

JAW SUSPENSION IN VERTIBRATES

INTRODUCTION OF JAW

❖ Each of the upper and lower bony structure in vertebrates forming the framework of the mouth and containing the teeth.

EXPLANATION OF JAW SUSPENSION

Jaw suspension means attachment of the lower jaw with upper jaw or skull for efficient biting and chewing .

There are different ways in which these attachments are attained depending upon the modification in visceral arches .

DEFINATION

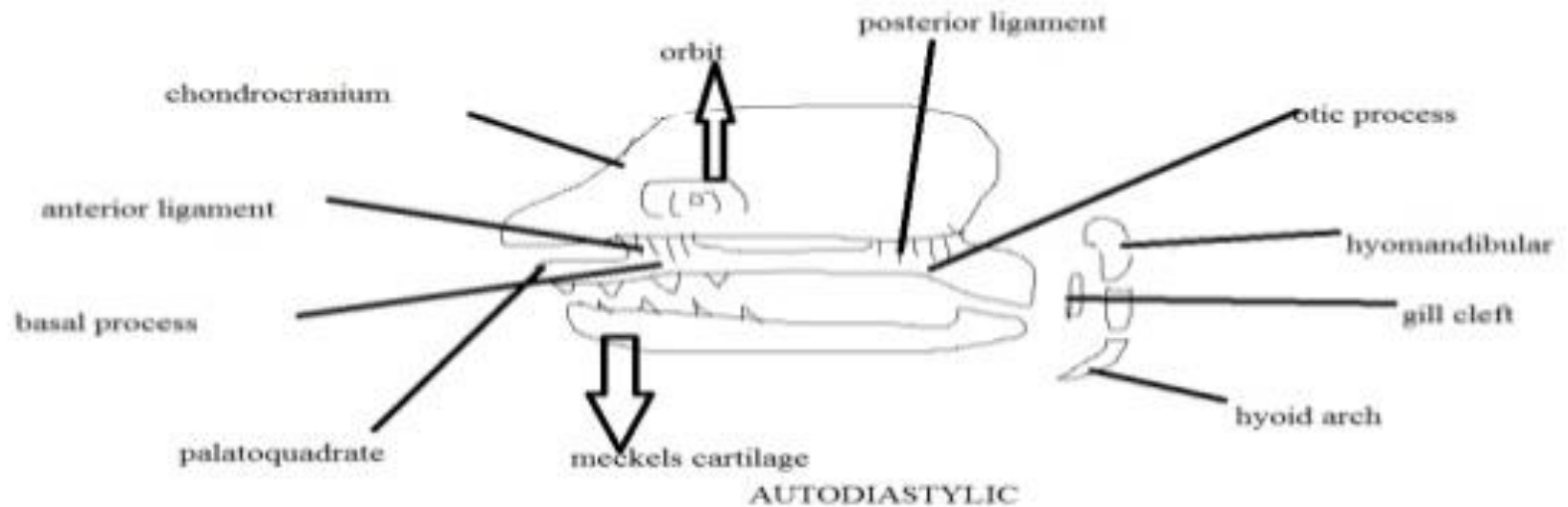
The method by which the upper and lower jaws are suspended or attached from the chondrocranium is known as suspension



1)AUTODIASTYLIC

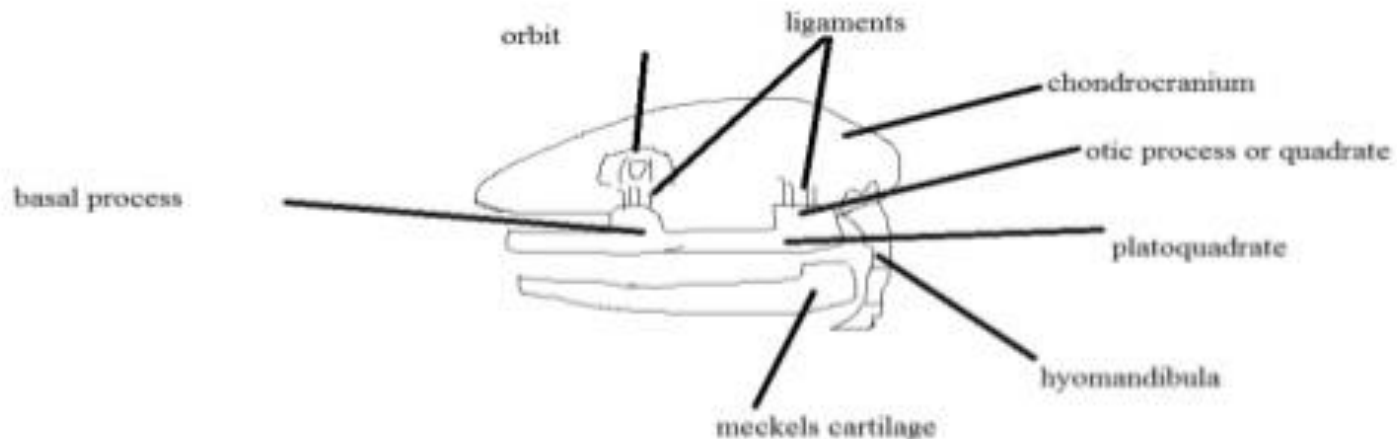
The jaws are attached to the cranium by anterior and posterior ligaments. Hyoid arch remains completely free or independent and does not support the jaws.

