



THE SNAKES OF INDIA

BY

Lieut.-Colonel K. G. GHARPUREY, I. M. S. (Ret.)

NO.

26

Price: Rs. 3

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Calcutta July 1941.



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THE KING COBRA

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BY
Lieut.-Colonel K. G. GHARPUREY, L. M. S. (Ret.),
B. A., F. R. G. S., F. Z. S.

Second Edition

1937

THE POPULAR BOOK DEPOT
LAMINGTON ROAD, BOMBAY 7

Price: Rs. 3/-

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Printed by Mr. Anant Vinayak Patwardhan, at the Aryabhushan
Press, House No. 936/3 Bhamburda Peth, Poona 4

and

Published by Mr. G. R. Bhatkal at the Popular Book Depot,
Lamington Road, Bombay 7

Preface to the Second Edition

The favourable reception accorded to the first edition of this book by the public, the Press, and several medical officers and the medical profession both in British India and in the Indian States, as well as the fact that a second edition has been called forth so soon after the appearance of the first, may be regarded as an indication that the book has supplied a want of a popular book on snakes in this country. The present edition has been revised and enlarged in some places with a few minor alterations.

The author gratefully acknowledges his obligations to the REV. FATHER J. F. CAIUS of the St. Xavier's College, Bombay, for making valuable suggestions and furnishing some new information, specially in the chapter on snake mythology and folklore, which have been availed of in the present edition, and to Mr. R. K. Golikere, who has extended his chapter, at my request, to include some information about the natural enemies of snakes in various parts of the world. It is hoped that these few additions will be of interest to the readers.

During the past year some interest is aroused in this subject as snake-poison is being used in the treatment of certain diseases. Cobra-venom is being tried in cancer and the poison of Vipers, specially Russell's Viper, in the minutest quantity, is used to arrest bleeding and in diseases of blood as Hæmophilia.

January 1, 1937

K. G. G.

Preface to the First Edition

Most snakes, especially if they are of any size, are regarded as poisonous by the people in India, and this, together with the superstitions and legends that have grown round the various snakes, is responsible for a certain number of deaths from snake-bite, even where no poison is injected with the bite. Some deaths are due to sheer fright, and some to ignorance and unscientific methods of treatment. This ignorance will be dispelled if the people are able to recognize the dangerously poisonous kinds of snakes. Snake-bite cases are sometimes, out of ignorance, treated by profusely douching the head and body with cold water, by making the bitten person walk about to prevent his sleeping till he becomes exhausted, by incantations and mantras and various kinds of herbal medicines. These methods lessen the chances of recovery of a bitten person if the snake is a poisonous one, and are absolutely unnecessary in the case of a bite by a harmless snake. A knowledge of the dangerous kinds of snakes whose bite is likely to be fatal to man is essential, and the object of this book is to enable laymen to distinguish such snakes from others which are harmless, though these may have an aggressive or fierce appearance like the Python or Dhaman for instance. The importance of this knowledge will be appreciated from the fact that 20,000 to 23,000 persons die every year of snake-bite in British India alone. This is about ten times the number of deaths that occur every year from all other wild animals put together such as tigers, panthers, leopards, bears, wolves, hyænas and crocodiles. Attempts are made to prevent mortality from wild animals in several ways, but a knowledge of the various kinds of snakes and of the identification of poisonous snakes from non-poisonous ones is essential in reducing the present high mortality from snake-bite.

There is so far no modern standard book on Indian Snakes or a scientific and technical one. From my experience there appears to be a demand for some popular book giving general information and useful knowledge about the various common snakes of India. I have been interested in the subject for over 25 years, being drawn to it mainly by the heavy mortality figures. There is hardly anything original in this book. The information has been collected from diverse sources and put together without its being made too technical. A little information is added about some of the principal snakes of other countries, whose names one often comes across in the course of general reading. Burma and the Andamans, being at present under Indian jurisdiction, have been treated as a part of India for the purposes of this book.

Some of the illustrations given are not very clear, as they represent specimens of snakes preserved in spirit.

In the preparation of this work I have availed myself of the excellent articles on Indian Snakes by Colonel F. Wall, C. M. G., I. M. S. (RET.), in the Journals of the Bombay Natural History Society. Colonel Wall has made a thorough and extensive study of the subject, and but for his pioneer work, I do not think that the knowledge about the snakes of India would have progressed to the extent it since has. I cannot too highly express my indebtedness to his following two works which I have utilised freely :—

1. *The Poisonous Terrestrial Snakes of our British Indian Dominions and How to Recognise them.*
2. *The Snakes of Ceylon.*

I am also indebted to the following books and journals which I found necessary to consult :—

1. *Indian Snakes* by E. Nicholson.
2. *Thanatophidia of India* by Colonel J. Fayrer, I. M. S.

3. *Journals of the Bombay Natural History Society.*
4. *The Snakes of South Africa* by F. W. Fitzsimons,
F. Z. S.
5. *Snake Life Simply Told* by J. M. Dowsett.
6. *How to Identify the Snakes of India*
by Col. F. Wall, I. M. S. (RET.).

I am highly thankful to Mr. S. H. Prater, C. M. Z. S., Curator of the Bombay Natural History Society, for the great help he gave me as regards the illustrations and for his courtesy in placing the materials in the Society's possession at my disposal, whenever required.

I am also grateful to Mr. R. K. Golikere, the author of *Through Wonderlands of the Universe*, for kindly going through the manuscript and making many valuable suggestions and also for contributing a chapter at my invitation.

July 26, 1935

K. G. GHARPUREY

572(A)

CONTENTS

	Page
INTRODUCTION	... 1
CHAPTER	
I. GENERAL INFORMATION ABOUT SNAKES	... 3
II. ANIMALS CONFUSED WITH SNAKES	... 8
III. TEETH AND POISON-GLANDS	... 11
IV. SNAKE POISON	... 14
V. SCALES ON A SNAKE	... 18
VI. CLASSIFICATION OF SNAKES	... 24
VII. POISONOUS SNAKES	... 28
VIII. VIPERS	... 29
IX. PITLESS VIPERS :	... 31
(1) RUSSELL'S VIPER OR DABOIA	... 31
(2) SAW-SCALED VIPER OR ECHIS OR PROOBSA	... 34
(3) OTHER PITLESS VIPERS	... 36
X. PIT VIPERS	... 40
XI. COBRAS :	... 45
(1) INDIAN COBRA	... 45
(2) HAMADRYAD OR KING COBRA	... 53
XII. CORAL SNAKES	... 55
XIII. KRAITS :	... 58
(1) THE COMMON KRAIT	... 59
(2) BANDED KRAIT	... 61
XIV. SEA SNAKES	... 63
XV. BLIND SNAKES	... 65
XVI. BURROWING SNAKES	... 67
XVII. EARTH-SNAKES :	... 69
(1) RUSSELL'S EARTH-SNAKE	... 69
(2) JOHN'S EARTH-SNAKE	... 71
XVIII. CONSTRICTORS :	... 73
(1) PYTHONS OR ROCK SNAKES	... 74
(i) INDIAN PYTHON	... 74
(ii) RETICULATE PYTHON	... 76
(2) BOAS	... 76

	Page
XIX. IRIDESCENT EARTH-SNAKE	... 78
XX. SLUG SNAKES	... 79
XXI. WATER SNAKES	... 80
XXII. RAT SNAKES OR DHAMANS	... 84
XXIII. TREE SNAKES :	... 90
(1) WHIP-SNAKES OR LONG-NOSED TREE-SNAKES	... 90
(2) CAT SNAKES OR BROAD-HEADED TREE-SNAKES	... 93
(3) BRONZE-BACKS	... 94
(4) ORNATE TREE-SNAKE	... 96
XXIV. SAND SNAKES	... 97
XXV. WOLF SNAKES	... 98
XXVI. KEEL-BACKS	... 103
XXVII. KUKRI SNAKES OR FILLETED GROUND-SNAKES	... 108
XXVIII. OTHER SNAKES :	... 110
(1) TRINKET SNAKE	... 110
(2) COPPER-HEADED RAT-SNAKE	... 111
(3) GUNTHER'S REED SNAKE	... 112
(4) BRIDAL SNAKE	... 112
(5) MANY-TOOTHED SPOT-BELLIED SNAKE	113
XXIX. SNAKES IN BRITAIN, SOUTH AFRICA AND AUSTRALIA	... 114
XXX. IS A SNAKE POISONOUS OR HARMLESS ?	... 116
XXXI. TREATMENT FOR SNAKE-BITE	... 122
XXXII. PROTECTION AGAINST SNAKES	... 127
XXXIII. IDENTIFICATION OF A SNAKE	... 130
XXXIV. SNAKE MYTHOLOGY AND FOLKLORE	... 137
XXXV. GEOGRAPHICAL DISTRIBUTION OF SNAKES IN INDIA	... 141
XXXVI. A WORLD SURVEY OF DANGEROUS SNAKES AND THEIR ENEMIES (BY MR. R.K. GOLIKERE).	150
INDEX	... 161

List of Diagrams and Art Paper Illustrations

Note.—The asterisks indicate art paper illustrations.

FIGURE		PAGE
	King Cobra with hood raised ...	Frontispiece
1.	Slow-worm	8
2.	Hair-worm	10
3.	Teeth in the upper jaw of a harmless snake ...	11
4.	Section of teeth in the upper jaw of a harmless snake	11
5.	Poison-fang	12
6.	Poison apparatus in a venomous snake ...	12
7.	Back of a snake: showing Costals, Dorsals and Vertebral row	18
8.	Method of counting longitudinal rows of scales on the back	19
9.	Broad belly-scales or Ventral plates ...	19
10.	Small belly-scales as on the back ...	20
11.	Narrow belly-scales or Ventrals ...	20
12.	Subcaudals and Anal shield ...	20
13.	Scales on the head of a Russell's Viper ...	21
14.	Top of the head of a typical snake showing various shields ...	21
15.	Side-view of the head of a typical snake showing upper-lip-shields. ...	22
16.	Under surface of the head of a typical snake showing sublinguals. ...	22
17.	Top of head of a King Cobra showing Parietal and Occipital shields... ..	23
*18.	Russell's Viper—Full grown	32
*19.	" " (Young)	32
*20.	Skull of a Russell's Viper showing fangs and other teeth	33
*21.	Russell's Viper with mouth open showing fangs, duct and poison-gland	33
*22.	Phoorsa or Echis carinata	34
*23.	" " " (coiled up like the figure 8) ...	35
*24.	A pair of Phoorsas	35
25.	Head of a Horned Viper	37
26.	Side-view of the head of a Pit-viper showing the pit	40
27.	Head of a variety of Pit-viper showing both scales and shields on head	40
*28.	Green Pit-viper	42
*29.	Head of a Green Pit-viper showing pit, and its mouth open showing fangs	42
*30.	Millard's Viper	43
31.	Rattle of a Rattlesnake	44
*32.	Binocellate Cobra showing hood	44
*33.	Cobra in a basket	44
*34.	Cobra with mouth open, showing the fangs and the dark plates under the neck	45

FIGURE		PAGE
35.	Side-view of the head of a Cobra showing large third upper-lip-shield	46
*36.	Hamadryad or King Cobra	54
*37.	Maclelland's Coral Snake	55
*38.	Common Indian Coral Snake	55
39.	Back of a Krait showing enlarged Vertebrae	58
40.	Under part of the head of a Krait showing 4 lower- lip-shields, the 4th largest	58
*41.	Common Krait	62
*42.	Banded Krait	62
*43.	Sea Snake	63
44.	Head of a Blind Snake showing beak-like projection	65
45.	Belly of a Blind Snake showing small scales	65
*46.	Blind Snake	66
*47.	Phipson's Rough-tailed Earth-snake	67
48.	Belly-scales of a Rough-tailed Earth-snake	68
*49, 50.	Russell's Earth-snakes	70
*51.	John's " "	71
*52.	Russell's Earth-snake and John's Earth-snake	71
*53.	Indian Python	78
*54.	A piece of skin of an Indian Python—stretched out	78
*55.	Iridescent Earth-snake (Head and front part)	79
56.	Under part of the head of a Sing Snake showing the sublinguals and the absence of Mental Groove	79
*57.	Rasp-skinned Water-snake	80
*58.	Dog-faced Water-snake	81
*59.	Dhaman or Common Rat-snake	84
*60.	Snake-man with Dhamans round his neck	85
*61.	Fasciolated Rat-snake (Head and front part)	86
*62.	The Graceful Dhaman	87
*63, 63a.	Green Whip-snakes (coiled)	92
*64.	" " (in natural position)	93
*65.	Common Brown Tree-snake	93
*66, 66a.	Common Wolf-snakes	100
*67.	Common Wolf-snake, Head and front part showing distinct markings	101
68.	Back showing keeled scales	103
*69, 70.	Chequered Keel-backs	104
*70a.	Chequered Keel-back	105
*71.	Green Keel-back	105
*72.	Green Keel-back swallowing a frog	105
*73.	Buff-striped Keel-back	107
*74.	Common Kukri Snake (Head and front part showing markings)	108
*75, 75a.	Trinket Snakes	109
*76.	Trinket Snake (Head and front part showing markings)	110

THE PYTHON

Suddenly,

Straying too near his den, a serpent's coils
 Seized Bhima's daughter! a prodigious snake,
 Glittering and strong, and furious for food,
 Knitted about the Princess. She o'erwhelmed
 With horror and the cold unfolding death,
 Spends her last breath in vital laments.

That hour a hunter, roving through the brake,
 Heard her bewailing, and with quickened steps
 Made nigh; and, seeing a woman almond-eyed,
 Lovely, forlorn, by that fell monster knit,
 He ran, and, as he came, with keen shaft cleve,
 Through gaping mouth and crown, th'unwitting worm,
 Slaying it. Then the woodman from its folds
 Freed her, and laved the snak's slime from her limbs
 With water of the pool,

—*Sir Edwin Arnold* in *INDIAN IDYLLS*:
 Nala and Damayanti.

ERRATA

<i>Page</i>	<i>Line</i>	<i>For</i>	<i>Read</i>
3	19	flexible	flexible
10	2	mollusc	mollusk
10	2	development	developmental
11	7	alone	along
21	4	Parical	Parietal
25	16	posinous	poisonous
48	6	guldin	guiding
111	28	brownish	is brownish
119	25	chara-	charac-
133	25	kind	kind,
137	26	explain	explains
143	29	Argug	Argus

SNAKES OF INDIA

INTRODUCTION

We all know what snakes are. All of us have seen these slippery, creeping creatures, the very sight of which most people detest and whose close proximity is certainly not desired. They create a feeling of horror in most persons. However, as they have a place in Nature, it is as well that we should know something about them.

All snakes are commonly considered to be poisonous, in the sense that the venom in their saliva is sufficient to kill or paralyse their prey. But in the majority of them, their poison can act on small creatures only. Such snakes are harmless to human beings and for our purposes may be considered as non-poisonous. Unless a definite poison-gland, a duct to carry the poison from it and a specialised grooved or tubular tooth, called the fang, to instil that poison, are present, a snake is not a poisonous one. Only very few of the Indian land-snakes are dangerously poisonous to man and kill him by injecting their poison in him. These are Cobras, Kraits and Vipers (principally Russell's Viper and Echis). Most other land-snakes are practically harmless to man, though some may be slightly poisonous. All sea-snakes are poisonous.

