Farokh J. Master
Snakes to Simillimum - Demystifying Venom

Reading excerpt

Snakes to Simillimum - Demystifying Venom
of Farokh J. Master
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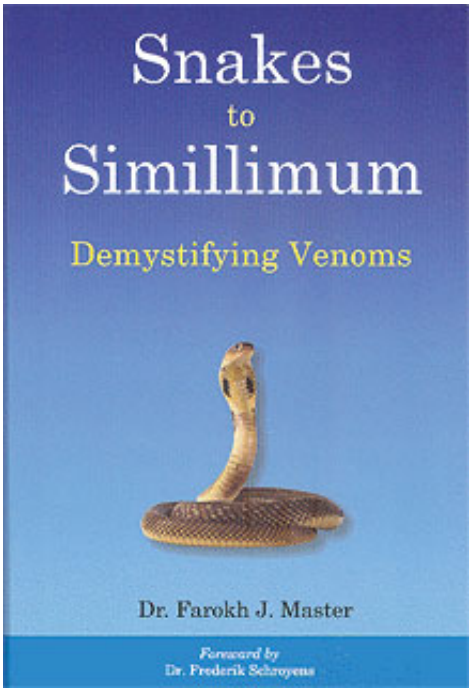

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ANATOMY OF SNAKES

From the time immemorial man has always been aware of venomous animals and has had a natural fear of them. This fear stems from painful experiences early in life like being bitten by an insect. Animals dangerous to man have always excited attention. Dangerous animals, and in particular those which deliver a poisonous bite or sting, hold a particular fascination and horror. The words "venonr" and "poison" are almost synonymous, but venom is usually used to describe a poison that is injected by stinging or biting.

Poisonous snakes use their venom for capturing prey. Snakes and their venom are important natural resources and play an important part in the ecological balance of ecosystems. Snakes control rodent populations, thus preventing the destruction of grains and minimizing the spread of diseases found in rodent populations.

GENERAL ATTRIBUTES

Snakes are the most linear of vertebrates, having only a skull and an extended spinal column. Most other vertebrates have some sort of appendages for locomotion—wings, legs, arms, flippers, finsr-but not the snake. On an evolutionary scale, snakes are the youngest of the reptiles, having appeared only about 150 million

years ago. Almost undoubtedly snakes have developed from lizards. Their bodies seem to have adapted to a life of burrowing. The legs were lost because they would interfere with burrowing. The ear channel was sealed off to keep out dirt, and the ear bones, instead of being connected to the eardrum, are joined to the Iower jaw for sensing soil vibrations better. The unique structure of modern snakes' eyes suggests that the organs had nearly vanished among ancestral snakes, then re-evolved when snakes once more took to the surface and needed vision.

Their paired ribs arch out from each of the hundreds of . vertebrae, forming a concave umbrella that runs the entire length of the body. The amount of movement between each spinal segment is limited, but the net effect is an animal that can writhe and coil sinuously, so that even the word we use to describe such shapes is "Serpentine." Snakes use four patterns of movement: lateral undulation, concertina movement, rectilinear movement and sidewinding (used by desert vipers). When they are at rest, their bodies are always coiled, forming drooping loops; they never remain stretched out.

They have delicate spines that can be easily damaged; even the skull is made up of many small, lightly fused bones, lacking the solidity of a mammalian skull. The ribs are attached to the vertebral column and to each other with elastic muscles and tendons and also to the skin, which contains other connecting muscles. Thus, the snake can control the movement of its ribs, skin and individual scales äs well.

Animals are, äs a rule, bilaterally symmetrical that is, appendages and paired organs are the same size and positioned opposite to each other. Snakes, which have already dispensed with legs, have also broken the rule of symmetry with regard to several internal organs due to the elongated narrow cylindrical body shape.

Most snakes have one right lung that is elongated filling the whole body cavity. In snakes that also have a left lung, it may be reduced or vestigial and non-functional. The heart is also somewhat elongated and like most reptilian hearts, is only partly efficient; it has three chambers and the chambers allow the oxygenated and deoxygenated blood to mix. More importantly, a snake lacks an effective way of creating and maintaining body heat; thus, they are referred to äs "cold-blooded" animals.

SNAKE DISTRIBUTION

The "cold-blooded" characteristic explains the worldwide distribution of snakes; they are most common in tropical and warm desert environments, less so in temperate zones, and all but absent from the highest latitudes and altitudes. In the tropics, blessed by constant high temperatures the year round, at night äs well äs during day, snakes can be active with little concern for the weather, ensuring only that they avoid direct midday sun. In temperate regions, snakes retreat into hibernation from early autumn until warmer weather arrives. Hibernating snakes are not asleep äs it is commonly thought, their body temperature simply drops so low that function becomes impossible—respiration and heartbeat become almost imperceptible. If the temperature should dip below freezing, snakes risk death. Many die nevertheless, since though metabolism diminishes, it does not stop completely, and those snakes which do not have sufficient fat reserves, die.

