



SARASWATI INSTITUTE OF PHARMACEUTICAL SCIENCES

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CLINICAL TOXICOLOGY

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ENVENOMATION

FAMILIES OF VENOMOUS SNAKE

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Classification of Snakes

- Snakes are classified on the basis of morphological characteristics such as arrangement of scales (lepidosis), dentition, osteology, myology, sensory organs, and immunological analysis of venom and serum proteins, and sequence analysis of DNA that encodes mitochondrial and other enzymes.
- There are about 3500 known species of snakes in the world, of which less than 350 species are venomous. Among non-venomous snakes.
- only the giant constrictors belonging to family Boidae are dangerous to man.
- Examples include rock python (*Python sebae*) of Africa, reticulated python (*Python reticulatus*) of South East Asia, especially Indonesia, and anaconda (*Eunectes murinus*) of South America. The Indian rock python is seen all over India, and grows up to 3 metres, but not a single case of human fatality has been reported that can be definitely attributed to this snake. The regal python of Nepal grows up to 10 metres in length, and is said to be the largest snake in the world

- Snakes (also referred to as serpents) are limbless creatures with elongated bodies covered with scales.
- The body is divided into head, trunk, and tail.
- The head may be oval, triangular, or the same width as the trunk, ending as a blunt snout.
- The head bears two eyes, two nostrils, and a mouth.
- The eyes of a snake lack eyelids, each being covered by a transparent scale.
- Pupils may be round or elliptical.



Venomous snakes belong to 5 families:

- Colubridae
- Atractaspididae
- Elapidae
- Viperidae
 - a. Viperinae or true vipers
 - b. Crotalinae or pit vipers:
- Hydrophidae

COLUBRIDAE

- This family includes almost 1400 species, or 75% of all the snake genera and 78% of all the snake species in the world.
- Approximately 400 of these species of Colubridae have short immobile fangs, or enlarged solid teeth at the posterior end of the maxilla.
- About one third of the Colubrid species possess rear fangs which deliver a toxic saliva delivered by a chewing motion.
- Colubrid snakes are the predominant species on all continents except Australia.
- Examples include mountain racer, Western and Eastern hognose snakes, parrot snake, rat snake, wandering garter snake, etc..



TRACTASPIDIDAE

- This family comprises African and Middle Eastern burrowing snakes (also known as burrowing or mole vipers or adders, false vipers, side-stabbing snakes), which have very long front fangs used for immobilising their prey by a side-swiping motion.
- These fangs often protrude from the corner of the partially closed mouth.



ELAPIDAE

- These snakes have relatively short, fixed front (proteroglyph) fangs, which however may extend up to 10 mm long).

- They are anchored at the anterior portion of the maxilla.

Examples

a. Cobras (Naja)

b. Kraits (Bungarus)

c. Coral snakes (Calliophis, Maticora, Micrurus)

d. Mambas (Dendroaspis)



VIPERIDAE

- These snakes have highly developed long curved, hinged, front fangs, which are channelised in the form of a hypodermic needle. There are two sub families
- a. Viperinae or true vipers: Vipers and adders
- b. Crotalinae or pit vipers: Rattle snakes (*Crotalus*, *Sistrurus*), and Asian pit vipers (*Trimeresurus*, *Hypnale*).





C



B



A

HYDROPHIDAE

- This family comprises sea snakes, which have short fixed fangs as in the case of the elapids.
- Approximately 330 species of snakes exist in India, of which about 70 species are venomous (40 land snakes and 30 sea snakes).
- The commonest Indian venomous snakes are referred to as the “Big Four”,

A-comprise common krait (*Bungarus caeruleus*)

B-common cobra (*Naja naja*)

C-saw-scaled viper (*Echis carinatus*)

D-Russell’s viper (*Vipera russelli*).



D



Other venomous snakes which are less commonly encountered include

A - Green pit viper or bamboo snake (*Lachesis gramineus*)

B - Large-spotted viper (*Lachesis monticola*)

C - Horse-shoe viper (*Trimeresurus strigatus*)

D - Gray's viper (*Trimeresurus purpureomaculatus*)

E - Anamalai viper (*Trimeresurus anamallensis*)





F - Brown or common himalayan viper (*Agkistrodon himalayanus*)

G - Hump-nosed viper (*Agkistrodon hypnale*)

H - Millard's viper (*Agkistrodon millardi*)

I - Large-scaled viper (*Lachesis macrolepis*)

J - Mock viper (*Psammodynastes pulverulentus*) all of which are pit vipers.





Following are important:

- A - King cobra (*Ophiophagus hannah*)
- B - Bibron's coral snake (*Calliophis bibroni*)
- C - Maclelland's coral snake (*Calliophis maclellandi*)
- D - Slender coral snake (*Calliophis trimaculatus*)
- E - Common Indian coral snake (*Hemibungarus nigrescens*).
- The commonest sea snake encountered in Indian seas is the
- F- Hook-nosed sea snake (*Enhydrina schistosa*).



Common Indian Venomous Snakes

- Indian Snakes of Medical Importance
- The WHO classifies the following as Indian Snakes of Medical Importance:
 - Class I - Commonly cause death or serious disability: Cobra/Russells Viper/Saw-Scaled Viper
 - Class II - Uncommonly cause bites but are recorded to cause serious effects (death or local necrosis): Krait/King Cobra
 - Class III - Commonly cause bites but serious effects are very uncommon. It is interesting to note that the king cobra is present on this list. There are other snakes such as the hump-nosed pit viper that also qualify under these categories. The term 'The Big Four' has been used in India for many decades, to describe the common cobra, Russell's viper, common krait and saw-scaled viper.



THANK YOU