India and the country of Brazil in South America are the two countries of the world where mortality from snake-bite is highest. Over 100,000 (one lakh) persons die of snake-bite in the world every year. The figure is probably much larger if we include China, parts of Africa and some countries in the Middle East where causes of deaths are probably not properly registered. We should be quite correct in saying that about 100 persons die every day in India alone

if we included the States. Bengal, Bihar and Orissa and the United Provinces are the worst sufferers in this respect.

The pity of it is that some of these deaths from snake-bite are not due to any poison being injected in the person. Persons have been known to die from snake-bite even though the snake that has bitten has been found to be harmless. In such cases death could only be due to fright or wrong methods of treatment. Such fear and ignorance would be dispelled by ability to distinguish the chief poisonous kinds of snakes. "Half the number of fatal cases are stated to die from fear, not having the heart at the time to apply any remedial measures" (Krafft).

The majority of deaths from snake-bite occur in the fields and villages, and the knowledge of recognising poisonous from non-poisonous snakes must be carried to all the villages. This can only be done by organised attempts to spread knowledge on the subject by posters, leaflets and books, and every schoolmaster must be taught and made to pass a test in this subject, if the present high mortality from snake-bite, which is after all an accident, is to be appreciably reduced.

CHAPTER I

General Information About Snakes

The Animal World is divided into two sub-kingdoms, the Vertebrates (with a spinal column or backbone) and the Invertebrates (with no backbone). There is a class known as Reptilia amongst the vertebrates. Snakes belong to this class. They are limbless creatures, with elongate bodies, covered with scales, and their method of progression appears to be by gliding. The words Serpent and Snake mean the same. The word 'Serpent' is derived from the Latin 'serpens' (=creeping), while the word 'Snake' is from the Anglo-Saxon 'snaca'.

A snake has a head, a body and a tail. There is in the rear under-part of the body an opening called the Vent. This is the common orifice for the intestinal as well as the genito-urinary systems. The part behind this opening is called the tail. On the head there are two eyes, two nostrils, but no external ears.

The mouth of a snake is usually very flexible and widely distensible. The tongue is sheathed at the base and can be protruded. It is forked at its outer end.

A snake has two eyes but no eyelids, and hence its steady, unwinking stare. The eye is covered by a transparent scale. The pupil may be round or vertically or horizontally elliptical.

Snakes usually like seclusion, and some people may live in the tropics, especially in the cities, for years without coming across a snake. Snakes are usually timid and nervous and try to escape and seek cover if disturbed. A snake attacks or bites only when it is brought to bay and cannot escape, or when a person treads on it. Some snakes will sit

upright on their tails and hiss and protrude their long, slender, bifid tongue as if they were spitting poison. This is only a bluff, though the on-looker may think that the tongue is a weapon of offence and is a deadly thing. But the tongue is only an organ of feel and is not connected with any poison-gland. The bifid tongue probably conveys the sense of smell to the two nostrils.

Most snakes climb well with the exception of some of the burrowing species. All snakes can swim, and those which live in water have their nostrils on the top of the snout, whilst the others have the nostrils on the side of the head. Sea-snakes have very big lungs. A snake may remain under water for an hour or two without moving. Land-snakes are not helpless in water, but sea-snakes are helpless on land.

Snakes can live for a long time without food, some say two or three years or even more.

All snakes swallow their food whole. Their teeth are adapted for holding the prey and not for masticating. Nearly all snakes are cannibals, that is, eat other snakes and even those of their own kind. They are essentially carnivorous and have their use in keeping down the number of smaller reptiles and rodents in jungles and swamps and even in houses. They swallow millions of frogs, rats, mice and insects yearly.

Snakes regularly cast off their skin even to the eye-scale, the old skin being turned inside out. The skin is cast every two months or earlier, the young ones casting it at shorter intervals. The eye-scales are also cast, and just before casting its skin the snake is lethargic and dull and practically blind, feeling its way with its tongue, and can be caught easily. After the skin is cast, the snake becomes alert and active and looks fresh and bright.

Snakes like sunshine and warmth. In temperate climates they usually hibernate in winter, without food or water, in secluded places. For this purpose at the end of summer

they store up fat which sustains them through the winter. In the tropics they usually do not hibernate, but may be seen in the open all the year round. They come out more in the rains and in the hot weather.

Snakes cannot travel on a perfectly smooth surface. The rougher the surface, the easier for them to move. This is due to the arrangement of the plates on their belly. Hence the more difficult the ground for the prey, the easier for a snake to pursue it.

The stomach juice of a snake is very powerful and can digest skin, feathers, bones and even horn.

Snakes may die from the poison of other snakes when bitten by them.

A snake's hiss is due to the forcible expulsion of air through its nostrils after it has inhaled a large quantity of air into the lungs. The Puff-adder can produce the loudest hiss among all African snakes, and Russell's Viper among Indian snakes.

The sexes are distinct in snakes. Each kind or species is considered to breed true. No hybrids are known. Some snakes bring forth their young alive. But, as a rule, the female lays eggs in the sun or at places where there is sufficient heat to hatch them. The eggs take about three months to hatch.

Snakes grow fast in the first year of their life and reach their full development at the end of four years. Some have been known to live about 20 years. Snakes, in general, probably attain a greater length in the northern parts of India than in the southern.

Snakes breed quickly, producing 10 to 100 eggs a year.

Snakes are cold-blooded, that is, their temperature varies with that of the air. It is determined by external conditions and is not constant as in warm-blooded animals. Their temperature is low and they can live without air for hours, the blood circulation in them being sluggish.

Snakes have been found all over the world except in the Arctic regions. They are abundant in the tropical and semi-tropical regions of the globe, especially where rank vegetation and forest abound. New Zealand is the only country from where no snakes have been reported. In Ireland and Madagascar no poisonous snakes have so far been found.

Snakes have a limited and distinctive distribution, in the sense that only some species are found in some countries and not in others. Those found in Europe are not found in Africa or India, and vice versa. Pit Vipers are unknown in Africa. Pitless Vipers are unknown in America. No vipers, either with or without a pit, have been found in Australia.

Snakes are found practically everywhere, underground, on land, on trees, in bushes, in marshes, in fresh water and in sea water. They have been found in the hills up to 16,000 feet above sea-level. Except Earth Snakes and Blind Snakes very few burrow, though some live in ant-holes, tree-holes and burrows of other animals.

Some snakes, like the python, kill their prey by constricting it and reduce it to pulp in a few minutes. To undo the constriction, catch the tail and unwind it. If a snake is struck on the back and its spine damaged, it is easily disabled and cannot move far. This is the best way to disable a snake as then it is easier to kill it. The safest way to hold a snake is by its tail at arm's length. Then it may wriggle but cannot bite or twist round the arm.

The majority of snakes are harmless and non-poisonous.

The colour of a snake is usually an adaptation to its surroundings so that it may not be easily seen.

Snakes swallow their prey, beginning with its head, and swallow it whole with a succession of gulps. They cannot have much sense of taste.

Snakes can hear, but, as they have no external ears, sounds conducted through the air are not heard by them.

But sounds conducted through solids, such as the sounds of footsteps on the ground, are heard by them, being conducted through their spine.

It is commonly believed that most snakes fascinate their prey, but the belief is erroneous. The majority of animals have no fear of snakes. They will move unconcerned if put in a snake's cage. However, monkeys show a marked terror for snakes, and so does Man, another Primate.

Occasionally freaks of Nature are met with among snakes, the most common being the possession of a double head. Such animals, however, do not survive long after birth.

CHAPTER II

Animals Confused with Snakes

Snakes are creeping, limbless animals, and hence naturally certain other creatures which look similar to them are sometimes mistaken for snakes. The lower jaws of a snake are not joined in the middle, and so these jaws on the two sides have no continuous bony connection in the middle. Besides, snakes have a long, forked, protractile tongue which can be withdrawn into a sheath at the base inside the mouth. These characteristics are rather distinctive of snakes. There are, however, certain kinds of lizards which have a similarly protractile, forked tongue, but these have well-developed limbs, and hence can be easily distinguished from snakes.

There are, likewise, certain lizards which have practically no limbs and can be easily mistaken for snakes. But on a careful examination it will be seen that they have movable eyelids while snakes have none, and further, these lizards, unlike snakes, have an external ear opening. The 'blind-worm' or 'slow-worm' (Fig. 1) looks like a snake, but it is only a limbless lizard.

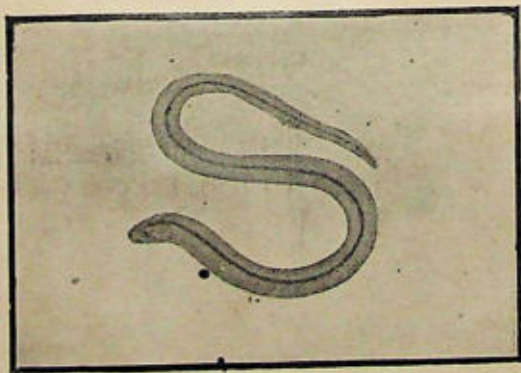


Fig. 1. 'Slow-worm'.

Certain burrowing amphibious creatures may occasionally be mistaken for snakes, but they have their vent opening at the end, whilst snakes have this opening between the tail and the rest of the body. Besides, the scales on the back of these creatures are minute and are embedded in the skin and not epidermal as in the case of snakes.

Eels, which are fish, are sometimes mistaken for sea-snakes (Fig. 43). Some eels are big and have scales, and may have no fins. Fish breathe by gills and fins, and have no lungs. Water is circulated on these gills and taken there through a gill-opening on either side behind the head. Snakes breathe by lungs into which air is taken through the nostrils on the head. Hence these eels, though looking like sea-snakes, have always at least one gill-opening.

Earth-worms are sometimes mistaken for snakes, but they are very small and burrow. A magnifying glass will show that, unlike snakes, they have no scales on the body. Earth-worms have ringed and segmented bodies, while a snake has no rings or circular segments. The anus or vent in earth-worms is situated at the end of the body, whilst in snakes it is in front of the tail on the underpart of the body.

There is also a thin round worm called the Gordius Worm which is sometimes mistaken for and considered to be a snake, on account of its length and thinness. It is a long thin round worm reaching a length of 2 feet and is white in colour. It looks like a horse-hair or a fiddle-string. Hence it is called 'Hair-worm' (Fig. 2). Its body has no scales, it has only one opening, the mouth, and has no vent opening.

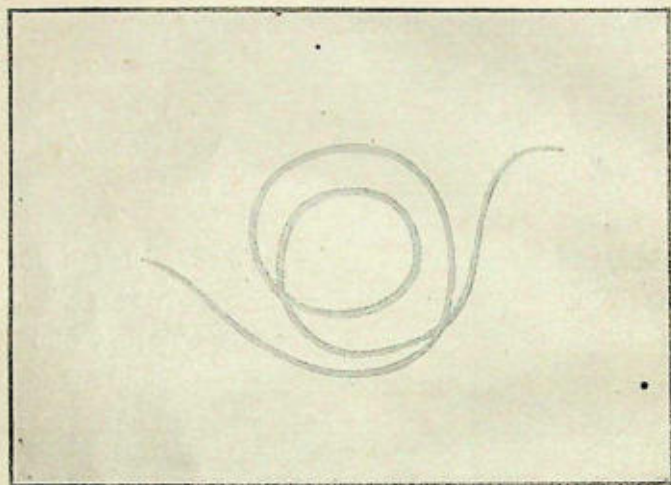


Fig. 2. 'Hair-worm.'

These worms live in water and pass a part of their development life-cycle in a mollusc, an insect or a water-snake. They lay their eggs freely in the water. When the eggs emerge from their intermediary hosts, the worms come out in large numbers the same day, giving rise to the belief that there has been a shower of worms with the rain. These worms are found in ponds and rivers, and have been found in hills at various elevations up to 7,000 feet. They were found in a wash-basin at the Civil Hospital at Nasik, twice within my recollection.

CHAPTER III

Teeth and Poison Glands

Most snakes have four rows of teeth in the upper jaw and two in the lower jaw. Two of the rows in the upper jaw are situated in the middle of the roof of the mouth on the palate and are called the 'palate teeth', and the other rows are along the margin of the upper jaw (Fig. 3). The lower jaw has one row of teeth along its margin on either side.

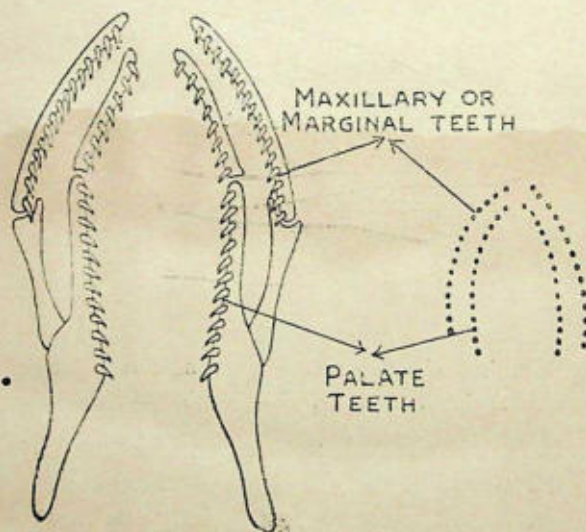


Fig. 3. Teeth in the upper jaw of a typical harmless snake.

Fig. 4. Section of teeth in the upper jaw of a harmless snake.

The dangerously poisonous snakes have fangs in place of ordinary teeth in front, along the margin of the upper jaw. Fangs are specially developed teeth which are grooved or more or less tubular. They carry the venom from the

poison-glands in poisonous snakes. The fang (Fig. 5) is like the needle of a hypodermic syringe and is thus perfectly adapted for injection of the poison under the skin. In poisonous snakes, there is a poison-gland on each side, somewhat almond-shaped, situated below and behind the eye, from which a duct carries the poison to the base of the fang (Fig. 6).

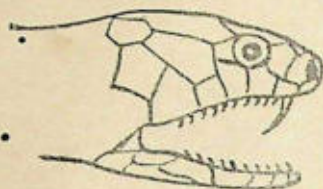


Fig. 5. Head of a poisonous snake, with mouth open, showing poison-fang.

There is usually one fang on each side, but there may be two or more reserve fangs enclosed in a sheath.

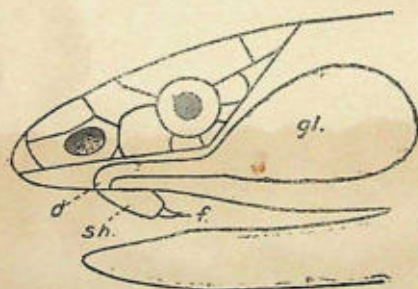


Fig. 6. Poison apparatus in a venomous snake.
gl—Poison gland, d—Duct, sh—Sheath, f—Poison-fang.

