BITING MECHANISM IN SNAKES

B.Sc. Part –I,
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Introduction

- Snakes are specialized group of reptiles under order Ophidia, (limbless group). There are about 3,000 species of snakes are found in the tropical and subtropical part of the world. Out of these about 300 are poisonous. All the poisonous snakes have specialized poison apparatus in their heads.

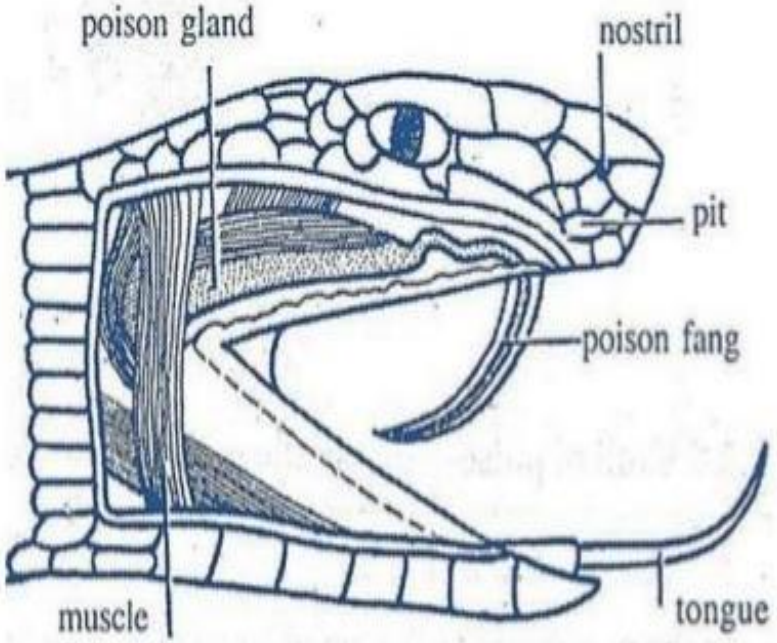
The skull and jaw bones of poisonous snakes are very flexible. Due to their loose and flexible attachment they can adjust accordingly at the time of swallowing or biting. The position of fangs in different snakes are different, as in Cobra they are erect while in vipers, they lie against the roof of mouth when closed

The biting mechanism serve two purposes, erection of fangs and injection of venom or poison in victim's body.

Biting apparatus

- The biting apparatus taking part in biting mechanism are- Poison gland, Poison duct and Fangs
- **1. Poison gland**-one pair,
- on each side situated on upper jaw.
- Sac like structure
- Held in position by-anterior ligaments
- Posterior ligaments
- Anterior ligaments joins gland and maxilla
- Posterior ligaments joins gland and quadrate
- Fan shaped ligament present between side walls and squamoso- quadrate
- **2.Poison ducts**-runs through the side of upper jaw and opens at the base of fangs.
- **3. Fangs**
  4.associated bones and muscles

Poison apparatus of snake



SNAKE-POISONOUS -APPARATUS

On the basis of structure and position, the fangs are of the following types:

