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Anatomy of the Head of a Snake

Adder, *Vipera berus* (Linnaeus, 1758)

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The model shows:
the general features of the head of a snake the venom apparatus the distinguishing characteristics of the adder.

The head is shown with the mouth open for a clearer view of its parts, some of which are exposed.

General features

The head is longitudinally flattened. The toothed mouth has a large gape. The trachea (19) extends from the floor of the mouth to near the base of the chin. The snake is therefore able to breath during the act of swallowing. Below the trachea lies the muscular tongue sheath (4) with the deeply forked tongue. A notch on the anterior upper jaw edge enables the snake to flicker out tongue with the mouth closed, which is essential for smelling. The tips of the outstretched tongue received the scent and carry it to the openings of Jabobson`s organ (6) in the anterior palate region, marked red on the model. The laterally situated, apparently motionless eyes (1) give the snake its fixed, hypnotic gaze. In fact, the eyes are movable beneath the fused, transparent lids which cover them. The nostrils (2) are also situated laterally. No ear openings are present. The shields (21-35) are also characteristic.

Venom apparatus

The truly poisonous snakes have a venom apparatus of which the only externally visible parts are the two large fangs (8). Each fang is connected to a venom gland (12). Some snakes (opisthoglyphs) transfer their poison to the victim via a furrow on the anterior of the fang. The venomous vipers (solenoglyphs) to which the common viper belongs, transfer the poison by injecting it through a canal of hollow running through the interior of the fang. The fangs are attached to the upper jawbone. When the mouth is closed they lie close to the roof of the mouth, being for the most part embedded in sheaths of mucous membrane (9). However, they can be raised to the upright position by rotation of the upper jaw. This is shown on the model where the left fang and its replacement fang protrude further our of the surrounding mucous sheath than do the right fangs. The other teeth (7) have nothing to do with the venom apparatus; they attach to the mandibular bone and to the front part of the lower jaw.

The venom glands extend on each side to well behind the eyes, and can be regarded as a modified part of the upper labial slivary gland with its own excretory duct



on the upper jaw. These comprise the venom producing venomsalivary gland (12) and the venomsalivary gland duct (10) to the front in the form of a developed accessory gland (11) which assumingly increases the effect of the venom. The significance of the accessory mucous gland is not yet known. The entire venom gland complex is enclosed in connective tissue (13). This is partly open on the model. Between the eye and venom gland part of the Harderian gland (14) is visible, and between the venom gland complex and upper lip the actual upper labial salivary gland (15) can be seen.

Distinguishing characteristics of the adder

Apart from the special varieties (melanistic or flavinistic forms), the more or less clear or completely developed x-shaped marking on the top of the head is the most obvious characteristic of the common viper. This mark distinguishes the adder from other native species - most clearly from the grass snake, *Natrix natrix* (LINNAEUS), with its yellow crescent-shaped spots on the nape of the neck; also from the smooth snake, *Coronella austriaca* LAURENTI, with its crown-like patch on the back of the head, and the dice snake, *Natrix tessellata* (LAURENTI), which has a spot with a forward point on the neck.

A vertical pupil (1) and a reddish-brown iris (1) as well as the characteristic size and distribution of the head shields (21-35) are also distinguishing features of the adder. The upper-labial shields (32) are separated from the lower edge of the eye by a series of small scales. This is not the case in non-poisonous native snakes. Moreover, the latter have nine larger shields on the upper side of the head where the adder has only five (25,26,31).

The model does not emphasize the triangular shape of the head (seen from above) so often regarded as typical, because the head only takes on this form when the animal is irritated or when the glands are swollen with venom. The detailed naming of the head shields is of special taxonomic interest.

Organs shown:

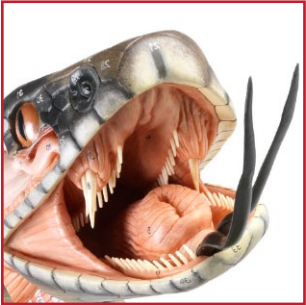
1. Eye, with vertical pupil
2. Nostril
3. Forked tongue
4. Tongue sheath
5. Larynx
6. Openings of Jacobson's organ
7. Teeth
8. Fang, with replacement fang behind
9. Fang sheath of mucous membrane
10. Venom duct
11. Accessory gland
12. Venom gland
13. Connective tissue of the venom gland
14. Harderian gland
15. Upper labial salivary gland
16. Masseter muscle
17. Zygomatic ligament
18. Esophagus
19. Trachea
20. Left horn of the hyoid bone

Shields and scales (when given in the plural these are in pairs or multiples of same):

21. Rostral shield, Rostrale
22. Nose-horn scales, Apicalia
23. Canthal scales, Canthalia
24. Internasal scales, Intercanthalia
25. Frontal shields, Frontale
26. Parietal shields, Parietalia
27. Keeled dorsal scales, Dorsalia
28. Prenasal scales, Nasorostralia
29. Nasal scales, Nasalia
30. Preocular scales, Praeocularia
31. Supraocular scales, Supraocularia
32. Upper-labial shields, Supralabialia 8-10
33. Chin shield, Mentale
34. Lower-labial shields, Sublabialia, 10
35. Groove shields, Inframaxillaria
36. Ventral shields, Ventralia

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ZoS 115 • Anatomy of the Head of a Venomous Snake Adder

enlarged approximately 15 times, made in SOMSO-Plast®. After Studiendirektor Christian Groß. It illustrates very clearly the general construction of the head of a snake, the venom apparatus and the distinguishing characteristics of an adder. Not detachable, on a stand with green base.

Height: 39 cm., width: 49 cm., depth: 26 cm., weight: 1.7 kg

SOMSO snake models of the common European viper graphically illustrate the relationships existing between the typical characteristics of poisonous snakes: solenoglyphous (pipe grooved) dentition, opisthoglyphous (rearward grooved) dentition, proteroglyphous (forward grooved) dentition, neurotoxic and hemotoxic snake venom, colubridae, venomous colubrids, vipers, vertebrates, sensory organs, smell, forked tongue, nasovomeran organ, infrared receptors, inner-ear vibration detection, mobile jaw, vertically split pupil, snakebite, toxins) and medicinal active agents as medicaments (snake serum, immunoserum, antidote, antitoxin, neurotoxin, hypertension).

SOMSO reptile models serve as zoological teaching tools in the study of biology, medicine and zoology, and in the specialisations of toxicology, natural medicine, homeopathy, hematology and herpetology.

Further informations:

http://en.wikipedia.org/wiki/Vipera_berus

<http://en.wikipedia.org/wiki/Snake>

http://en.wikipedia.org/wiki/Venomous_snake

<http://en.wikipedia.org/wiki/Viperidae>

<http://en.wikipedia.org/wiki/Elapidae>

http://en.wikipedia.org/wiki/Snake_venom

<http://en.wikipedia.org/wiki/Neurotoxin>

<http://en.wikipedia.org/wiki/Antivenom>

<http://en.wikipedia.org/wiki/Snakebite>

<http://en.wikipedia.org/wiki/Antiserum>

<http://en.wikipedia.org/wiki/Herpetology>

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