In harmless snakes there are a number of small teeth at the place where a fang is situated in a poisonous snake. So if a pin is taken and passed along the margin of the upper jaw and it strikes many teeth in front, the snake is most probably harmless. But if one tooth only is struck which is rather prominent, the snake is poisonous. This is a good rough test to find out if a snake is poisonous, except in cases where the head is badly smashed and the teeth are broken. Remember that the palate teeth are in the middle of the roof of the mouth and are present in poisonous as well as in harmless snakes.

The teeth of a snake are directed more or less backwards. Hence when a prey is seized, it has got to be swallowed as it cannot be disgorged easily. It cannot throw it out ordinarily, because, if it attempts to do so, the teeth become more and more embedded in the prey.

The fangs are usually recumbent and pointing backwards and are concealed in a sheath of the mucous membrane. Fangs being specialised teeth, the sheath probably protects them and prevents their being broken when the prey is passed down the mouth. When a poisonous snake wants to bite and inject poison, it opens its mouth, and throws its head slightly backwards to erect its fangs before striking. The poison-fangs are small in sea-snakes, but are very long in vipers. Some snakes can eject poison from the fangs in the form of a spray and are then said to spit venom.

CHAPTER IV

Snake Poison

Snake-poison is a clear viscid liquid of a yellowish colour, odourless and tasteless. When dried, it breaks into lumps, flakes or needles, and appears somewhat like amber. When properly dried, it keeps indefinitely. It dissolves again readily in salt solution or water, and its solution is fully powerful and poisonous. It acts only on a broken surface of the skin or mucous membrane. Hence, if the mouth and throat have no scratches or abrasions, a snake-bite wound can be sucked and the poison swallowed without resulting in any symptoms of poisoning. It is considered to be primarily a digestive juice and is capable of digesting everything in an animal except hair and claws.

The amount of poison discharged at one bite by a poisonous snake may vary from two to three drops as in the case of a Sea-snake, to even thirty as in the case of a King Cobra. It depends on the size of the snake and its condition at the moment and also on whether it had bitten some animal before. Whether a person can become immune to snake-poison by repeated inoculations of gradually increasing doses is a point not fully investigated. It is extremely doubtful whether snake-charmers in India do so, because Cobra venom is a very powerful poison and 15 milligrammes or about one-quarter of a grain is enough to kill a person.

In Mexico certain Red Indians called Curados de culebras know how to acquire the art of becoming proof against the poison of the rattle-snake. Fearlessly catching a rattle-snake by the neck, they give a swift scratch to their arm with the fangs of the reptile, when a tiny quantity of its venom enters their body. By repeating this daring

operation several times, they eventually probably acquire immunity to the poison.

In India, Antivenene is prepared from a horse immunised by injections of gradually increasing doses of the poisons of a Cobra and Russell's Viper. In about six months' time or more the horse shows no ill-effects, even if a very big dose of the venoms is injected in him. This indicates that enough anti-bodies are formed in his blood to counteract the poison. Blood from a vein of such an immunised horse is drawn, the clot is allowed to separate, and the serum that is left which contains the anti-bodies, is called Antivenene. It is then packed in phials. It is an absolute specific for Cobra and Russell's Viper poisoning. The only remedy for real snake-poisoning is Antivenene. In such cases no time should be wasted in giving other medicines. Antivenene should be injected as early as possible.

The effects of snake-poison vary with the different kinds of venom and also with the amount injected, manner of injection, etc. Broadly speaking, the poison of a Cobra affects a person differently from that of a viper. The symptoms in each case may be briefly described. In poisoning by a Cobra, the effects appear within 10 minutes to two hours after the bite, the time depending on the amount of poison injected and the severity of the bite. Locally on the spot bitten, there is an immediate burning, tingling pain, followed later by numbness. Soon after, inflammation and swelling occur, and blood-coloured fluid oozes through the punctures. The person bitten feels drowsy, weak and unsteady on the legs, and feels a strong inclination to sit down owing to gradual paralysis. He soon lies down, unable to move, speak or swallow. Owing to paralysis of the muscles of the mouth, saliva dribbles from it. He does not become unconscious though he feels very weak. The feeling of sickness is present; vomiting usually occurs and convulsions may occur too. Breathing becomes slow and

noisy and ultimately stops, and the person dies. Death may occur within an hour of the bite or even after nearly two days, but usually a person dies within 5 to 12 hours. In cases where a person recovers, the paralysis passes off and there is a rapid recovery, though there may be a little sloughing at the wound.

Some points should be noted in these symptoms. It will be seen that the victim gradually becomes weaker and weaker and paralysed. If a person gets violent and uncontrollable after a bite, it is likely that the snake is non-poisonous and that the person has merely been frightened. I well remember a case in 1907, when a sepoy, who said he was bitten by a snake, was brought to the Regimental Hospital. I was asked to see him when I was having my dinner at the Mess. On enquiry from the person who reported to me, I was told that the sepoy had become so violent that six persons had to hold him down and put him on a stretcher to be brought to the hospital. This was enough to convince me that the bite was by a non-poisonous snake, and so it turned out to be. Beyond assuring him and giving him an injection of distilled water as a placebo, nothing was done. He had a good sleep and was 'discharged for duty' next morning.

Another point to be noted is that death usually takes place after 5 hours. So, if within a few hours of the bite the person gets Antivenene, he is sure to be saved even if the symptoms and paralysis are fairly advanced. In these days of quick transport, it should not be difficult to have Antivenene within reach of most of the villages if it is kept at the dispensaries in the Talukas or Tahsils. Again, it should be noted that the quack's treatment of making the person move about and keeping him on the move, as is done in cases of opium poisoning, is absolutely wrong if there has been real poisoning by the bite. It will exhaust the patient quickly and remove whatever chance he may have of natural recovery even if poison has been injected.

When a viper like Russell's Viper or the Echis (Saw-scaled Viper) bites a person, the symptoms are a little different from those of Cobra poisoning. The local signs at the part bitten are much more evident. There is great swelling and pain and bruising of the part, and the swelling spreads. The other symptoms are not those of paralysis, but of a rapid collapse and heart-failure if a large amount of poison has been injected. The person has a feeling of sickness, and he vomits and suffers from cold sweats. Later on, even after some days, bleeding occurs from mucous membranes or under the skin. The wound suppurates and may slough and cause septicemia and death. Death may occur after some hours or even after a week or two. But if the symptoms are recognised and properly treated, there is a good chance of the person surviving.

In cases of poisoning from the bite of a krait, the symptoms are similar to those of Cobra poisoning, with the addition of severe pain in the abdomen. In poisoning by sea-snakes, the symptoms are like those of Cobra poisoning but appear later. Though their poison is more powerful than that of a Cobra, the amount injected is very little.

If a person becomes unconscious or faints soon after a bite, as is often reported in newspapers, it is pretty certain that the fainting is due to fright. Snake-poison though virulent, seldom acts so very quickly. It leads to gradual paralysis or hæmorrhages, and though the patient becomes gradually weaker and may collapse, he hardly ever becomes unconscious as a result of snake-poisoning.

CHAPTER V

Scales on a Snake

Even for a layman, some knowledge of the scales on a snake is advisable, as a certain amount of precision in its identification can only be acquired by noting the characteristics of some of the important scales. The colour of a snake varies with its surroundings, and its size varies to a certain extent with its age. In some snakes, the markings on the fully grown ones are different from what they are in the early stages of their life. But in all snakes the scales usually retain their characteristics throughout their life. Nearly all the terms used in the description of these scales are more or less self-explanatory.

The back of a snake is covered by scales which are usually small and roughly quadrilateral. The lateral scales on the back are called 'Dorsals' or 'Costals' (Fig. 7). They may be contiguous or overlapping. They may be smooth, polished or dull and stiff. They may be keeled (with a central ridge in each scale) as in Keelbacks, or tuberculated (with a slight

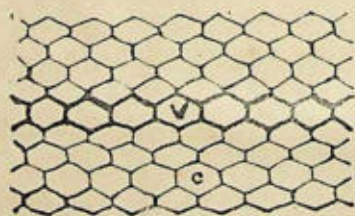


Fig. 7, Back of a Snake.

C—'Costals' or 'Dorsals'.

V—'Vertebral' or 'spinal' row.

prominence on the scale) as in sea-snakes. The scales along the centre of the back on the spine are called 'vertebrals' or 'spinals' (Fig. 7).

The number of longitudinal rows of the scales on the back as counted from side to side is uniform in each species of snake (Fig. 8).

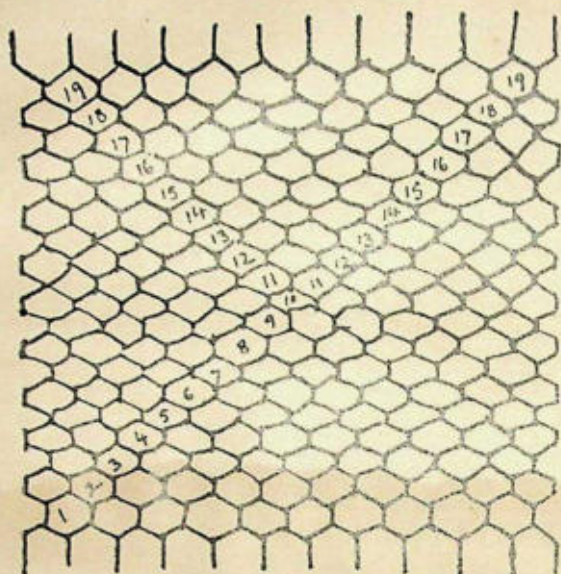


Fig. 8. Back of a Snake

Method of counting longitudinal rows of scales on the back.

The belly of a snake is that part of it which touches the ground as it crawls along. The scales on the belly are usually very broad (Fig. 9). When the width of a scale is much in excess of its length, it is called a 'plate'. The scales on the belly are called 'ventrals'. Sometimes the belly is

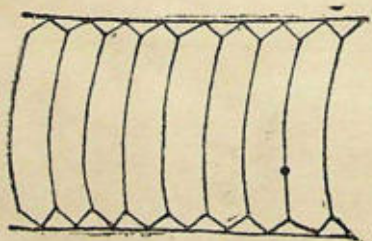


Fig. 9. Broad belly-scales or Ventral plates.

covered with small scales as on the back (Fig. 10), and in some, the plates are somewhat broad but are limited to the middle part of the belly (Fig. 11), that is, they are not broad enough to cover nearly its entire width, but are comparatively narrow.



Fig. 10. Small belly-scales as on the back.

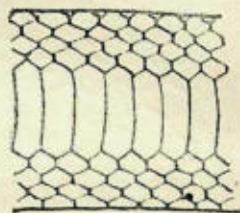


Fig. 11. Narrow belly-scales or Ventrals.

The scale in which the vent is situated is called the 'Anal'. It may be single, bifid or in rare cases trifid. The scales behind the Anal on the under-part of the tail are called the 'Subcaudals' or Tail Shields. They may be entire, running over the whole breadth of the tail, or may be divided into two rows (Fig. 12).

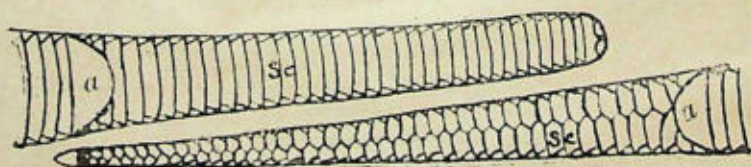


Fig. 12. Showing Subcaudals (Sc) and Anal Shield (a).

The scales on the head may be small like those on the back as in most vipers (Fig. 13), but usually the head is covered by scales whose length is greater than the breadth.

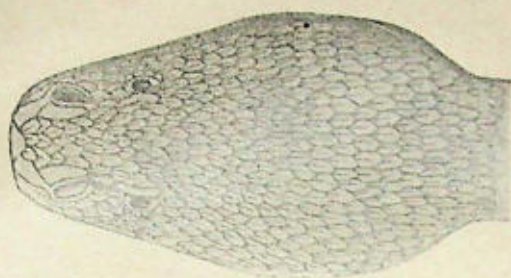


Fig. 13. Scales on the head of a Russell's Viper.

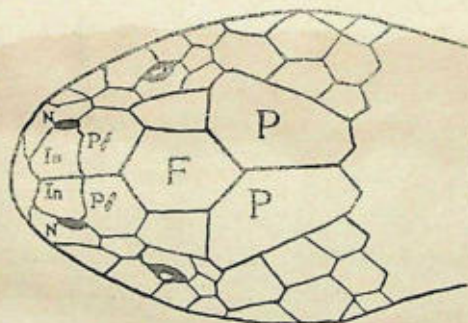


Fig. 14. Top of the head of a typical snake, showing shields.
 F—Frontal, P_f—Prefrontal,
 In—Internasal, N—Nasal, P—Parietal.



Such scales are called 'Shields' (Fig. 14). These are usually arranged in a characteristic pattern. They are given different names according to their position, and though the terms are technical, the meanings are clear. To understand the head shields of a typical snake, see the big shield on the head between the eyes, but not touching them. This is called the 'Frontal'. The two shields in

front of it are called 'Pre-frontals.' The two in front of the Pre-frontals are known as 'Internasals.' Those in which the nostrils are situated are called 'Nasals' or 'Nose-shields.' The shields along the margin of the upper lip are known as 'Supralabials' or 'Upper-lip-shields' (Fig. 15). These extend to the gape of the mouth. The central shield in the

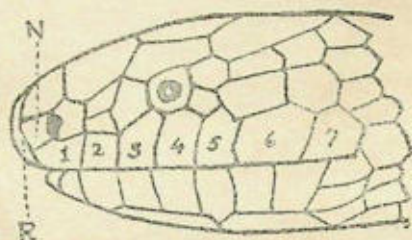


Fig. 15. Side-view of the head of a typical snake showing upper-lip-shields. N—Nasal. R—Rostral.

1-2-3-4-5-6-7 Upper-lip-shields numbered in order. The diagram shows 7 of these. They may be more than 7 or less, the last one being at the angle of the mouth at the end of the upper lip.

middle of the upper lip is called the 'Rostral' or 'Beak-shield.' The shields along the margin of the lower lip are termed 'Infralabials' or 'Lower-lip-shields,' of which the central one is called the 'Mental' or 'Chin-shield.'

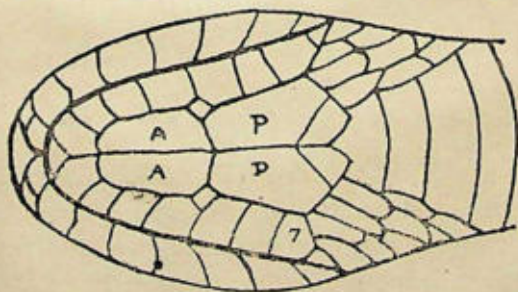


Fig. 16. Under surface of the head of a typical snake. A—anterior sublingual. P—Posterior sublingual. 7 is the seventh infralabial shield.