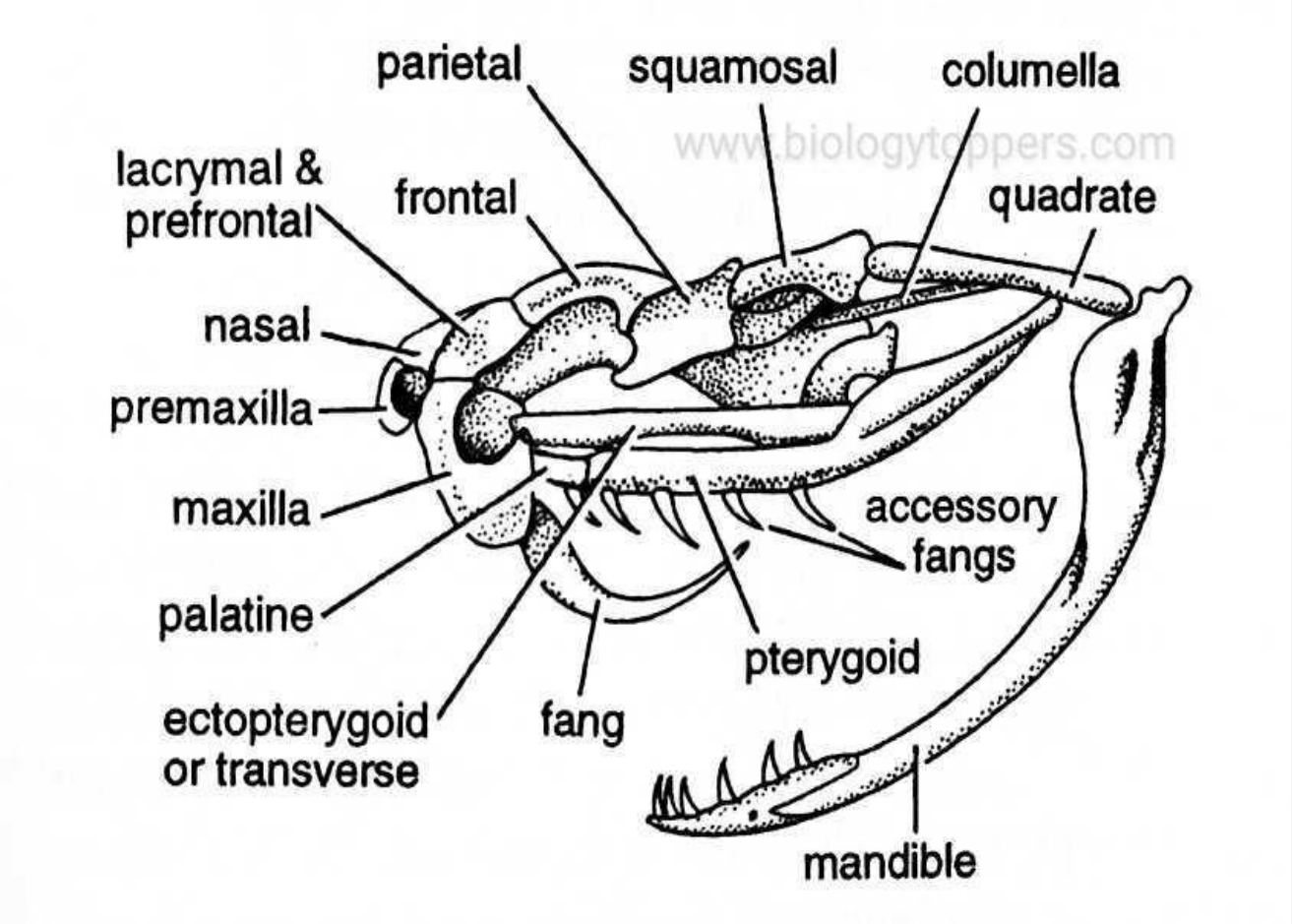
Fangs

- There is one pair of fangs in the upper jaw.
- They are enlarged maxillary teeth which are very sharp and pointed.
- There is great power of regeneration (when lost for some reason).
- On the basis of structure and position, the fangs are of the following types :
- 1) Proteroglyphous type: The fangs are comparatively small and they are present in front of the maxillae. The fang has a groove all along its anterior face. Examples : Cobra, Krait, Sea snakes and Coral snakes.
- 3) Opisthoglyphous type. The fangs are small and lie at the back portion of maxillae. The fang has a groove along its posterior face. Examples : Some colubrid snake (African tree snakes)
- 4) Aglyphous type: Aglyphous dentition is present in the non- poisonous snakes.

Associated bones and muscles

- **Associated bones and muscles**
- There are some important bones and muscles which are directly or indirectly associated with the mechanism of biting. In the skull, maxillae, quadrate, pterygoid, squamosals, ectopterygoids and palatines are movably articulated. Premaxillae are very much reduced. Sqamosals are loosely attached to cranium. The joint of quadrate and lower jaws acts as fulcrum. Quadrates are also loosely articulated with the cranium, pterygoid and lower jaw. Ectopterygoid is a transverse bone.
- The important muscles are Digastric muscle, Anterior and Posterior temporalis muscles and Protractor-Pterygoid or Sphenopterygoid muscle. In addition to these, there are two more muscles associated with the poison glands. These are masseter muscle and Mandibular constrictor muscle.
- The gastric muscle is attached with the squamosal bone anteriorly and with the base of the lower jaw (articular) posteriorly.
- The Sphenopterygoid muscle is attached to the Sphenoidal region anteriorly and dorsal surface of the Pterygoid posteriorly. Anterior and Posterior temporalis muscles are attached to the side walls of the cranium and the lower jaw.

