Poisonous and Non poisonous Snakes

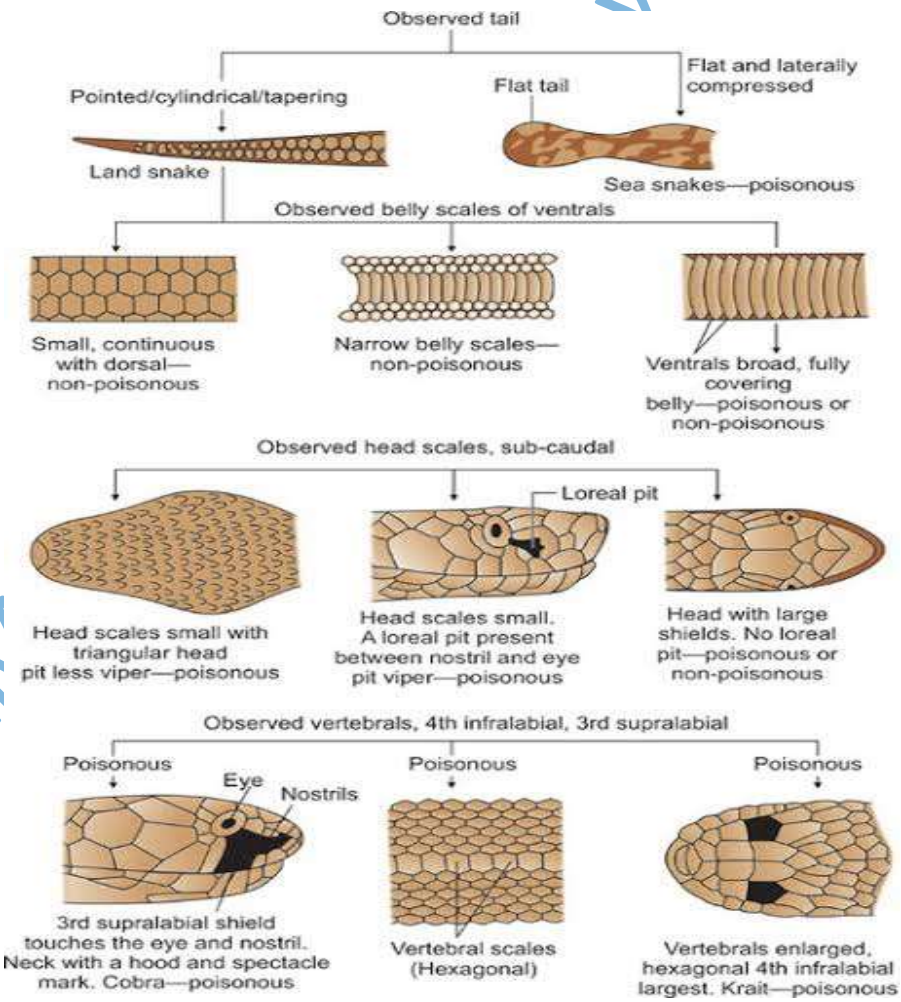
Introduction:

Snakes are the reptiles without limbs. They belong to order Ophidia- the snakes. In the classification we have studied that vertebrates are having two pairs of pentadactile limbs. The presence of limbs is governed by Hox genes. In snakes the hox genes governing limbs are already lost. This is having environmental stress. The snake habitat belongs to crevices and holes. It was difficult to enter the holes in presence of limbs. During the course of evolution the limbs are lost.

In India, snakes are represented by over 200 species distributed in 11 families. Mostly the snakes are non-poisons or harmless animals. The exoskeleton of snakes is in the form of scales and shields. Taxonomically the arrangement of scales & shields is peculiar in different species & forms an important basis for their identification.

Identification of Poisonous & non-poisonous snakes:

Chart showing key to identification of non-poisonous & poisonous snakes. Observing & comparing following characters can distinguish the poisonous & non-poisonous snakes of India.



Type of the tail: Type of the tail is an important criterion, where all marine snakes can be separated.

a).Tail laterally compressed: If the tail is flat, laterally compressed, it is a marine & highly poisonous snake.

b). Tail cylindrical: Or rounded- terrestrial or land snakes may be poisonous or non-poisonous.

c) In North America is found most poisonous snake the Diamondback Rattle snake. Small portion of the skin after molting is not cast off from tail of the rattle snake. After five to six seasons it forms loose rings and makes a rattle like sound when shivered. This apparatus is known as rattle, and bears the name the rattle snake. Before strike the snake shakes the rattle for alarming the victim. Its jaw opens wide and the snake strikes making a jump especially on the face of the victim.

2. Type of ventral scales*:* The scales on ventral side of the trunk are called ventral scales. If the tail is cylindrical, then observe the ventral scales.

a. The ventral scales are small & continuous with the dorsal scales- the snake is non-poisonous.

b. The ventral scale is broad but not cover the belly completely – the snake is non-poisonous & land snake. Ex. Python.

c. The ventral scales are broad & run completely across the belly – it may be a poisonous or non-poisonous snake.

3. Type of the head, shields/ scales: Now observe the head shields.

a. If shields are absent on heads & instead it is covered with small scales- the snake is poisonous & it is a viper.