The number of upper-lip and lower-lip shields may be 4 to 7 or more. Behind the chin-shield in the middle are usually two pairs of shields which, being under the tongue, are called 'Anterior' and 'Posterior Sublinguals' (Fig. 16). The central groove separating the sublinguals on either side is called the Mental Groove. The last shield along the margin of the lower lip which touches the posterior sublingual may be considered as the last infralabial shield.

The scales or shields round the eye are called Supra-ocular, Subocular, Preocular or Postocular according to their positions, above, below, in front of or behind the eye.

Behind the Frontal are two shields called 'Parietals,' and on the side of the parietals are the 'Temporals.' Sometimes there are large shields behind the parietals called 'Occipitals' as in the King Cobra (Fig. 17).

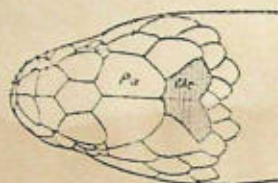


Fig. 17. Top of head of a King Cobra. Pa—Parietal
Oc—Occipital (shaded in diagram).

The region between the nose and the eye is called the 'Loreum,' and the shields or scales in it are called 'Loreals.'

CHAPTER VI

Classification of Snakes

The animal world is divided into two big groups, Vertebrates and Invertebrates. These are further divided into smaller groups, all of which differ from one another, though they agree in fundamental points of structure. These groups are called 'classes', amongst which is one class called Reptilia. Every large class is composed of still smaller groups or 'orders', all of which have, beyond the common features of their class, their own distinctive characters. The order Ophidia, which means snakes, is one of the orders of the class Reptilia. Every large order, like that of ophidia or snakes, can be split up into smaller groups or 'families', and every family into 'sub-families', every sub-family into 'genera', and every large genus into 'species' or kinds which are the ultimate units of classification.

There are about 1,700 species or kinds of snakes in the world, of which about 300 are distinctly poisonous and harmful to man. Snakes are divided or classified into nine big groups or families. The classification is based on the arrangement of the bones in the skull, which varies in these groups; out of these, the kinds or species in seven families are perfectly harmless, as they have got no poison-glands or special teeth to carry poison. There are 287 kinds of snakes in these seven groups. There is one family of snakes, the 8th group (*viperidae*), called vipers, which contains 110 kinds of snakes. These are all poisonous. The 9th group of snakes (*colubridæ*) contains the remaining kinds and includes most of the common land-snakes seen. Out of these, about 190 kinds are definitely poisonous. This number includes about 55 kinds of sea-snakes, which are all poisonous.

This family (*colubridæ*), which contains the majority of snakes, is divided into 3 classes according to the character of the teeth in the upper jaw, whether the teeth are grooved or not, and when some of the teeth are grooved, whether they are in the front of the jaw or at the back.

There are about 300 other kinds of snakes whose saliva has some poisonous properties and which are regarded as 'doubtfully poisonous'. They have got no specially developed poison-fangs in the front of the upper jaw, as the typically poisonous snakes have. But the back teeth in the upper jaw are rather prominent and well-developed, and probably enable them to paralyse their prey when it is caught. These snakes are, however, not usually dangerous to man.

Within Indian limits, there are 29 kinds of sea-snakes and 40 of land-snakes including vipers, cobras, kraits and coral snakes, all of which are poisonous to man. The total number of species of poisonous and non-poisonous snakes recorded in Indian limits is 330 out of about 1,700 in the whole world.

The various families or groups of snakes are classified according to the disposition, number and character of the scales on the head, body, belly and tail. But this classification, though not difficult to understand, is somewhat technical.

The number of longitudinal rows of scales on various parts of the back, the number of belly plates, and the number of subcaudals (shields under the tail) are, within certain limits, uniform in each species of snake. On the back, the rows of scales are usually counted at three places: (1) two head-lengths behind the head, (2) the middle of the body, and (3) two head-lengths in front of the vent (where the tail begins).

For practical purposes snakes can be divided into five big groups according to their habits:—

(1) *Burrowing Snakes*:— These snakes live underground. They mostly feed on earth-worms and other worms

and insects. They have a small head and a small mouth which slightly projects forward so as to be adapted for burrowing. The little 'blind' snakes, which look somewhat like earth-worms, belong to this group. Some other snakes like the so-called 'double-headed' snake also belong to this group. This snake is not really double-headed, but its tail is short, blunt and thick, so that it superficially appears like a head. The snakes in this group are mostly non-poisonous and harmless.

(2) *Tree-snakes* :—These snakes spend most of their life in trees and bushes. They are thin, slender and longish creatures. Their tail is long and prehensile, and adapted for seizing or grasping. Their food consists of lizards, small birds and tree-frogs. They are mostly harmless, and if the saliva of some is poisonous, the poison is of a mild quality and has no serious effects on human beings. The whip-snake and the common brown tree-snake (or Gamma Snake) are examples of this group.

(3) *Sea snakes* :—These are all poisonous. Their tails are flat and laterally compressed, and their nostrils are placed on the top of the snout to facilitate their swimming in water. They feed on fish and are seen in the sea not far from the shore, and occasionally on the shore or on rocks and on rare occasions at some distance up the tidal rivers.

(4) *Fresh-water Snakes* :—These feed on frogs and fish. Their nostrils are more near the top of the snout than on the sides, so that they can breathe when they are under water. They are always found in pools of fresh water or very near them. All of them are non-poisonous and perfectly harmless to man.

(5) *Ground-snakes* :—A large majority of the snakes we commonly see, belong to this group. They live on or above ground, though many live in holes in the ground. They usually do not climb trees or enter water, though

most of them can go up trees and can swim in water. They contain both poisonous and non-poisonous kinds. Cobras, Kraits and Vipers are examples of the poisonous kinds. Dhamans and Pythons are instances of the non-poisonous ones. The snakes in this group have a biggish head and expansible mouth, and mammals like rats and squirrels form their favourite food.

CHAPTER VII

Poisonous Snakes

The chief poisonous snakes of India are the Cobras, Kraits, Vipers and Sea-snakes.

The Cobras include the Common Indian Cobra and the Hamadryad or King Cobra. The Coral Snakes, usually so called from their brilliant colouring, are also poisonous in that they have a definite poison-gland, duct and fangs, but they are not dangerously poisonous to man. Hence they need not be described here in detail.

Kraits are dangerously poisonous, and unfortunately there is no Antivenene prepared against their venom. The Common Krait and the Banded Krait are the two important species of this group.

Vipers form an important group. Some of them have a pit on the head in the loreal region (between the nose and the eye), and these are called Pit Vipers. They are usually found in hills, and though poisonous, their venom is seldom fatal to man. The other vipers which have no pit are called Pitless Vipers. The important common species among them are Russell's Viper or Daboia and the Phoorsa or Echis, which are dangerous to man.

Sea-snakes are all poisonous and are met with on or near the coasts or in the sea. They are easily distinguished by their flat fin-like tail, while land-snakes have a round cylindrical tail. Though sea-snakes are poisonous, bites from them are rare and no death has been authentically recorded from this cause.

These are the poisonous groups of snakes in India. They will be described first. All snakes outside these should be considered non-poisonous and therefore harmless to man.

CHAPTER VIII

Vipers (Viperidae)

The name 'viper' is derived from *Vivus*—alive and *parere*—to bring forth, as the young in this family are usually born alive. This is a group of snakes in which the poison-fangs are well developed. It contains about 110 kinds of snakes, which are all poisonous. The general characteristics of the body are somewhat distinctive. A viper has a broad, flat head usually covered with small scales (see Fig. 13), a narrow neck, a vertically elliptical pupil and a short tail. The head is somewhat triangular with sharp angles and the body is thick and plump.

There are two chief classes of vipers. All have broad plates on the belly. Some have a distinct pit on the side of the head between the nose and the eye in the region called the 'lore'. These are called Pit Vipers (*crotalinae*)—see Fig. 26. There are 65 kinds of Pit Vipers in the whole world. Pit Vipers are unknown in Africa, but are found all over southern Asia and America. About 22 kinds of Pit Vipers are found in Asia, of which 11 are found in India. 43 kinds of Pit Vipers are found in America.

The other class of vipers is that of Pitless Vipers (*viperinae*), as they have no pit between the eye and the nose. They are easily distinguished by the broad plates on the belly extending right across and small scales on the head similar to those on the body. No other land-snakes possess these two features combined. So if we find that a snake has broad plates on the belly and small scales on the head similar to those on the back, it is a Pitless Viper. Most of the Pit Vipers too have broad plates on the belly and small scales on the head, but some of them have also, unlike the Pitless Vipers, large shields on the head. Familiar

examples of Pitless Vipers are the Puff-adder of Africa and Russell's Viper and Phoorsa or Saw-sealed Viper of India.

There are about 42 kinds of Pitless Vipers, of which 7 are found in India and 10 in Africa. These latter include the Night-adder or Demon-adder, the Puff-adder, the Horned Adder and the Berg Adder. The back of these snakes is usually marked with black blotches or inverted-V-shaped (\wedge) markings.

No vipers have been found so far in Australia, neither Pit Vipers nor Pitless Vipers. No Pitless Vipers are found in America, whilst in Africa there are no Pit Vipers.

Vipers as a class do not lay eggs. The female, except in a few kinds, brings forth the young alive. Whilst all vipers are poisonous and the venom of some is fatal to man, the poison of many others is not powerful enough to cause death. The two important Pitless Vipers of India are the Daboia and the Echis.

CHAPTER IX

Pitless Vipers

I

Russell's Viper or Daboia or Chain Viper (*Vipera russelli*)

This snake was first brought to the notice of the scientific world by Dr. Patrick Russell in 1796. Hence the name. It is common in some parts of India. It has a beautiful and distinctive appearance. It has large plates on the belly (see Fig. 9) and small scales on the head (see Fig. 13). There are large black spots on the body, arranged in three rows, one in the middle of the back and one on either side. The long rows of spots look like chains, hence the snake is also called Chain Viper. It is a stout and lazy-looking animal with a flat, triangular heavy head and a short tail. The ground colour of the back is light brown or buff or of a sandy hue, on which there are dark spots. The spots may be solid black or may be hollow in the middle showing the colour of the back. Their number is 23 to 30. The lateral spots may not be complete, but broken at the lower end. The central spots may be continuous. The coloration and markings of this viper are sufficiently distinctive, so that it cannot be mistaken for any other snake. The spots may be present on the head also, but there is always on the head a mark like the letter 'V' with its apex towards the front. The belly is white, with small dark spots scattered on its surface. The tail is small, and the shields under it are divided. The nostrils are much bigger than in any other Indian snake. The eyes are large, and the pupils are vertically elliptical, with a heavy speckling of golden-yellow around them (Figs. 18, 19, 20 and 21).

It commonly inhabits and prefers the plains, but may be found at elevations as high as 7,000 feet. It has been found in the Brahmaputra Valley close to the Bhutan foot-

hills. It is met with anywhere except in dense jungles. It is very common in certain areas such as the Punjab, the vicinity of Bombay and some parts of Burma and the Madras Presidency. Its fangs are well developed. They are long and may reach even half an inch in length, and the bite is frequently fatal to man. The body of this snake is stouter than that of any other Indian snake except the python. It may be met with anywhere, but it prefers open country and sunny places. During the day it is lazy and quiet, lying coiled in the grass, but it is very alert and agile in catching its prey, and after sunset or at night it goes out in search of food. It is decidedly a nocturnal snake, but is occasionally seen in the day. It can swim in water or climb trees, but does so only under exceptional circumstances. It is very fond of small mammals, especially rats. Hence it is not uncommonly found in or near human habitations. One was found behind the door of a big ward, during the day, in the Civil Hospital at Belgaum, when I was Civil Surgeon there. A baby reptile of this kind was once found in the Sholapur Club at 8 o'clock in the evening in a corner where members were playing table-tennis.

This snake makes a very forceful hiss, and once it is heard, it is not likely to be forgotten; while in captivity, it hisses fiercely when disturbed, reminding one of a leaking football bladder. Ordinarily it is disinclined to bite and does not readily strike, but when it does, it bites with great force and tenacity. The young, however, are not sluggish or indifferent and are easily provoked to bite. The snake, having big fangs, gets a firm hold and is not easily shaken off when it makes a vicious bite. When angry and about to strike, it will spring with great force from the ground. Its movements are usually slow, and it seems to crawl and does not move fast. When disturbed, it will heave its sides and hiss angrily. Its lungs are of a big size. The snake fills them with air and expels



Fig. 18. Russell's Viper.



Fig. 19. Young Russell's Viper.

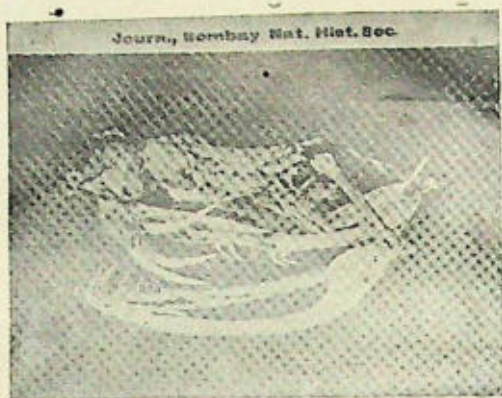


Fig. 20. Skull of a Russell's Viper showing fangs and other teeth.



Fig. 21. Russell's Viper with mouth open, showing fangs, duct and gland.

it through the big nostrils, producing the loud hissing sound.

This snake does not lay eggs. The young are born alive with clear, well-marked, dark spots on the back (Fig. 19). The young measure 8 to 11 inches long at birth. They are much more active than the adults, and their poison is quite as potent. It is a prolific snake, 30 to 40 or more being produced in one brood. Frequently the adults are 3 to 4 feet long, but they may grow to 5½ feet.

The part bitten by this snake shows considerable swelling, and the skin round about becomes discoloured. The poison it can inject at one bite is about enough to kill two persons. There is intense pain, and a thin red-coloured fluid continues to ooze out of the wound which does not get sealed with clot. If the patient lives for some time, the tissues near the seat of the bite slough. The poison has a strong local action in killing the tissues. The victim may die in a few hours or after some days, according to the amount of poison injected. But if the person goes to a doctor and is injected with Antivenene there is a great probability of his life being saved.

When looked at superficially and carelessly, some snakes are occasionally mistaken for a Russell's Viper. These are the Python, the Common Earth Snake (Russell's Earth Snake) and the Royal Snake. Hence the following four characteristics of a Russell's Viper should be noted: (1) broad plates on the belly, (2) small scales on the head, (3) three series of black spots or chains on the back, and (4) the shields under the tail are divided.

This snake is called by various names in India. Some of these are :—

GHONUS—in Marathi, in Bombay Presidency.

CHITAR—in Gujarati —Do—

KORAIL—in Sindhi in Sind.

KANDODI or Hulikandodi in Canarese.

KANNADI VIRIAN—in Tamil, and
MANDALI in Malayalam, in the Madras Presidency.

BORA AND CHANIRA BORA—in Bengal.

MWE BWE—in Burma.

- It is also called SUSKAR in some places, probably owing to its hissing, as '*Sus-Karna*' means 'to hiss'.

