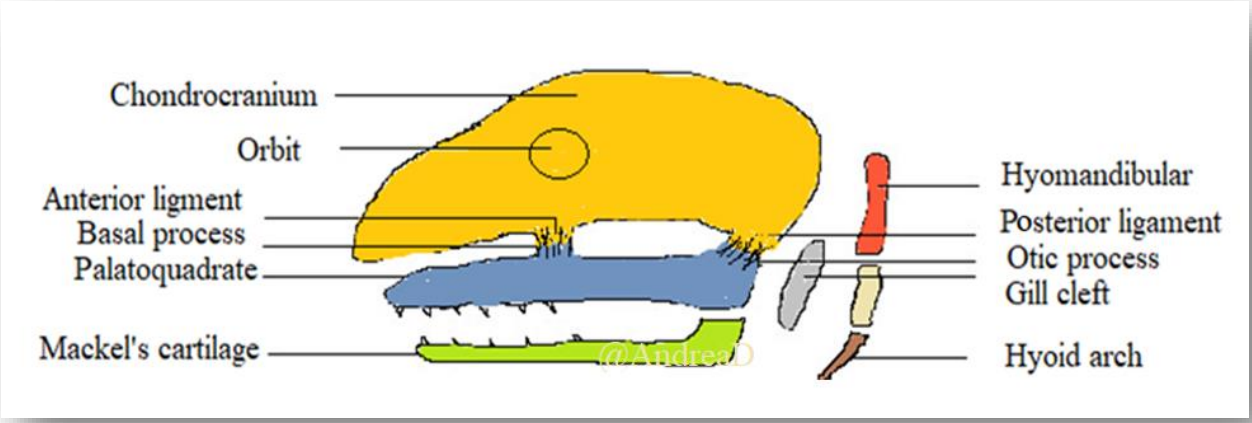
There are several ways in which these attachments are attained depending upon the modifications in the visceral arches in vertebrates. Jaw suspension or Suspensoria are of the following five types

1. **Autodiastylic**

   The jaws are attached by ligaments (anterior and posterior) to the chondrocranium.

   The hyoid arch does not support the jaws but remain completely free as the posterior branchial arches.

   The gill-cleft in front of the hyoid arch does not form a spiracle but forms a complete gill. This kind of a jaw suspension is seen in early bony fishes (acanthodians).



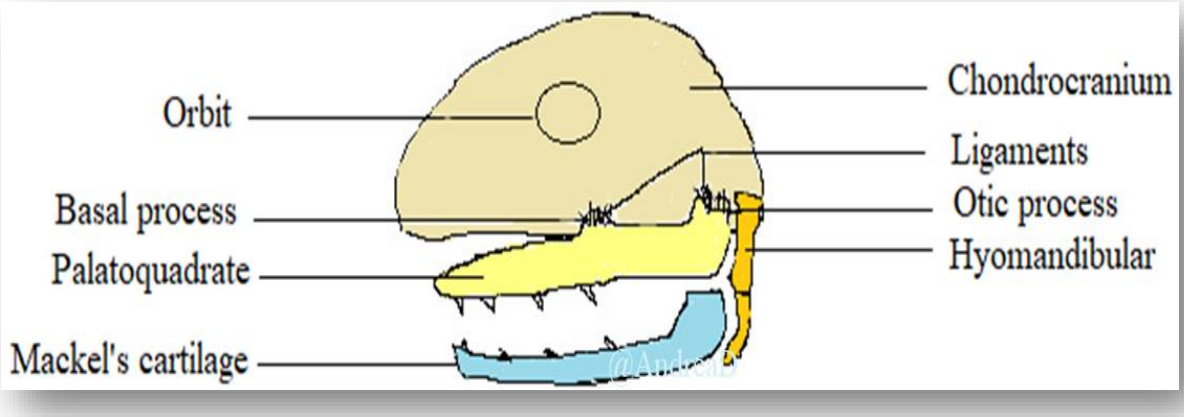
2. **Amphistylic**.

In this types of jaw suspension the upper jaw has basal and otic processes which are attached by ligaments to the chondrocranium.

Hyoid arch is unchanged. The hyomandibular of the hyoid arch also attached to the chondrocranium. At the other end both jaws are suspended from it.

It is therefore a double suspension in which both the mandibular and hyoid arches are attached to the chondrocranium.

This type of suspensorium is found in Crossopterygii and some primitive sharks- Heptanchus and Hexanchus.



3. **Hyostylic**.

The upper jaw i.e. the palatoquadrate is loosely articulated with the cranium by the anterior ethmopalatine ligament and the posterior spiracular ligament. Both jaws are suspended from the hyomandibular which is attached to the otic region of the skull. Only the hyoid arch binds both the jaws with the cranium and, hence, it is called hyostylic.

This type of jaw suspension is found in most elasmobranchs and bony fishes.

The use of hyomandibular in anchoring the upper jaw and lower jaw makes it possible for the mouth to be larger and open more wide than it otherwise could, hence these fishes are able to swallow large preys.

This extension of the jaws backward brought about the reduction of the first gill cleft to a spiracle as seen in sharks.

In fishes the autodiastylic suspension is the most primitive, the amphistylic condition was derived from it, while the hyostylic condition is the most recent having been arrived independently.