Eg:gnathostomes and acanthodians



2) AMPHISTYLIC

The quadrate or the basal and otic processes of upper jaw(mandibular arch) are attached by ligaments to chondrocranium.similarly,the upper end of hyomandibula(hyoid arch) is also attached to chondrocranium, while the two jaws are suspended from its other end.this arrangement makes double suspension(amphi=both+styly=bracing)since both the first and second arches participate in binding the jaws against the chondrocranium.Eg:primitive shark.

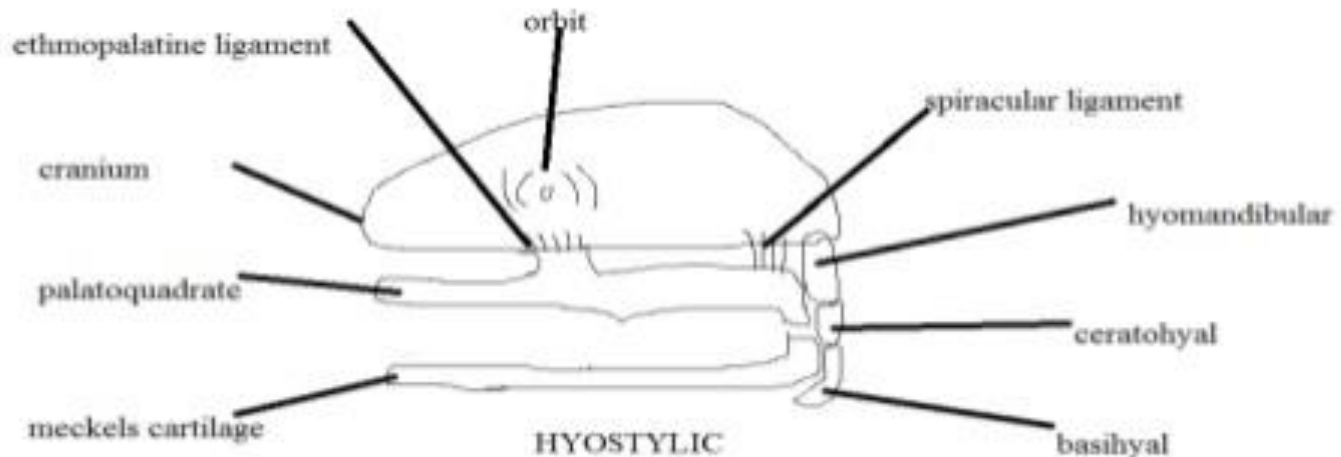


AMPHISTYLIC

3)HYOSTYLIC

Upper jaw (palatoquadrate) is loosely attached by anterior ethmopalatine ligament and posterior spiracular ligament to cranium.both the jaws are suspended from the hyomandibular,the upper end of which fits into auditory region of the skull . since only hyoid arch binds the two jaws against cranium ,this jaw suspension is termed as hyostylic it provides the jaws a wider movement and helps in swallowing larger preys