II

Saw-Scaled Viper or Echis or Phoorsa (*Echis carinata*)

This is another pitless viper with broad plates on the belly and small scales on the head. The shields under the tail are entire and not divided, thus differing from those of a Russell's Viper. It is commonly called 'Phoorsa' or 'Echis' and is very common in some parts of India. In Sind and in some parts of the Konkan, especially in the Ratnagiri district of the Bombay Presidency, it is an extremely common snake. It is a desert snake which prefers a sandy arid soil and does not like to live in thick vegetation or jungle.

It is a small snake, about 1 ft. 6 in. long, though a few specimens grow to 2 feet or even to 2 ft. 7 in. One was brought to me at Larkana in Sind in 1912, which measured 2 ft. 7 inches. It is brown, buff or sandy in colour or may be green. It has got a pale, sinuous, white line along either flank of the back. It may have small, white, diamond-shaped and somewhat square patches along the middle of the back, which may join laterally the wavy white line mentioned above. The head is triangular and has got a distinct white mark on it which somewhat resembles the foot-print of a bird, or may be likened to a broad arrow or a trident. The belly is white and covered with light-brown or dark spots. There is no pit between the nose and the eye which shows that, like Russell's Viper, it belongs to the class of pitless vipers. The broad belly-plates, small scales on the head and tail shields which are entire, are characteristics of the Echis (Figs. 22, 23 and 24).

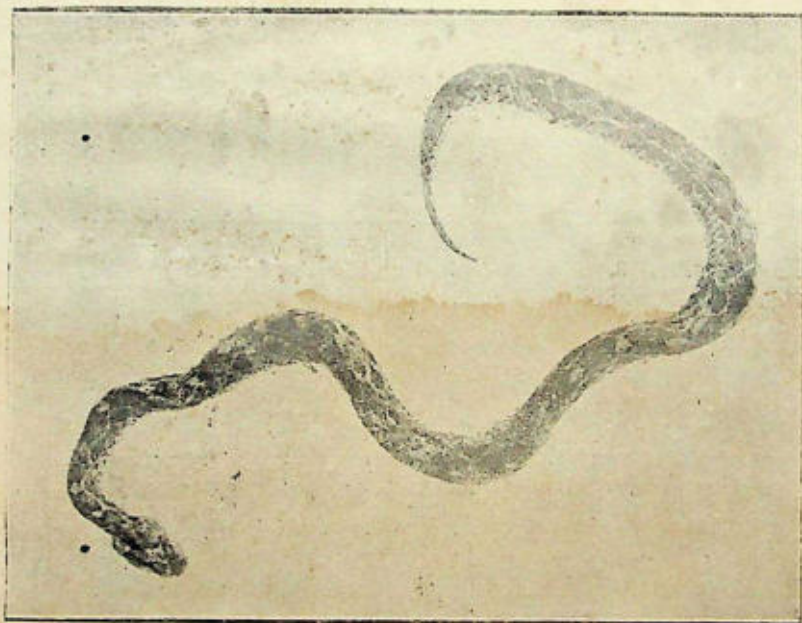


Fig. 22. Phoorsa or Echis carinata.



Fig. 23. Phoorsa (coiled up like the figure 8.)



Fig. 24. A Pair of Phoorsas.

It is a small, vicious animal. When disturbed or irritated, it throws itself in a double coil in the manner of the figure 8, and rubs the coils together continuously, producing a loud rustling sound like the scrubbing of sandpaper, as it rubs its sides together. The scales on the back are distinctly keeled and rough, and it is these which produce the sound. The ridge in the middle of each scale on the back is dented like a saw, and hence it is called the Saw-scaled Viper. The sound produced is something like a 'fiss' or 'phoo,' whence its name 'Phoorsa' in the Konkan. It is called 'Phissi' in the Punjab, 'Afai' round about Delhi, and 'Khuppar' in Sind. It is called 'Surutai pambu' in the Tamil districts of the Madras Presidency. While rubbing its coils, it continuously inflates its lungs with air and blows it out with a hiss. At the same time it puts out its tongue and throws its head rapidly forward if there is an object for attack within striking distance. It will bite on the slightest provocation.

Being a small snake the Saw-scaled Viper does not inject much poison. It is estimated that 10 to 20 per cent of phoorsa-bite cases are fatal. Death may occur within 24 hours or even after 2 to 20 days following the bite. The local signs and symptoms of poisoning such as swelling and discoloration are very marked, the bitten part may slough and the person die of septic poisoning. There is also a tendency to bleed from various parts of the body a few days after the bite, and so a doctor should be consulted as soon as possible after the bite.

The Echis is an aggressive snake, found plentifully in desert and semi-desert areas. It is sometimes seen basking on the sand in the hottest rays of the sun. It is usually seen in daytime.

It generally feeds on mice. I saw one trying to swallow too big a mouse which got stuck in the mouth. The snake was easily caught alive, as it was helpless being practically suffocated in its effort to gulp down its prey.

It is found in northern Africa, Somaliland, Mesopotamia, India and northern Ceylon. In India it prefers to live in the plains, but can be found up to an elevation of 6,000 feet. It is very common in some districts as in Gujranwala in the Punjab, Larkana and Thar and Parkar in Sind, and Ratnagiri in the Bombay Presidency. In Ratnagiri during 8 days in 1862, no fewer than 1,15,921 Phoorsas were caught by the people to earn the reward offered by Government. In the same district in 1878, 62 cases of phoorsa-bite, which later proved fatal, were treated in the local Civil Hospital, a fact which shows how abundant this snake is in that district.

Being a viper, its young are born alive.

The Coloured Echis (*Echis colorata*)

This is another variety of Echis, found in Arabia, Palestine and Egypt. Its coloration and marking are slightly different, and the arrow-mark on the head found in the Phoorsa is absent in this species. The scales, however, have the same characteristics as those of the Phoorsa. I saw in 1908 in the Civil Hospital at Aden a bottled specimen which was identified at Bombay as *Echis colorata*.

III

Other Pitless Vipers.

There are five other kinds of Pitless Vipers reported from within Indian limits. All these have the distinguishing characters of this group of snakes, for they have broad belly plates, no pit between the nose and the eye, and have small scales and no shields on the head. They are all poisonous. They may be briefly described here.

1. *McMahon's Viper* (*Eristocophis mcmahoni*):— This grows to about 2 feet. It is a desert snake inhabiting sandy tracts and is found in Baluchistan and probably the adjoining parts of India. It is sandy brown in colour, with

white-edged, dark-brown spots along the back. Its belly-plates are definitely ridged on either side.

2. *The Levantine Viper* (*Vipera lebetina*):—This is found in northern Africa and south-eastern Europe, and in countries extending from Asia Minor to Baluchistan and Kashmir. It grows to 5 feet. The back is grey or pale brown, with a series of large brown spots, often with black edges. The spots may join each other. In some specimens of this species there are small dark spots or cross bars, or small dark lateral spots and vertical bars. The belly is whitish, with brown spots. The end of the tail is yellow. This snake is somewhat like Russell's Viper, with this difference that the spots on the belly are brown instead of black and the large lateral spots on the sides so typical of Russell's Viper are absent. A large V-shaped mark both on and behind the head, as also a dark speck behind the eye, may be present.

3. *The Perso-Baluch Horned Viper* (*Pseudocerastes persicus*):—It grows to 3 feet. It occurs in Persia and Baluchistan. It is greyish brown, with six series of large, ill-defined, blackish spots which alternate with those in the adjacent rows. It has got a projection above the eye, the so-called horn, and is thus easily distinguished from the other Pitless Vipers.

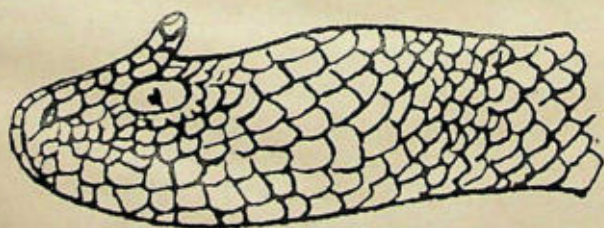


Fig. 25. Head of a horned viper.

4. *Smith's Viper or Two-horned Viper* (*Pseudocerastes bicornis*):—A rare specimen was found in Waziristan which was just over 2 feet. It is of a dusky khaki colour with a

series of short transverse bars on each side of the spine. It has two elongated scales above the eyes, which are free and erect appearing like two horns.

5. *Fea's Viper* (*Azemiops fea*):—A rare specimen was found in Kachin Hills in Upper Burma. This snake is peculiar in that it has shields on the head and no scales as other Pitless Vipers have. It has got a 'loreal' shield, that is, a small scale between the nose and the eye which does not touch either. This scale is present in no other poisonous snake with large shields on the head. It looks like a harmless snake, but it has poison-fangs like other vipers. Its belly is greenish grey, with some small spots of a lighter colour.

Some idea may here be given of the Pitless Vipers of other parts of the world. The most dangerous *Pitless Vipers of Africa* are well-known. They are:—

1. *The Night or Demon Adder* (*Causus rhombeatus*):—It grows to 2 feet. It is olive or pale brown on the back, with a series of large V-shaped dark brown spots.

2. *The Snouted Night Adder* (*Causus defilippii*).

3. *The Puff Adder* (*Bitis arietans*):—It is a typical viper, being one of the commonest and most widely distributed snakes in South and East Africa. It is very poisonous and dangerous to man, as it haunts the vicinity of houses in search of rats, mice or chickens. It is quite common to see it crawling about in a room. When provoked, it hisses loudly and makes a puffing sound, and hence it is called Puff Adder. It has long and very powerful poison-fangs. There are a few reserve pairs behind those in function. While in East Africa, I had the fangs removed from a Puff Adder, and they were nearly $\frac{1}{2}$ inch long. There may be some in which the fangs are still longer. If the snake gets a good bite, it can kill almost immediately. After striking its victim, it will leave it to die, at the same time

watching it carefully. People have been known to die within two minutes of its bite. It does not bite readily, but when it does, it does with fatal results. It is a stout, ugly, lazy snake, 2 to 3 feet long, but it may grow even to 5 feet. Compared with its length, its girth is disproportionately great. It is yellow or pale-brown on the back, with regular chevron-shaped dark brown or black bars pointing backwards or black with orange, yellow or white markings. I saw many specimens of this snake in British East Africa (now Kenya) lying on the railway line during my walks from camp.

4. *The Berg Adder* (*Bitis atropos*).

5. *The Horned Puff Adder* (*Bitis caudalis*).

6. *The Horned Adder or Horned Asp of Egypt* (*Bitis cornuta*):—This is an ugly snake, about 2 feet long, with a horny, scaly projection above each eye. It has become famous by its mention in connection with the somewhat spectacular suicide of Cleopatra.

Of *European Vipers*, one is a Pit Viper and the others are Pitless Vipers, and these are of seven kinds. One of them, the Levantine Viper, has already been mentioned. The common viper of Europe is the *Vipera berus*, which is a small reptile about 2 feet long. It is the only viper found in Great Britain. It may be grey, brown, red or black. Usually there are diverging black marks like a V or X on the back of the head and a zig zag line down the back with lateral spots. It prefers heaths and moors, and in such districts is found in copse or on stony ground. It lives on mice, for which it hunts at night. It does not climb or swim, and during the day may be found basking on the sand or stone. It hibernates during winter. Its bite is usually not fatal to man.

CHAPTER X

Pit Vipers

These have all a triangular head and broad belly plates as in Pitless Vipers and a pit in the loreal region, i. e., between the nostril and the eye on each side (Fig. 26). Most of them have small scales, but some have shields on the head.

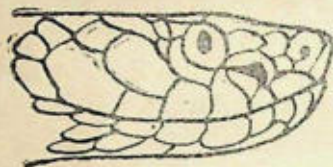


Fig. 26 Head of a Pit Viper showing the pit (shaded black) between the nose and the eye.

There are about 65 kinds of these, out of which two-thirds are found in America and one-third in Asia. Pit Vipers have not been found in Africa. The well known Rattle-snake of America belongs to this group.

Though the Indian species are sometimes fairly big and have well-developed poison fangs, their bite is rarely fatal to man. Locally the part bitten becomes swollen and painful, and the person is unwell for some time, sometimes for weeks, but ultimately he recovers completely. Pit Vipers in India are exclusively confined to hilly regions at elevations of 1,500 to 10,000 ft. or more.

Pit Vipers can be roughly divided into two groups: those

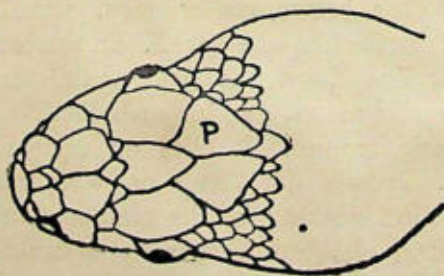


Fig. 27. Head of a variety of Pit Viper showing both scales and shields on head.

whose head is covered with small scales and those which have shields on the head (Fig. 27). Of the former group, there are seven kinds in India, Burma, and the Andaman and Nicobar Islands, and a brief description of them may be given.

1. *The Common Green Pit-Viper or Bamboo Snake* (*Lachesis gramineus*):—This is the most plentiful and widely distributed of Indian Pit Vipers (Figs. 28 and 29). It is found in all the hills of India at elevations of 1,500 to 6,000 feet and occurs also in Burma. It is usually vivid green, and rarely yellow or brown. There is generally a yellow or white line on each flank. The belly is whitish or greenish, and may be mottled. The head is flat, broad and triangular. The eye has a black vertically elliptical pupil with a golden-yellow iris. The tail is one-fifth or one-sixth of the whole length. This snake usually grows to 2 feet 6 inches, but may attain a length of 3 feet 8 inches.

Scales — 21 mid-body on the back. Ventrals — 145-175. Anal entire. Subcaudals — 53-75, divided.

It is easy to identify, being a green snake with a vertical pupil. It prefers to live in bamboos and low vegetation. It lies on branches. Its colour is so well adapted to its surroundings that it escapes notice except when it moves. It is usually sluggish, but, when irritated, it becomes fierce and strikes at objects and bites. It feeds on small rats, mice, birds and lizards. It does not lay eggs, the young being born alive.

Its bite is rarely, if ever, fatal; but it may cause nausea, vomiting and slight fever lasting up to 48 hours. The bitten part becomes swollen and discoloured and occasionally sloughs.

This snake is very common in the Western Ghats, in the Himalayas, and in the hills of peninsular India except the southern parts of Madras Presidency. It is found almost wholly in hills, but occurs also in the plains of the Sunderbans in Bengal and at or near sea-level in Burma.

2. *Large-spotted Viper* (*Lachesis monticola*):—This is confined to the Himalayan regions. It grows to 3 feet. It is buff or light brown in colour, with large irregular square plates or spots of black on the middle of the back. The head

is dark brown, with a buff V-mark on it. This snake is sometimes mistaken for a Russell's Viper.

3. *The Horse-Shoe Viper* (*Trimeresurus strigatus*):—This is of a brown colour mottled with dark on the back, and there is a pale buff horse-shoe mark on the nape of the neck, with a dark streak behind the eye. It is confined to the Western Ghats, the Nilgiris and other hills of Southern India. It is said to be common about Ootacamund.