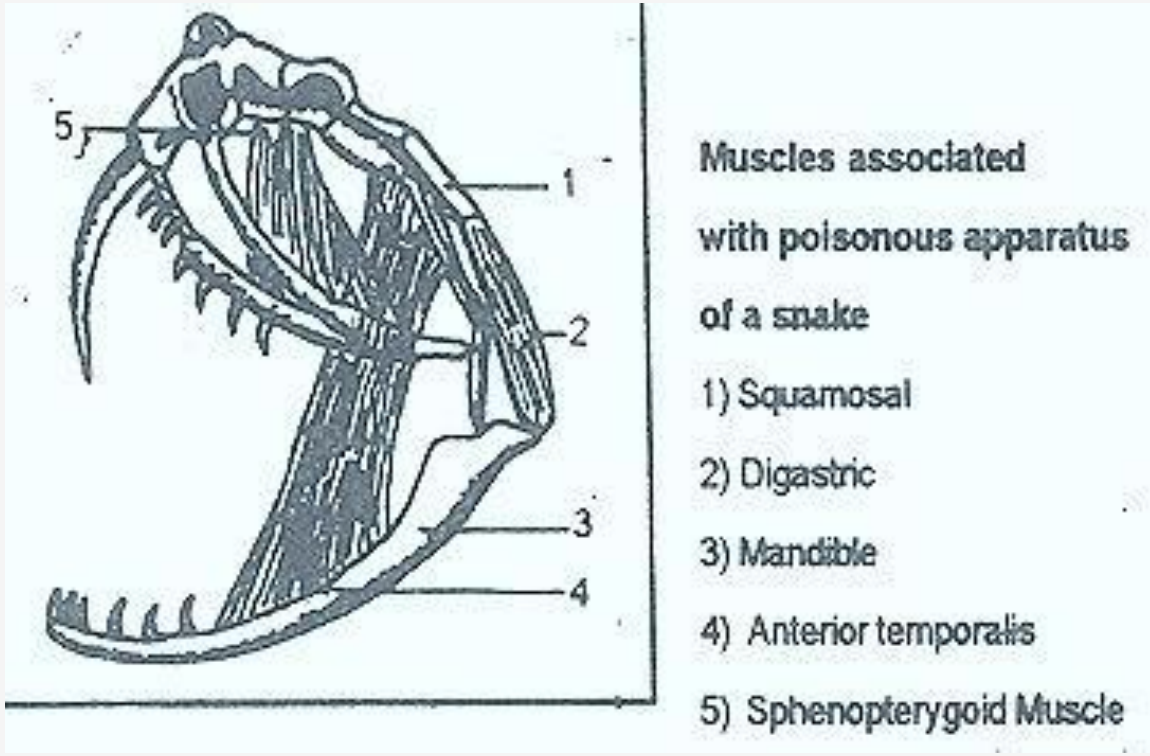
Bones associated with biting mechanism



muscles

- **Digastric Muscles**
- **Digastric muscles** are attached with the **squamosal bone** and articular of the **lower fang**.
- **Sphenopterygoid Muscles**
- **Sphenopterygoid Muscles** anteriorly remain attached with a **sphenoid** area and **posterior** with **dorsal surface** of the **pterygoid bone.**
- **Temporal Muscles**
- The **temporal muscles** remains divided into two parts, the interior part attached with the **cranium** and the posterior part remains associated with the **lower jaw.**
- **Masseter Muscles**
- **Masseter muscles** are associated with the **poison gland** and contract to press it when need