I. Presence of loreal pit between the nostril & eye – pit viper, poisonous.

ii. Absence of pit & sub-caudals are divided – Russell's viper, poisonous.

iii. Loreal pit absent, sub-caudals are undivided- Indian viper, Echis carnets, poisonous.

b. Head is covered with large shields- the snake may be poisonous or non-poisonous. Then observe the arrangement of shields and scales of the body.

1. The third supra labial shield touches eye & nasal shield- may be cobra or coral snake. Both are poisonous.

i. Neck with hood – cobra.

ii. Hood absent, coral strips on the body – coral snake.

2. The middle row of body scales on the back are called vertebrals. The vertebrals are large & hexagonal – the snake is poisonous & it is a Krait.

3. Presence of large shields on head but absence of hood, coral strips, and large vertebrals – then the snake is non-poisonous.

Presence of scales and the type of head or tail for identification is having academic value only. The common man faces snake accidentally. This accidental visit of the snake does not give any clue for knowing the snake. Any person having knowledge of snake anatomy shall be able to identify the dead snake. The general tendency of people after the first site of the snake is to kill a snake. The method of killing the snake is smashing the head of the snake. The smashed head will not provide the clue for identification.

Apart from nature of scales & shields, the snakebite mark & the nature of blood flow also form important criteria to identify poisonous & non-poisonous snakes.

Most of the snakes are non-poisonous, but those, which are poisonous, possess a poison apparatus.

Snake Venom And Antivenin.

Venom:

Snake venom is a poison secreted by the venom gland. The secretion probably assists digestion & paralyses the prey. It is a clear sticky liquid of faint yellow or greenish colour. It is tasteless, odorless & acidic in reaction. Venom in general consists of a mixture of many proteins, some metallic ions & hydrolytic enzymes. The toxicity is due to the simultaneous effects of all these together. The cobra venom is faint transparent yellow & slightly viscous. The viscosity varies according to the season. It is thicker in winter. The pH of cobra, venom is 6.8. Viper's venom is sometimes white & sometimes yellow with 5.8 pH. The venom can be dried as crystal. The dried venom is easily soluble in water. According to Anima Devi (1968), nitrogen content in Cobra venom is 16.8% & 15.8% in Russell's viper. Similarly phosphorous content is 9.36/100 mg & 13.02/100 mg in cobra & Russell's respectively. The main protein factor is neurotoxin & consists of more than 17 amino acids in case of cobra venom. These proteins exert various types of effects on nervous tissues producing paralysis also. Its effect on diaphragm leads to heart failure. The different enzymes present in the venom are proteases, phospholipase-A, cholinesterase, Ophio-Amino-oxidase, Nucleases, Hyaluronidase and Pyrophosphatese.

Effects *of Venom:* Nature has provided the snake with all the powerful enzymes. The effect produced by the venom varies considerably according to the composition of the venom, quantity injected, the site of the bite & the group to which the particular venom belongs.

Generally the effects of venom are neurotoxic, haemotoxic & cytotoxic affecting nervous system, blood system & tissue system respectively. All most all neurotoxins prevent the transmission of stimuli from nerves to muscles leading to paralysis. Heamotoxic venom causes destruction of red blood capillaries leading to leakage of blood from damaged vessels into internal organs & body cavity. The cytotoxic venom shows general cell damaging property. They also cause an irreversible change in the electric potential of cell membranes of nerve cells, & repress its sensitivity. The venom also causes muscular & renal necrosis & destruction of the capillary wall.

Types of venom: There are three types of venom according to its effect viz. Haemotoxic, Cytotoxic and Neurotoxic.

1. **Neurotoxin venom**: It acts on the nervous system. It affects the optic nerves, causing blindness, or the phrenic nerves of the diaphragm, producing respiratory paralysis. The venom of Krait, cobra and sea snake is neurotoxic.
2. **Haemotoxic venom:** It acts on the circulating system including heart and blood. It destroys the endothelium of the smaller blood vessels, causing bleeding into the tissues and coagulation of blood there. The venom of Viper is haemolytic.
3. **Cytotoxic venom:** It is a type of venom that kills cells and can cause a variety of effects, including Edema, blistering and cell death (Apoptosis and necrosis). This venom is not as deadly as hemotoxic or neurotoxic venom. Venom of puff Adder (*Bitis arietans*)

Antivenom: (Antivenin)

Serum against various venoms can be produced by injecting animals such as horses with sub lethal doses and extracting the immune serum, or antivenin from the blood of horse. Haffkine Institute, (Mumbai) produces anti- venom serum by hyper-immunizing horses against the venoms of the four common poisonous snakes. I.e. Cobra (Naja naja), Krait (Banjarus caeruleus), Russell's viper (Vipera ruselli) & saw-scaled viper (Echis carnatus).

Antivenin can be stored in refrigerator or at room temperature if available in the form of freeze-dried powder. The refrigerated antivenin is potent for six months. Freeze dried powder can be kept for five years without losing potency. It can be given by mixing with normal saline or with injectible water.

The antivenin of all poisonous terrestrial snakes is called polyvalent antivenin. There is **no antivenin** available against **bite of King cobra.** One Swiss company produces antivenin against Malaysian king cobra. But it is not effective against Indian king cobra.

Separate antivenin is marketed against Sea snake. It is available in government clinics of coastal region. The incidents of bite of sea snake are rare.