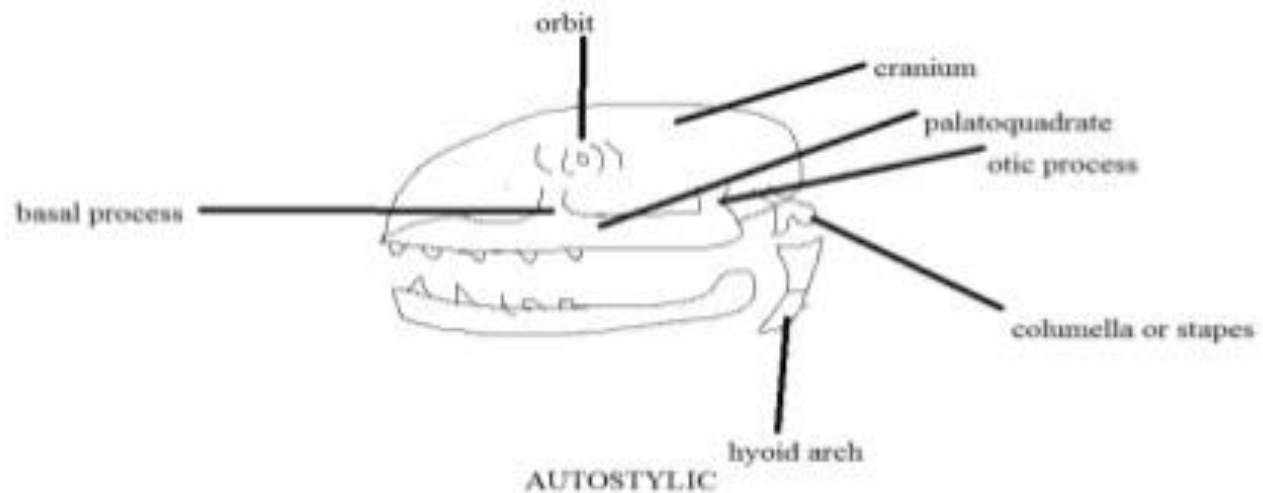
Eg:elasmobranch,bony fishes.



4)AUTOSTYLIC

This condition occurs when hyomandibular does not participate but becomes modified into columella or stapes of middle ear for transmitting sound waves.the upper jaw is completely fused by its processes to the bony skull and the lower jaw is suspended from the upper jaw.thus support from the hyomandibular is not needed,so it enters the middle ear as columella or stapes.

Eg:bony fishes,tetrapoda.



Autostylic jaw suspension is divided into 3 subtypes

a)HOLOSTYLIC

In this upper jaw is firmly fused with skull and lower jaw suspended from it.hyoid arch is complete ,independent and not attached to skull;

Eg:chimaeras

b)MONIMOSTYLIC

In many tetrapods , hyomandibular forms columella and articular articulates with quadrate. However ,the quadrate remains immovably attached with skull.

c)STREPTOSTYLIC

Quadrate is loosely attached and is movable at both ends a condition known as streptostylic.Eg:reptiles (lizzard,snakes)and birds.

5)CRANIOSTYLIC

This type of jaw suspension is characteristic of mammals and some consider it as a modification of autostylic suspension .upper jaw fuses throughout its length with cranium and hyomandibular forms the ear ossicles malleus and incus consequently two dermal bones ,dentary of lower jaw and squamosal of skull provide the articulation between jaws.

COMPARATIVE ACCOUNT OF JAW SUSPENSION

1) In agnathans the jaw suspension is in paleostylic stage in which none of the arches attach themselves directly to the skull.

2) In ganathostomes and acanthodians jaw suspension is autodiastylic in which jaws are attached to the cranium by anterior and the posterior ligaments. Hyoid arch remains completely free and does not support the jaws.

3) In primitive sharks the jaw suspension is amphistylic in which the quadrate or the basal and otic processes of upper jaw (mandibular arch) are attached by ligaments to chondrocranium. Similarly the upper end of hyomandibula is also attached to chondrocranium.

4) In modern sharks and all bony fishes the type of jaw suspension is hyostylic, in which the upper jaw (palatoquadrate) is loosely attached by anterior ligament to cranium. Both the jaws are suspended from the hyomandibular. Since only hyoid arch binds the two jaws against cranium it is called hyostylic jaw

5) In most tetrapods like amphibians, reptiles and birds hyomandibular does not participate but becomes modified into columella or stapes of middle ear for transmitting sound waves.

6) In most lung fishes upper jaw is firmly fused with skull and lower jaw suspended from it. Hyoid arch is complete, independent and not attached to the skull; this is holostylic type of jaw suspension.

7) In many tetrapods monimostylic jaw suspension is seen i.e. hyomandibular forms columella and articular articulates with quadrates. However, the quadrate remains immovably attached with skull.

8) In some reptiles (lizard, snakes) and birds the type of jaw suspension is streptostylic i.e. quadrate is loosely attached and is movable at both the ends a condition known as streptostylism.

9) In mammals craniostylic type of jaw suspension is seen it is a modification of the autostylic suspension. Upper jaw fuses throughout its length with cranium, and hyomandibular forms the ear ossicle, stapes. But articular and quadrate also become modified into ear ossicles malleus and incus.



CONCLUSION:-

- Development of jaws transition was there in feeding method.
- due to jaw the mouth could shut quickly with a strong bite,securing the “inhaled” prey
- limits to prey size were also removed;
- _active predation became a common lifestyle in subsequent vertebrates.