4. *Cantor's Viper* (*Trimeresurus cantoris*):—This is confined to the Andaman and Nicobar Islands. It grows to 3 to 4 feet. It is greenish with dark spots, or brownish with green spots.

5. *Gray's Viper* (*Trimeresurus purpureomaculatus*):—This snake looks like the common green viper or bamboo snake. It is found in Bengal, the Himalayas and Burma. It grows to 4 feet. It may be uniformly green or uniformly purplish brown, or green and brown mingled. A well-defined yellow or white line is usually present on the side.

6. *Jerdon's Viper* (*Trimeresurus jerdoni*):—It grows to 2½ feet. It is greenish and black. The head is black, ornamented with yellow. It is found in Assam and Burma.

7. *The Anamalai Viper* (*Trimeresurus anamallensis*):—This is confined to the Western Ghats and hilly regions south of the Krishna river in Southern India. It grows to 3½ feet. It is greenish and blackish or may be reddish brown, with the sides dappled in buff.

Of the other group of Pit Vipers, those with shields on the head, the following four are found within Indian limits.

1. *The Brown or Common Himalayan Viper* (*Ancistrodon himalayanus*):—As the name indicates, this is mostly found in the Himalayan regions, but it is very common in Chitral, Kashmir and the Western Himalayas. In Kashmir it is called 'Pohur' and grows to 2 feet or more. Its colour is brown, either uniform or mottled so as to form

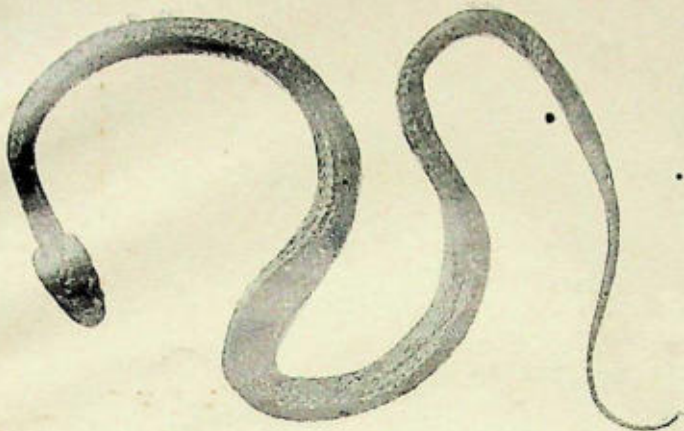


Fig. 28. Green Pit Viper.

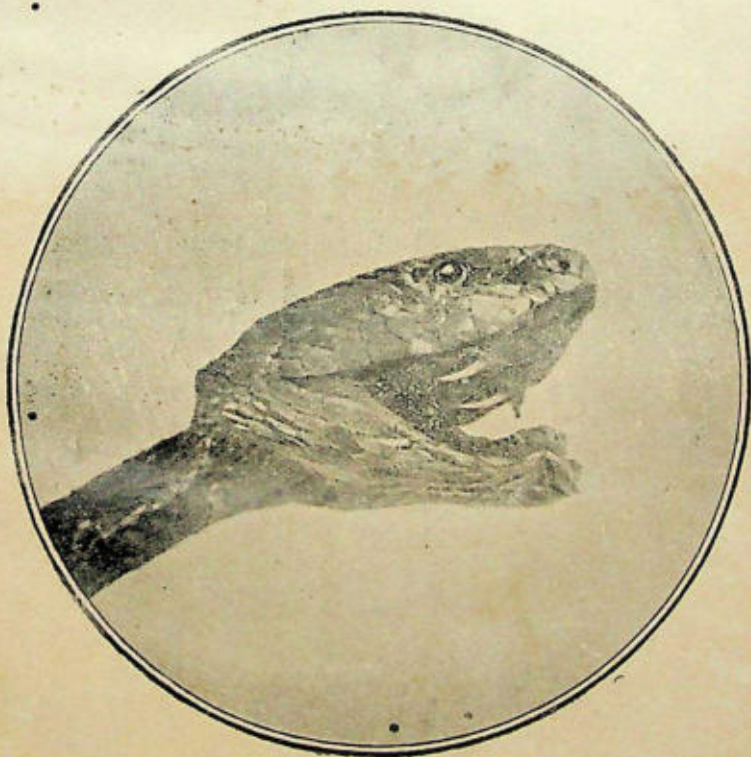


Fig. 29. Head of Green Pit Viper showing pit, and its mouth open showing fangs.

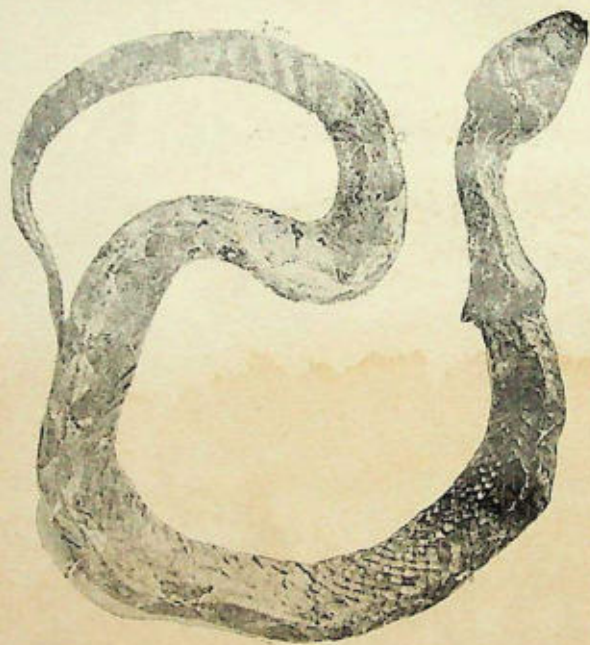


Fig. 30 Millard's Viper.

bars or carpet patterns. The belly is white with black and red dots. When molested, it coils itself ready for defence and vibrates its tail vigorously like the rattle-snake which is also a pit-viper. It can flatten out its body from head to tail so as to get a firmer hold of the ground.

2. *The Hump-nosed Viper* (*Ancistrodon hypnale*):— This is peculiar to Ceylon and grows to 18 inches. It is brown or variously mottled and has a longitudinal series of large, dark, oval spots on each side of the back. The snake has a boss on the snout, hence its name. It is found in Southern India also.

3. *Millard's Viper* (*Ancistrodon millardi*):— This is found at the top of the Western Ghats from Karwar to Castle Rock in the Bombay Presidency. It grows to 1 foot or a little over. It resembles the Hump-nosed Viper, but the boss on the snout is not so high. Its colour is of various shades of brown with mottlings. There are series of dark oval spots on the sides of the back (Fig. 30).

4. *The Large-scaled Viper* (*Lachesis macrolepis*):— This is confined to the hills of Southern India. It grows to 2 feet. It is usually bright green above and lighter beneath, with a white or yellow line running down the flanks. It may be olive-brown also.

The Mock Viper (*Psammodynastes pulverulentus*):— This snake is non-poisonous, but it has a striking resemblance to the Common Himalayan Viper. It has a short and rather stout body, a contracted tail, a flat head, swollen lips, large eyes with vertical pupils, and highly polished belly-plates. The scales on the back are of a dull colour. The young are born alive. These are all viperine characteristics. It adopts a menacing attitude like the Himalayan Viper when provoked. But it has no poison-fangs, and has no pit in the loreal region. It is not a viper at all, but belongs to the family of Colubridæ. It is between 1 and 2 feet long. The tail is one-fifth or one-sixth of the total length. It is

eminently a forest snake and not a sand-snake, though its Latin name would suggest its being allied to other sand-snakes. It is common in the Khasi Hills and Eastern Himalayas at elevations of 3,000 to 6,000 feet.

The Rattlesnake of America (Crotalus):—There are many species of Rattlesnakes found in America, their length varying from 5 to 8 feet. Their bite is very dangerous. They have at the end of the tail a rattle made up of a number of loose horny segments or rings (Fig. 31), which form interlocking joints and make a rattling sound when shaken. These rings or bells increase in number with age, and consist of 6 to 16, but some rattlesnakes may have even 20 rings. Some



Fig. 31. Rattle of a Rattlesnake.

of the rings are lost from time to time, so that the number of segments affords no guidance to the age of the snake. It is said that when a rattlesnake waggles its tail, every one in the vicinity becomes aware of it, and if it is in a room, the noise makes conversation impossible. The tail is oscillated with great speed when the snake is annoyed, the resulting rattling sound being somewhat like that of an alarm clock and sometimes very loud.

The rattlesnake feeds upon small mammals, hunting for them at night. Pigs kill it and eat it with avidity. In daytime the snake basks in the sun, but during the rains it retires into a hole, occupying, as a rule, the hole of a rat or a ground-squirrel. During the winter it hibernates. It is of a sluggish disposition, not inclined to bite except when disturbed or in pursuit of prey. Rattlesnakes are confined to America and are the most important among the Pit Vipers of that Continent.

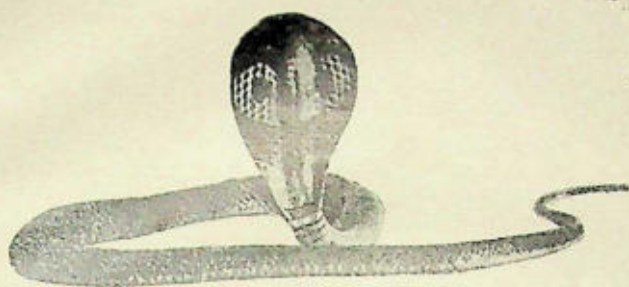


Fig. 32. Binocellate Cobra, showing hood.



Fig. 33. Cobra in a basket.



Fig. 34. Cobra with mouth open, showing the fangs and the dark plates under the neck.

CHAPTER XI

Cobras

There are 10 species of Cobras altogether, of which 7 are found in Africa, one is peculiar to the Philippines, and only two occur in India. These last are the common Indian Cobra and the King Cobra.

I

Indian Cobra (*Naja tripudians*)

All people living in the tropics have seen a cobra. Who has not seen the snake-charmer playing his gourd before a fine-looking and graceful snake with its hood swaying sideways to the lateral movements of the snakeman? This snake has indeed a very beautiful appearance, but it is a very poisonous and dangerous reptile. The most prominent characteristic of the cobra is its well-marked hood. It has long ribs on the neck just behind the head, with attached muscles. The ribs behind the neck are shorter and smaller. Hence when the neck muscles contract, the ribs stand out sideways and the neck expands laterally, forming the hood (Figs. 32, 33 and 34). Other snakes, when irritated, may also stiffen their neck and rear it up above the coiled up part of the body. Superficially looked at, the neck may then look like and be mistaken for a hood. But there is no mistaking the hood of a cobra. It is well-marked, widely expanded, and slopes down gently from just behind the head towards the back. When any other snake stiffens its neck and raises it and it resembles a hood, the hood will be found to be narrow, and such snakes are usually not of a black or wheat colour, which is the usual colour of the cobra in this country.

A snake with a well-marked hood can be identified with certainty as a cobra, and this hood sometimes bears

what is called a spectacle mark, something like ∇ . Such cobras are of the variety called two-ringed or Spectacled Cōbra commonly seen in Bombay Presidency. In others, there is an oval spot surrounded by an ellipse. These are the one-ringed or monocled variety found in Bengal. In still others, there is no mark on the hood. These are found in Cutch, Rajputana, Kathiawar and Central India. The mark consists of black spots surrounded by white ones. When the neck is dilated, these marks, if present, are clearly seen but are not discernible when the neck is not dilated. When a cobra dies or is killed, the joints and the neck become stiff, and the hood cannot be demonstrated. Hence some other points should be remembered for purposes of identification of the snake. These are:—

The third shield of the upper lip in a cobra is big and extends from the eye to the shield containing the nostril (Fig. 35). This is a characteristic only of cobras and coral snakes. In the Indian Cobra will be found a tiny shield, wedged in between the fourth and fifth lower-lip-shields, called the cuneate or wedge shield. Only in rare cases is this shield absent. Besides, in the Indian Cobra the subcaudals (shields under the tail) are double. These three characteristics will enable one to identify the snake in the absence of an expanded neck.

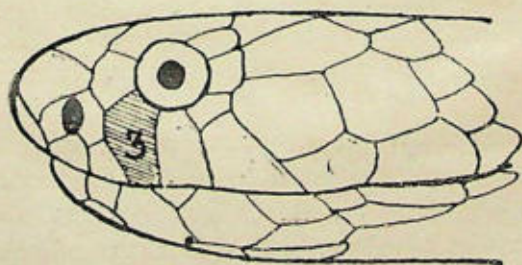


Fig. 35. Side view of the head of a Cobra showing large third Upper-lip-shield.

Another point which has not been emphasised so far by other writers is that, if two or three series of very dark, nearly black, belly plates are found under and below the neck, the snake is definitely a cobra. The black ring or rings or the spectacle mark on the back of a cobra's neck lie between the 10th and 17th series of the transverse scales. But when the neck is in an unexpanded state as in the case of a cobra undisturbed or dead, the scales on the back are not separated. The scales are then imbricate and so conceal the pattern of the marking on the neck. But on the under side of the snake towards the head, there is a dark spot on either side of the belly plates, the position of which corresponds with that of the round mark on the back of the neck. Between the 15th and 30th belly plates under the neck there are two or three series of dark belly plates. Each series may consist of 4 to 6 plates, more or less, and separated from the next by normal-coloured or whitish belly plates. These dark belly plates are found in the cobra only, though not in all cobras. Hence if two or three series of dark belly plates are present under the neck, the snake is definitely a cobra. These dark plates on the belly under the neck are alone sufficient ordinarily to indicate that the snake is an Indian Cobra (Fig. 34).

It is not safe to identify a snake from its colour or external appearance. The colour is usually an adaptation to the surroundings. In the black cotton soil of the Deccan, the cobra is usually of a black or slate-grey colour, though specimens are met with, which are brownish or ash-grey.

In India the cobra is usually black, buff or wheat coloured, and occasionally brown. In countries with red laterite soil, the snake may be of red colour. I have seen at Nairobi and other parts of East Africa brick-red cobras. In Sind and Baluchistan, where the variety without any mark on the hood is found, the cobra is of a sandy hue, while in Siam there are cobras of green colour. Rarely they are whitish (I had

one sent to me from Belgaum, and there is one in the Haffkine Institute at Bombay sent from Gwalior).

Again, in some kinds of snakes the markings and colour of the adults are different from those of the young. Hence, for definite identification of a snake, the characteristics and arrangements of the scales should be the guiding factor, though the size, colour, external markings etc. will be helpful in approximating a specimen to a particular type.

Other snakes, like some kind of Rat Snakes, have been mistaken for a cobra. Some keel-back snakes too can stiffen their neck to a certain extent, leading people to mistake the part for a hood. But the characteristics mentioned above should prevent one from mistaking such snakes for cobras.