Muscles associated with biting mechanism



Biting mechanism

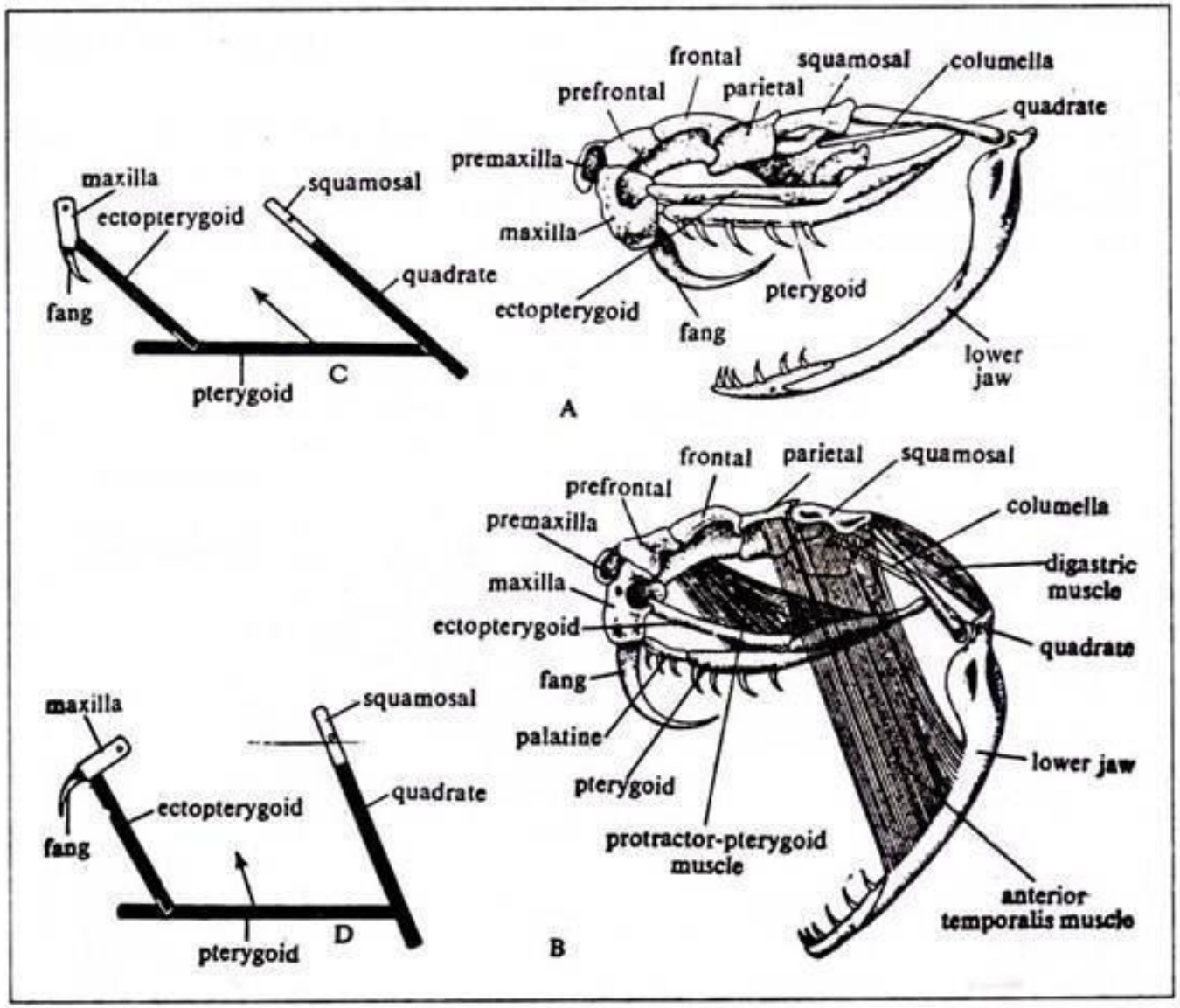


Fig. 8.32 : Showing partly opened (A) and fully opened (B) mouth of a poisonous snake. Note the relative position of the fang, maxilla, lower jaw, quadrate and squamosal. C and D. Schemes showing the relative position of principal bones involved in the erection of fang.

Biting process

Opening of the Mouth:

- By the contraction of digastric muscles the mouth is opened (lower jaw moves down).

Rotation of Maxilla:

- As the mouth opens the lower jaw moves down and the lower end of quadrate moves forward. Quadrate and squamosal are very movable. The pterygoid is movably attached to the palatine. Quadrate pushes the pterygoid forward and the pterygo-palatine joint bent.
- This forward movement of the pterygoid is conveyed by the trans palatine bone to the maxilla and causes it to rotate through about 90° upon its prefrontal articulation in such a way that the surface to which the fang is attached is carried forwards and ventral wards, and the fang is erected, i.e., is made to project downwards at the front end of the mouth. The contraction of sphenopterygoid muscles also helps in the movement of pterygoid forward.

Closing of Mouth:

- The closing of the mouth is brought about by the contraction of the temporalis and sphenopterygoid muscles. The point of fang is directed backward while the mouth is closed. It takes longer time to open the mouth than to close it.

Transference of Venom:

- During the contraction of the digastric muscle the posterior ligament is relaxed and during the rotation of the squamosal bone the fan-shaped ligaments are stretched to squeeze the wall of the poison gland. This makes the poison to come out of the poison gland through the poison duct and the fang.