Biting Mechanism in Snake

The biting mechanism in snakes is a fascinating aspect of their biology, intricately adapted to their predatory lifestyle and, in venomous species, their defensive capabilities. Let's delve into the full-length answer, covering various aspects of this mechanism:

Dental Structure:

Snakes possess a unique dental structure that is crucial for their biting mechanism. They have different types of teeth, including fangs and regular teeth. Fangs are specialized teeth primarily used for injecting venom into prey or threats. These fangs can vary in size, shape, and location depending on the species.

Venom Delivery System:

Venomous snakes have evolved a sophisticated venom delivery system. Their fangs are hollow or grooved, allowing venom to flow from venom glands located behind the eyes through ducts and into the fangs. When the snake bites, muscles around the venom glands contract, forcing venom into the prey through the fangs. The venom is a potent cocktail of proteins, enzymes, and toxins that immobilize or kill the prey and aid in digestion.

Fang Types:

Venomous snakes can be categorized based on their fang types. Some species have fixed fangs, such as vipers and pit vipers, where the fangs are rigidly attached to the maxillary bone. Others, like rear-fanged snakes such as boomslangs and vine snakes, have grooved fangs located towards the back of the mouth. These fangs can be folded against the roof of the mouth when not in use and are typically smaller than those of front-fanged snakes.

Bite Mechanics:

The mechanics of a snake's bite depend on its feeding habits and prey type. Constrictors, such as pythons and boas, use their teeth to seize and hold onto prey while they coil around it, exerting pressure to suffocate it. Venomous snakes, on the other hand, strike quickly and release their

prey, allowing the venom to take effect before consuming it. Some species may also use constriction in conjunction with venom to subdue their prey more effectively.

Defensive Biting:

Snakes also use their biting mechanism defensively. When threatened, they may strike as a warning or as a means of self-defense. Even non-venomous snakes can deliver painful bites, while venomous species possess bites that can be potentially lethal to humans and other animals.

Regeneration of Teeth:

Snakes continuously replace their teeth throughout their lives. As teeth become worn down or damaged from feeding, new teeth grow in to replace them. This ensures that the snake maintains an effective biting mechanism. The rate of tooth replacement varies among species but generally occurs frequently, ensuring that the snake always has functional teeth for hunting and defense.

Poisonous snakes have movably and loosely articulated jaw and skull bones, which allows them to swallow entire big prey pieces and open a huge gape. While the fangs of vipers are broad and curled and rest against the root of the mouth cavity when closed, the fangs of cobras are tiny and stay continuously upright. The upper jaw's bones are only slackly joined to the rest of the skull by the premaxilla, which is often toothless. connected to the squamosal quadrate.

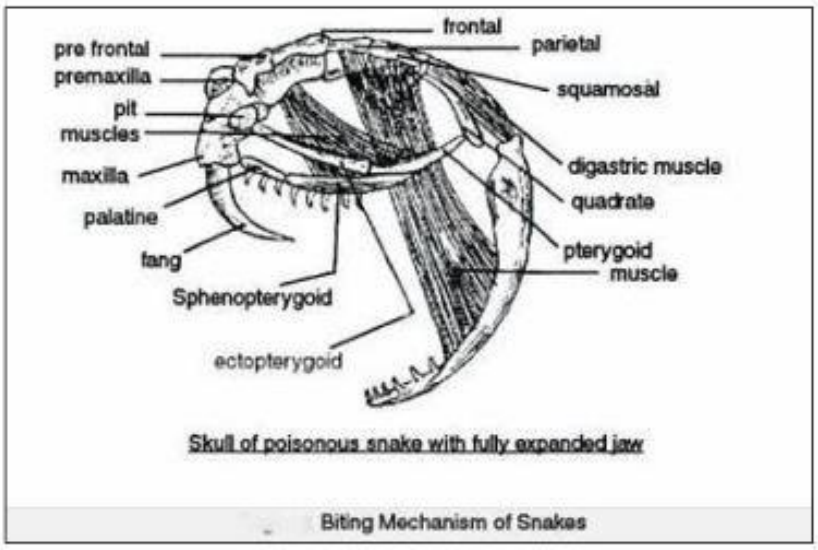
The prefrontals, nasals, and frontals, as well as a few more brain case, palate, and jaw bones, are all joined by moveable joints. Due to their flexible ligaments and ability to move in several directions, these joints provide a large gap. Ligamentous tissue with elasticity connects the two portions of the lower jaw. They can therefore be quite far apart from one another. When a deadly snake bites, there are four different phases: (i) the striking; (ii) the mouth opening and the fangs rising; (iii) the jaws shutting and the venom being injected; and (iv) the fangs retracting.

I. **The strike**. The snake launches itself forward violently and quickly during this phase, covering a distance that often doesn't surpass one-third of its length. Vipers strike

more quickly than colubrids; some, particularly the hooded species, elevate their heads off the ground to somewhat compensate for their fangs' restricted range of motion.

II. **Opening of the mouth, rotation of maxilla and elevation of the fangs**. The majority of poisonous snakes close their jaws before striking, but as the head gets closer to the victim, the digastric, cervicomandibular, and vertebro-mandibular muscles contract quickly, depressing the mandibles. At the same time, the pterygo-palatine-transverse arch forward swings, rotating the fangs forward, thanks to the contraction of the spheno and parieto-pterygoid muscles. The lower jaw descends and the lower end of the quadrate advances when the mouth opens. Squamosal and quadrate are highly mobile. The palatine is movably joined to the pterygoid. The pterygoid is forced forward and the pterygo-palatine joint is bent by quadrate. The trans-palatine bone transmits the pterygoid's forward motion to the maxilla, causing it to spin by about 90° at its prefrontal articulation.

III. **Closure of the mouth and the injection of venom**. The simultaneous contraction of the anterior, middle, and posterior temporal muscles, which significantly raise the mandibles, causes the jaws to close. The superior and inferior portions of the anterior temporal muscles compress the venom gland in colubrids, causing torsion on its capsule and the expulsion of venom along the duct, whose papilla approximates the groove at the base of the fang. However, in some Australian species, venom has been



known to spurt during a snap bite, even when no object is actually being bitten. The venom gland's anatomical arrangement is completely different in vipers, and its contents are expelled instantly without the need for the lower jaw to be fixed.

IV. **Retraction of the fangs/ insertion of venom:** The retractor muscles of the pterygopalatine-transverse arch contract immediately after the fangs are inserted, and this contraction actually coincides with the release of venom. The result is the dragging of the raised fangs through the tissues, both downward and backward. The muscles tense up following the fang penetration at the moment of venom injection. The poison gland is forced into the fangs' groove or channel by the muscular contraction. Even while the four steps, which include the venom inoculation, are discussed individually, in nature they take the form of a sequence of quickly coordinated movements, with several deadly dosages sometimes injected in a split second, particularly in the case of vipers.