The cobra is a more or less ubiquitous snake, found in the thick growth of trees, in jungle and in open country with or without vegetation. It is found in gardens, in cultivated fields or in plains. It is very common in populated areas. It makes its abode in man's proximity in spite of bustle and disturbance. It lives in stacks of wood, in drains, under rubbish, in loose masonry, in crevices of walls in ruins, in loose brickwork of walls, etc. Fallen houses, old cemeteries, old mosques, etc. afford ideal places of habitation to this snake. It is often seen in bathrooms, dark corners of houses, dwelling-rooms, stables, servants' quarters, etc. It may be found in an old hole in a tree, in a hole in the ground, and frequently in an ant-hill. It is sometimes seen in water, as it swims with ease. It climbs trees in search of birds' nests. It has been occasionally seen even in the sea, according to reports.

It is usually not an aggressive snake. When disturbed, it attempts to escape. If disturbed when close, it erects itself, sways its hood backwards and forwards, hisses and gets ready to strike. If the person keeps still, it drops its head and glides away quietly, but if he makes any movement, it again erects its hood and gets ready to strike. It is usually

timid. A young cobra, on the other hand, is alert, irritable, and strikes and bites viciously and is hence much more dangerous than a full-grown cobra. One hardly ever sees, therefore, a young cobra with a snake-charmer. The attitude of a cobra about to strike is characteristic. When alarmed, it erects the fore part of its body to a remarkable degree, sometimes as much as one-third of its total length, and flattens its neck to form the hood. The mark on the hood, if any, becomes then very prominent, as the scales on the back of the neck separate when the neck is dilated.

The bite of a cobra is usually a quick snap, but may be tenacious. The poison may trickle on the skin as a drop or may be sprayed, and very little may penetrate through the actual puncture. The spraying of the poison as a jet from the fangs is typical of some African cobras, and if the poison gets into the eyes of a person, it may cause considerable inflammation.

The cobra is usually diurnal in its habits. During the day it may be found roaming about in search of food or drink. In populated areas it is perhaps more frequently met with at night. It usually moves very fast, and young cobras move still faster.

It is a common belief that snake-men can charm cobras, and so they are called snake-charmers. These men are adroit in catching snakes. They are quick, and as soon as they see a snake, they grab it just behind the head, so that it cannot bite. It is all a matter of nerve and quickness. It is incredible that they can charm a snake. It is curious that no 'charming' is seen with any snake other than the cobra. Snake-men should be able to charm every snake if it is attracted by the music of their pipe.

The hearing apparatus in all snakes is very rudimentary and cobras are no exception. They have no external hearing apparatus and cannot catch sounds conducted through the air, but can hear sound conducted through solids, which are

better conductors of sound than liquids or gases. If a sound is made on the ground by a heavy tread or the thud of a stick, it is conducted first through the ground and then through the snake's body to its internal auditory nerve, and the snake hears it. But the sound of a rattle or even of a gun-fire cannot be heard by it, as the original medium of conduction is the air. Col. Wall, I. M. S., made some conclusive experiments and proved that it was not the sound of the musical instrument of the snake-man, but the constant movement of the instrument that kept the Cobra in its erect position. The Cobra's eyes follow the movements of the hands and the gourd of the snake-man, and the snake sways its head to accord with these movements and not with the source of the sound. Col. Wall cut small strips of sticking-plaster and with these covered a Cobra's eyes completely so that it could not see. The snake quickly relaxed its hood, being unable to see any danger. Then he banged a kerosene tin with a stick close to the snake's head, but the reptile took no notice and did not erect itself. A bugle was blown without any effect on the snake. But when a chair was moved or a servant walked on the wooden verandah, the snake erected itself, which showed that sound conducted through a solid was audible to the snake and gave it warning of what it considered as danger. But though snakes have no external ears, they are not deaf. They can hear faintly. Col. Wall's experiments conclusively prove that a Cobra is kept excited and erect by the snake-man, not by the so-called charm of the music, but by the constant movement of his hands as he plays on the instrument, or the restless movement of his knees while he is squatting. Any slight movement in front will attract the notice of a Cobra. In fact, if you attract its attention with one hand, you can seize the snake in the middle of the body with the other hand. It does not mind it, its attention being rivetted on the moving hand in front. It is the eyes and not the ears that keep a Cobra alert. The defective hearing and perfect vision of

a snake were well known to the ancient Hindus, for in Sanskrit, a snake is called *Chakshushrawa* (चक्षुश्रवा), which means 'hearing with the eyes'.

The hissing of a Cobra is a respiratory act, and when erect it can hiss in a fierce, explosive manner. It protrudes its tongue far out in hissing. The throat is turned into a sort of pouch. The hissing noise is produced both during inspiration and expiration, and the whole body is inflated as the snake inhales the air and again deflates as it exhales it.

The Cobra feeds chiefly on rats, mice, frogs and toads, and less frequently on birds and their eggs. It sometimes gets under hen-coops and kills hens and chickens. It will also eat squirrels, lizards, and other snakes like the wolf-snake, the cat-snake and even the dhaman. Sometimes the Cobra itself is eaten by its bigger relative, the King Cobra.

Like other snakes it feels thirsty and drinks water greedily. This fact probably accounts for the Cobra's occasional presence in a bath-room in hot weather.

The female lays eggs, usually from 12 to 22 at a time, which hatch after two months. The eggs are white and oval, and about 2 inches long. The young are 8 to 10 inches long when born. Young Cobras are very active and are definitely poisonous. The common belief that they are not poisonous is wholly wrong.

The poison of a Cobra is very potent and will kill a man usually within 2 to 6 hours of the bite. Cases have been known of death within half an hour and in some after 8 hours, while cases have been reported where death occurred after 24 hours. An average Cobra can secrete enough poison to kill 15 persons. In man the following are the symptoms :—

- (i) Stinging and burning pain, its severity being out of all proportion to the mechanical injury.

- received. The pain is immediate and persists for some time, after which the bitten part may become numb.
- (ii) Swelling of the part, which follows very soon and gradually increases till the whole limb is swollen and tumid.
- (iii) Blood-stained serum oozes out from the punctures which do not get sealed up with clot.
- (iv) Bruising of the tissues around the punctures, which become bluish or pinkish in colour.

The rapidity of the symptoms is in proportion to the irritant effect of the poison and the amount injected. These are local symptoms, that is, those that are seen at or near the punctures. But the poison is so quickly absorbed in the body that general or constitutional symptoms also develop. These consist of gradual, but rapidly advancing paralysis. The person bitten complains of weakness in the legs and feels inclined to lie down and does not like to walk or sit. This weakness gradually spreads over the whole body and affects the neck, so that the head droops, speech becomes difficult, saliva dribbles from the mouth and swallowing becomes difficult. The eyelids droop, and the person looks drowsy. Afterwards, breathing becomes difficult and then laboured. Nausea and vomiting occur, and bleeding may ensue from some parts of the body, and ultimately death follows from failure of respiration. If a person becomes violent or delirious, it would be due only to fright and not to poison.

The bite of a Cobra is not necessarily fatal. A doctor should be consulted without delay. Antivenene is an absolute specific for Cobra-bite and is sure to be effective if injected in the body within a reasonable time. It often happens that the amount of poison that has entered the body of the person bitten is not sufficient to constitute a lethal dose. This may be due to the possibility of the

snake having bitten some animal before or to much of the poison having lost itself in the clothes if the bite has been inflicted through clothing. In such cases there is every probability of the person's recovery. But all the same, if Antivenene is readily available or procurable without much loss of time, it is highly advisable to have it injected so as to strengthen the chances of recovery.

The word 'Cobra' is a Portuguese term, and in that language applies to any snake. Thus 'cobra de capello' means 'hooded snake' and is the name by which the ordinary Indian Cobra is called in Portuguese, and the name 'Cobra Monil' meaning 'necklace snake' applies to Russell's Viper.

In most parts of India, the Cobra is known in the vernaculars as Nag. In Tamil it is called 'Nalla pambu' or 'Naga pambu.' In Bengal, the spectacled Cobra is called 'Gokurra,' and the monocled one 'Keautiah.' In the North-West Frontier Province it is called 'Chajli'. In Pushtu 'Chaj' means 'a winnowing fan,' as the Cobra's dilated hood resembles it to some extent. Another Pushtu name is 'Chamcha-mar' (Spoon-snake), the hood being compared to the upper part of a spoon. In Burma it is called 'Mywe Howk,' which means 'a hissing snake.' In Sinhalese it is called 'Naya.'

II

Hamadryad or King Cobra (*Naja bungarus*)

This is a very big and dangerous snake, found in thick jungles or forests or in their vicinity. It grows to 8 to 12 feet usually, but may attain a length of 15 feet or more. It has two characteristics of the Cobra, in that it has a hood and that the third upper-lip-shield is very big and touches the eye and the nose-shield. It has no cuneate-shield on the lower lip. In the ordinary Cobra, all the shields under the tail behind the vent-opening are divided, while in the King Cobra those near the vent are entire, but those towards the end of the tail are

divided. Unlike the common Cobra, it has two large occipital-shields behind the parietals on the head and no spectacle or monocle mark on the neck or hood (Fig. 17).

• In colour the full-grown King Cobra is yellow, green, brown or black. There are usually yellowish or white cross-bars or chevrons on its body. The belly may be uniform in colour or mottled or ornamented with bars. The throat is light yellow or cream-coloured. The young are jet-black, with yellow or white cross-bars on the body and tail and four similar cross-bars on the head (Fig. 36). The King Cobra is regarded as a fierce and aggressive snake, and its length and size give it an awesome appearance. It occurs in the Himalayas, Bengal, Assam and Burma and in the hills and forests of Southern India. It has been found in hilly regions up to 7,000 feet above sea-level. It eats other snakes, even big ones like the dhaman and poisonous ones like the Cobra and the krait.

The bite of this snake is usually severe, and the person dies within a few hours. It is a common belief that it will attack human beings with or without provocation, but authentic records of unprovoked attacks are very few. Usually it tries to escape like other snakes when disturbed.

In some vernaculars it is known as Nag Raj or Raj Samp. In Canarese it is called Kâlinga.



Fig. 36. King Cobra.



Fig. 37. Maclelland's Coral Snake (Head and front part).

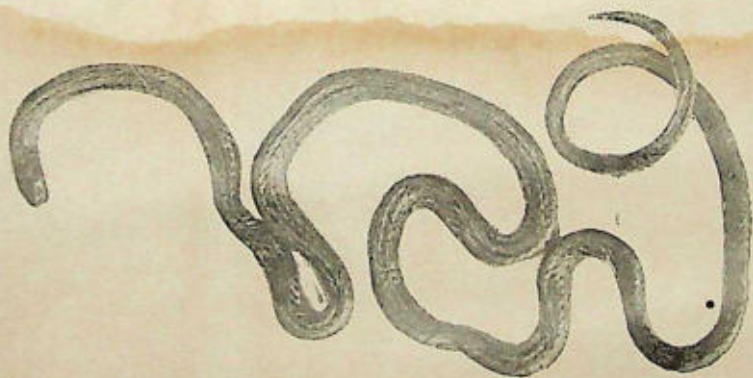


Fig. 38. Common Indian Coral Snake.

CHAPTER XII

Coral Snakes

These are mostly small snakes, but beautifully coloured. In most of them, parts of the belly are pink coral. They are all poisonous, though the poison does not do much harm to man. The tail is round, and the third upper-lip-shield touches the eye and the shield in which the nostril is situated, as in the Cobra. Cobras and coral snakes are assigned to the same group, as this shield is a characteristic common to both, and both snakes are poisonous, though their venoms differ in potency. As coral snakes are not so harmful to man, they will be described only briefly. There are 9 kinds altogether, of which 7 are found in India and Burma.

(i) *The White Striped Coral Snake* (*Doliophis bivirgatus*):— It is found in Burma. It grows to 5 feet. Its belly, head and tail are red. The back is of a dark colour with two or four longitudinal white lines on it.

(ii) *The Belled Coral Snake* (*Doliophis intestinalis*):— This is found in the Malay States and is said to occur also in Burma. It grows to 2 feet. It is brown or black, with lighter longitudinal streaks on the back, and the belly is marked with black cross-bars. The under surface of the tail is pink.

(iii) *Bibron's Coral Snake* (*Calliophis bibroni*):— This is a rare snake found in the Western Ghats. It grows to 2 feet or more. The front part of the head is black, and the belly is red with black bands across. The back may be cherry-red or purple-brown.

(iv) *Maclelland's Coral Snake* (*Calliophis maclellandi*):— This occurs in the Himalayas, Nepal, Sikkim,

Assam and Burma. It grows to 2 feet or more. It is cherry-red above, with black bands on the body and tail, or it may have no bands at all but only black spots on the back (Fig. 37). Some have a black stripe on the back. The head is black, with a white band across, and the belly is yellow.

(v) *The Slender Coral Snake* (*Calliophis trimaculatus*):— This is a very small and slender snake, growing to 13 inches or more. The body is light yellow-brown. The head and neck are black. The tail has two black rings. The belly is wholly or in some parts coral pink. It is found in Southern India, Deccan, Bengal and Burma.

It is considered to be a rare snake, but it is not so uncommon in the Deccan. I have had specimens brought from Gadag (Dharwar district), Nasik, Dhulia and Ahmednagar and from Bombay itself.

This is a poisonous snake, but there is a harmless one which looks very much like it except for the colour of the belly. This harmless snake is called the 'many-toothed spot-bellied snake'. It can grow, however, to a much greater length.

(vi) *The Small-spotted Coral Snake* (*Calliophis maculiceps*):— This is found in Burma only. It grows to 1½ ft. It resembles the Slender Coral Snake except that it has small black spots on each side of the spine.

(vii) *The Common Indian Coral Snake* or Gunther's Coral Snake (*Hemibungarus nigrescens*):— This is the biggest of the Indian Coral Snakes (Fig. 38). It is a hill-snake and is found in the hills of Western India and the Madras Presidency. The head and neck are black, except for a yellow curved streak on the back of the head. The back may be red or brown, with 3 or 5 long series of spots which may join and form lines.

Coral snakes are also found in Africa, some of which are brilliantly coloured and striped. These belong to the genera *Aspidelaps* and *Elapechis*. Other snakes of similar colour and stripes called Garter Snakes are also found in Africa. These belong to the genus *Homorelaps*.

CHAPTER XIII

Kraits

Kraits are one of the common kinds of snakes found on land. They are very poisonous. Fortunately most of them are not of a large size. Their mouth is not big, and so the gape is not very wide. The poison-fangs also are small and short as compared with those of other poisonous snakes. Hence the poison injected by the krait is not large in quantity, though enough to kill a man. As it is a poisonous snake, it is advisable to know how to distinguish it.

- (i) A krait has broad plates on the belly.
- (ii) The head is covered with shields.
- (iii) The tail is round.
- (iv) The central row of scales down the back is distinctly enlarged and is more or less hexagonal.
- (v) There are only four shields along either side of the lower lip.
- (vi) The plates under the tail are entire and not divided.

Where all these six characteristics are present, the snake is a krait. The fourth and sixth characteristics are sufficient to distinguish a krait.

