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Biting Mechanism of Snakes, snake venom and venom infection?

There are altogether more than 2600 species of snakes all over the world including the marine forms, and, out of which only 300 species are poisonous. Number of species diminishes progressively through the polar region. In India, there are 330 species only and among them only 69 species are poisonous. As per record of the W.H.O., nearly 30000 to 40000 persons die of snake bite in the world every year.

Biting mechanism:

The biting apparatus taking part in the biting process are

1. Poison glands
2. Poison ducts, and
3. Poison teeth or Fangs.

Now, they are being described below in details:

There is one pair of poison glands each one is situated on either side of the upper jaw.

The poison glands are actually the parotid glands.

Each poison gland is sac like in appearance. They are held in position by some ligaments. With the help of anterior ligament, the gland is attached with the maxilla. The posterior ligament is present between the gland and the quadrate.

In addition to these, fan-shaped ligaments are also situated between the side walls and squamoso-quadrate junction. Each poison gland is provided with a narrow duct at its anterior portion which passes along the side of the upper jaw, loops over itself and finally opens at the base of the fang.

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.
- 2) Stenoglyphous type: The fangs are movable and turned inside. Poison canal runs through the fang and opens at the tip. Examples: Vipers and Rattle snakes.

3) Opisthognathous 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

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. Squamosals 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 digastric 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.

Opening and Closing of Mouth (Process of biting)

(i) When the digastric muscle contracts, the mandible is lowered and the skull along with the upper jaws goes up. As a result, the mouth opens.

(ii) The distal end of the quadrate is pushed forward which thrusts the pterygoid, palatine and transverse bar.

(iii) Contraction of the Sphenopterygoid muscle also contributes to the above process and Pterygoid is pulled forward and ectopterygoid is pushed upward.

(iv) The upward movement of ectopterygoid brings about a rotation of maxilla on its own axis and as a result fangs are erected.

(v) The mouth closes by the contraction of anterior temporalis and pterygoid muscles. Fangs pierce into the skin of the victim.

(vi) Muscles associated with the poison gland (masseter and mandibular) contract and the poison is squeezed into the body of the victim through the poison ducts and fangs.

The **fangs** remain curved include in closed mouth during resting conditions.

The contraction of **temporalis** muscle pull lower jaw upward which result in **closure of mouth** and **insertion of fangs** into the body of the **prey**.

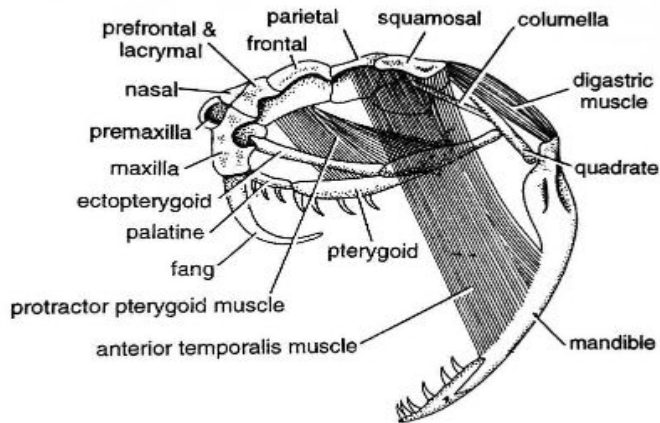


Fig. Opened mouth of biting snake

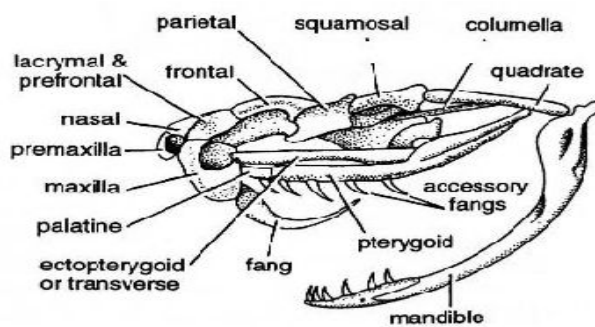


Fig. Closed mouth of biting a snake

Snake Poison (Venom)

Snake venom is complicated mixture of many organic compounds, for example — Protcolysins, Cardiotoxins, Haemorrhagin, Neurotoxins and Antibactericidum etc.

Various symptoms are shown by the victim of snake bite by different snakes. In the cobra bite the victim feels pain, weakness and difficult breathing. There is profuse salivation and frequent vomiting. The victim also becomes much lethargic. There is nervous breakdown also. In Krait venom the victim feels pain in abdomen, rest symptoms are like cobra. In the case of viper poison, swelling at the place of biting is very common, also rupture of endothelium, hemorrhage and blood clotting are very common signs. Low blood pressure and heart failure are also common.

Infection of Venom

At the time of **infection of venom** the **muscles** contract after the **piercing** of the **fangs**.

The **contraction of the muscle** causes the squeezing the **poison gland** into the **groove** or channel of the fangs.

Snake Venom

The **snake venom** is a clear **sticky liquid** of **faint yellow** or **greenish colour**.

It is **tasteless** and **odourless** and **acidic** in **reaction**. An **acidic** solution which becomes **crystalline** after drying up. It contains **proteolytic enzymes**, which causes severe damage to muscle **endothelium**. The **phosphatidase** causes **haemolysis**, which is present in the **venom** of **pit** vipers, **proteases**, **erepsin**, **cholinesterase**, **Hybronidases**, **Ribonucleases**, **ophio**, **oxidases** etc. also remain present in the **venom**.