FANGS AND TEETH

Snakes can be class^d on the structure of their fangs. Non-venomous snakes such äs the grass snake have no fangs and are called *aglyphs.* The back-fanged snakes or *opisthoglyphs,* have

fangs at the back of the mouth. Each fang has a groove along which venom flows. To inject a good dose of venom, the snake hangs on to its victim and chews its flesh. If such a snake is struck away immediately from the body it has bitten, the bite will not be severe. Cobras are *proteroglyphs* with fangs at the front of the mouth, The fangs of some proteroglyphs bear grooves while, in others, the sides of the grooves meet to form a canal. The position of the fangs and the canal makes injection of the venom more efficient. The mambas are proteroglyphs with very potent venom. The black mamba is notoriously aggressive.

The most advanced biting apparatus belongs to the *solenoglyphs.* The vipers, the rattlesnakes, fer-de-lance and others have very long fangs, each having a canal. When not in use, they are folded along the roof of the mouth. The strike is rapid, the fangs are thrown forward. and the snake then withdraws without chewing like opisthoglyphs an,d proteroglyphs. Proteroglyph venom acts mainly on the nervous System, while that of the solenoglyphs attacks the blood System and destroys tissues.

Almost all snakes will bite if provoked, although there is a world of difference between what constitutes provocation for different species. In a confrontation, an animal can kill or maim its adversary or it may get killed itself. It is far safer to retreat. For this reason, venomous animals are usually noticed only when they are forced to fight and have been unable to slip away unseen. Therefore. snakes have got a reputation for attacking on sight.

Another point to remember is that the bite or sting may not be 100 percent effective. Snakes may strike and miss, and accounts of snakebites usually omit the number of bites, which have resulted in a little or no venom being injected.

A snake's bottom jaw has a hinge which helps the snake to open its mouth very wide. It can swallow things which are quite

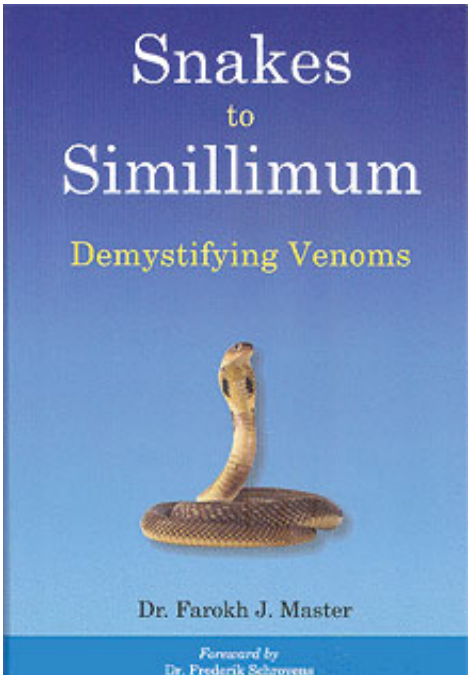
big. All snakes are strictly carnivorous. They can go for extended periods without any food because of slow metabolism. Snake's teeth (besides fangs) are fairly simple: short, backward curving and very sharp. They are designed merely to grip and hold, but they lack cutting surfaces and cannot chew or chop the prey into smaller pieces. It must have some way to force the whole food into its throat. Swallowing a large prey can be a lengthy and difficult process, and may take over an hour. With its mouth plugged, the snake needs a way to breathe. It does so by extending the glottis, a tube-like organ embedded in the floor of the mouth, around the prey. The glottis is the perfect breathing tubes bypassing the food until it is swallowed completely. The length of time it takes to digest the food depends on the air temperature. Most snakes are happy to eat live 'food' but a few groups of large snakes kill their prey immediately before eating.

The teeth of a snake,-{apart from the fangs), are needle-like, sharp and pointed. The fishhook-like recurved teeth point towards the rear of the snake's throat and pierce prey easily. With most snakes, having more than 200 teeth, no amount of struggling enables the prey, once caught, to escape the grasp of the jaws. A snake's teeth are continually shed in one of nature's best maintenance programs and are replaced by new teeth before the older teeth loosen and fall out.

SKIN

The skin of a snake is smooth, cold and dry to touch. Like all reptiles, snakes are protected by a layer of horny scales growing out of the skin which may hide the skin completely from view. Scales come in a wide variety of shapes, sizes and textures; there is even a scale, called the brille or spectacle which covers the lidless eye.

The outer layer of a vertebrate's skin is dead and must be replaced äs the animal grows. Human skin cells slough off individually äs scurf, but reptiles and amphibians shed the entire outer layer at once, at fairly regulär intervals. This is called "molting" and is especially drastic among snakes. The process begins with the release of hormones which trigger the growth of a new layer of skin and scales beneath the existing layer. Once that step is completed, lymphatic fluid is pumped into the microscopic space between the two layers, separating them and causing the eyes to appear milky. About 24 hours before molting, the fluid is reabsorbed and the eyes clear. The snake begins to rub its nose against an abrasive surface, until the tiny rostral scale comes loose, the same happens with the mental scale at the tip of the lower lip. Gently rubbing, the snake literally slides out of its old skin, which peels off inside out, like a long sock. The molted skin is thin and translucent, but retains a hint of color, and an exact replica of the snake's scale pattern, right down to the eye brille.



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