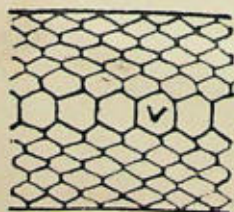


Fig. 39. Back of krait showing enlarged Vertebrals (✓).

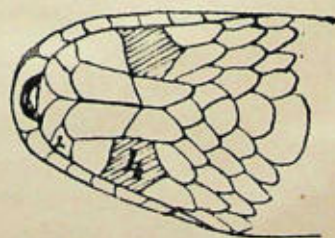


Fig. 40 Under part of the head of a krait showing four lower-lip-shields, the fourth being the largest.

Teeth in the side of the upper jaw, other than fangs, are not entirely absent in the krait. But in the front there are no teeth in the side of the upper jaw except the fangs. But behind the fangs in the back part of the side of the upper jaw there are four small teeth, and the krait is the only dangerously poisonous land-snake in which they are present.

There are 11 species of the krait, of which 10 are found within Indian limits, the eleventh occurring in the Malay States. Only two of the Indian Kraits are common, the Common Krait and the Banded Krait. The others mostly resemble the Common Krait, but have a very restricted habitat. Some of them are rare.

I

The Common Krait (*Bungarus cœruleus*)

This snake occurs throughout the Peninsular India and is the only krait found south of the Ganges basin (Fig. 41). It is a common snake and has all the characteristics of the krait mentioned above. It is usually glistening black or steel-black in colour and has white linear arches across the back. These are arranged singly or in pairs and extend from near the end of the tail upwards, but are absent near the head in front. In young specimens, however, there is some white mottling near the end of the head, but it disappears as they attain full growth. The Common Krait, when full-grown, is 3 to 4 feet long, but may grow to over 5 feet. It is a very timid snake and usually inoffensive. It is of a quiet disposition and is not easily irritated. It does not bite unless trodden on, annoyed or injured. It prefers to live in or near houses. It may be found in the gardens, verandahs, bath-rooms, on the ledges of doors, in book-cases or cupboards or in the roofs of bungalows or out-houses. It is fond of water. It is decidedly nocturnal in its habits. It avoids mov-

ing about in daytime. It becomes active at dusk and goes about at night in search of food.

Its belly is white. It has a black round pupil, difficult to make out when killed. It prefers to feed on other snakes, especially the blind burrowing snakes, though it also eats frogs, toads, mice and rats. Kraits usually go about in pairs. So if one is killed in or near a house, a look-out should be kept for its mate.

The female lays eggs, 6 to 10 in number. These are white and elongate, about $1\frac{1}{2}$ in. long and $\frac{3}{4}$ in. broad, and somewhat resemble plump eggs of a pigeon.

Scales—15 rows in midbody. Ventrals 195—225.

Anal—entire. Subcaudals—entire, 37—56.

This snake is called 'Manyar' in Marathi in Bombay and the Deccan, 'Pee-un' in Sind, 'Kawriya' or 'Chit Kawriya' in the Punjab, 'Chitti' in Bengal, 'Kattuvirian' and 'Yettadvirian' in Madras, 'Valla pambu' in Malabar and 'Kadambale' in Canarese.

The venom of the Common Krait is estimated to be three times as virulent as that of the Cobra. The signs and symptoms in krait poisoning are similar to those in Cobra-poisoning. The person bitten is overcome by a creeping paralysis, but in addition there is a violent abdominal pain, probably due to internal bleeding. Death by krait-poisoning usually occurs in 6 to 24 hours, but a person may die within 6 hours or even after a few days. There is no Antivenene for its poison so far. I know of 4 deaths having occurred in a single year as the result of krait-bite in the Ahmednagar district of the Bombay Presidency.

There is another common snake which superficially looks very much like the Common Krait and is often mistaken for it. It is the Common Wolf-snake, which is non-poisonous. Hence it is important to know how to distinguish these two. The wolf-snake is of about the same size

as the common krait and is often found in or near houses. Not only does it prefer human habitations like the common krait, but it also comes out at night like the latter. It has also white semi-circular lines across the back, but they begin very near the head and do not extend right up to the end of the tail but disappear at some distance from the tail, whereas in the krait, the white half rings go up to near the end of the tail and begin at some distance from the head. This is a rough way of distinguishing the krait from the wolf-snake, but the deciding factors are that in the krait the vertebral row of scales is enlarged and hexagonal, whilst it is not so in the wolf-snake, and the subcaudals in the krait are entire, while in the wolf-snake, they are divided. How external characteristics like colour, markings, etc. may mislead one in the identification of a snake is well shown in the case of these two snakes. The common krait is usually black, while the wolf-snake is usually brown, though I have also seen a brown krait and some black wolf-snakes. In fact, many of the wolf-snakes sent to me from Matheran were black. The white half rings on the back are fairly distinctive in these two snakes as explained above, but in these again, a young krait may have white spots quite near the head and a young wolf-snake may have white spots or lines near the end of the tail. But the characteristics of the vertebral and subcaudal scales will afford sure means of identification of these two reptiles. It is useful to know these points, for it is supposed that nearly half the number of snakes found near houses are wolf-snakes. The bite of a wolf-snake produces no appreciable harm, though this snake is much more aggressive than the krait.

II

Banded Krait (*Bungarus fasciatus*)

This is another important member of the krait clan, and by far the largest. It is found in China, Malay States and the basins of the Irrawadi and the Brahmaputra. In India it

is said to be found only in the north-east as far south as the basin of the Mahanadi river, though it has been recorded further south from the Hyderabad State.

It is a big, stout snake, which grows to 5 or 6 feet, but the greatest length recorded is 7 feet. It has all the distinctive characteristics of the krait, but in addition it has across the back large broad bands, their colour alternating yellow and black. The bands may be 1 to 1½ inches broad. The Banded Krait has a very beautiful appearance (Fig. 42). It is a deadly poisonous snake, its venom being estimated to be 16 times as powerful as that of the Cobra.

These are the two important species of the krait. Some of the others are:—

3. 'Yellow-headed Krait', which occurs in the Malay regions and is found on the borders of Burma, but is rare.
4. 'North-eastern Hill Krait', which is found near Darjeeling and the Khasi hills and is also rare.
5. 'The Lesser Black Krait', a rare snake found in and near Assam.
6. The Burmese Krait, found in the basin of the Irrawadi in Burma.
7. 'The many-banded Krait', found in China, the Andamans and rarely in Burma. It is black in colour, with 31 to 48 pure white bands on the back and 11 to 13 on the tail.
8. 'The Greater Black Krait', which is uniform black above, is found in Assam and the Eastern Himalayas.
9. 'Ceylon Krait', which is peculiar to Ceylon.
10. 'Wall's Krait', found in the Ganges basin.

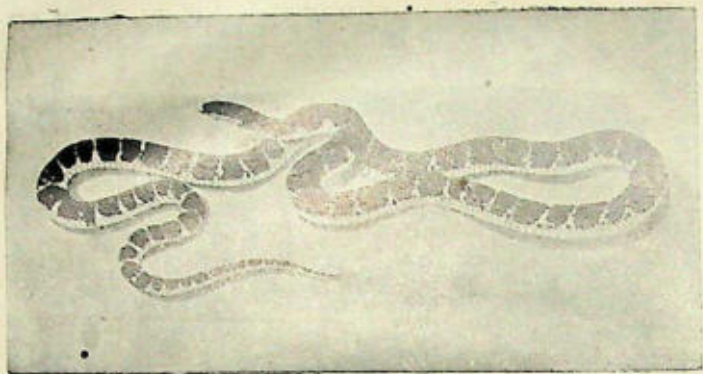


Fig. 41. Common Krait.



Fig. 42. The Banded Krait.



Fig. 43. Sea Snake.

CHAPTER XIV

Sea-snakes (Hydrophiinæ)

Sea-snakes can always be distinguished from other snakes by the flat shape of their tails (Fig. 43). This is an adaptation to their life in the sea, as the laterally compressed, fin-like tail enables them to swim with ease. In land-snakes the tail is cylindrical, and on section, would appear roundish like O or oval like \circ , while that of sea-snakes would appear flat like O. The flat tail of the sea-snake forms a vertical fin and resembles that of an eel.

In many of these, the belly-plates are not broad. Their nostrils are situated on the top of the snout, so that they can breathe while swimming or in the water. The eyes are very small. The head-shields are more or less regular. The nose-shields are contiguous. The scales on the back are not bright, but are dull and tuberculated.

Sea-snakes are all poisonous and are usually found in the Indian seas and the Persian Gulf. The poison-fangs in them are not highly developed, and behind these there are usually 3 or 4 teeth. The back is usually conspicuously banded with black, greenish or bluish stripes. The back is dirty green or dull blue and is usually conspicuously banded with black, greenish or bluish stripes which may be broad or thin, and the belly is white or yellowish. In the young the head may be black and have a horse-shoe mark on it.

These snakes frequent the close vicinity of the coast and find their way into tidal rivers even as far up as 100 miles. They are often found in or about the rocks that fringe the shore. I saw one resting on a rock in the sea near the shore at Sidab near Muscat, and another at Jask in the Persian Gulf. One was caught on the end of a boat-hook in the sea at Jask and pulled up into the boat. It

now lies bottled in the museum of the Bombay Natural History Society. There is a fine collection of sea-snakes in the Aquarium at Madras.

Sea-snakes feed entirely on fish. They are usually inoffensive by nature and not inclined to bite. Fishermen catch them in numbers in their nets and throw them back into the sea, but cases of bite among them are very rare.

These snakes swim with grace and ease, with the head above water, and dive deep when disturbed. On land they move with difficulty. They do not lay eggs, the young being born alive. The adults are 3 to 4 feet in length, but may grow to even 9 feet. They are generally bulky, though some are very slender. There are 55 species of sea-snakes, 29 of which are found in the Indian waters and 12 in the Pacific.

Sea-snakes are divided into various kinds according to the disposition of the scales on the head, the body and the belly. As they are not so frequently seen except in or near the sea, details for their identification need not be given here. It is sufficient to bear in mind that all sea-snakes are poisonous and are easily distinguished from other snakes by their laterally compressed or fin-like tail. They are usually named after the person who first described them.

In the previous chapters only the poisonous snakes of India have been described, namely, the Cobras, Coral Snakes, Kraits, Vipers and Sea-snakes. Of these, the Cobra is the deadliest, the next dangerous being the Russell's Viper and then the Echis or Phoorisa. Kraits rarely bite, but cases of bite are not as uncommon as one might think, and their bite is usually fatal. Two-thirds of the mortality from Cobra-bite could be prevented by the injection of Antivenene. The snakes described in the following chapters are harmless to man, in the sense that their bite is not followed by any grave symptoms and is never dangerous. They will be grouped according to their principal habits, and some of the common ones will be described.

CHAPTER XV

Blind Snakes (Typhlopidae)

These are small burrowing snakes, 5 to 12 inches long or more. They are slender and look like worms. They are active and wriggle like other snakes. They are found in the earth when it is dug. They are also seen on the ground and have been found in houses. They are non-poisonous and harmless.

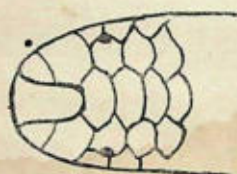


Fig. 44. Head of a Blind Snake showing beak-like projection.

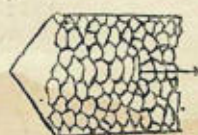


Fig. 45. Belly of a Blind Snake showing small scales.

They are blackish or brownish. The belly and the back are covered with tiny shining scales. The tongue is forked. There are no teeth in the lower jaw. The eyes are very small and are covered with scales and are therefore scarcely visible. These reptiles are hence called Blind Snakes. The tail is very short, conical, and in some, ends in a sharp spine. The scales being smooth, soil does not stick to them and so does not impede the quick movements of these snakes. They burrow and live underground. They may be found in decayed logs of wood, as their main food, viz., insect larvæ and pupæ, is available therein, and they also find warmth there. They sometimes come out through water-taps as they did in Calcutta, in certain seasons, being probably born in the water-mains. They are found in most parts of the globe such as tropical America, southern Europe, southern Asia, Australia and Africa. There are 18 kinds of these found in India (Fig. 46). The female lays eggs.

These snakes are fond of white ants' nests, and hence probably their invasion into houses. I frequently found them in the Civil Surgeon's bungalows at Dhulia, Sholapur and Ahmednagar in the Bombay Presidency, when I was stationed at these places.

II. *Glauconiidae* :—This is another distinct family of blind burrowing snakes exactly similar to the above, but they have teeth in the lower jaw only and none in the upper jaw.

These are found in Africa, South-western Asia and the warmer parts of America. In India only two species have been recorded from Sind, Punjab, North-West Frontier Province and Baluchistan.



Fig. 46. Blind Snake.

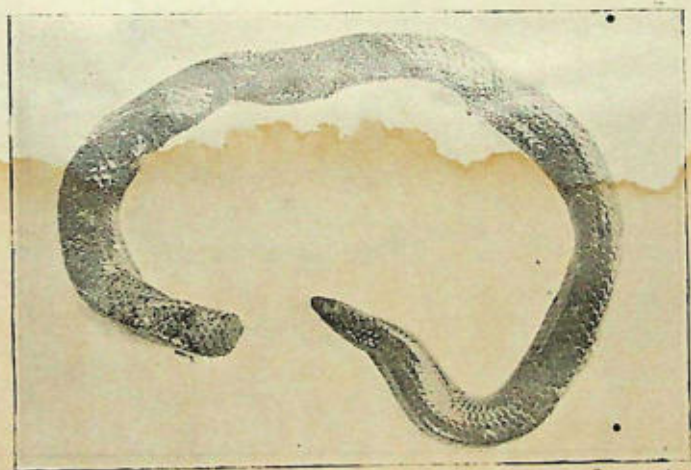


Fig. 47. Phipson's Rough-tailed Earth Snake.

CHAPTER XVI

Burrowing Snakes

There are four families of snakes which come under this category. They are all harmless. The belly scales in all these are similar to those on the back or slightly bigger and not markedly broad. Blind Snakes are of the burrowing kind and form two families as already mentioned. The third family (*Ilysiidae*) is found in Burma, Ceylon, Malay States, Indo-China and South America. The snakes of this family grow to 2 feet 6 inches in length. They live on worms and insects, but they are not blind. One found in South America has a very beautiful appearance, and, as it is harmless, it is said that the native women wear it as a soothing and cooling, if somewhat fidgety necklace. One kind of snake in this family is found in Ceylon, and one in Burma and the Malay regions.

The fourth family of Burrowing Snakes (*Uropeltidae*) is found in Southern India and Ceylon. They have a short and rigid cylindrical body and a short truncated tail. Sometimes this end-shield of the tail has got small spines or ridges on it. The peculiar rough tail fits into the burrow-hole in the ground and repels other animals that come in contact with it. The tail is peculiar, and once seen there is no mistaking it. The scales on the body are smooth and round. Some members of the family are very beautiful. They frequent damp localities, particularly in hilly and wooded districts. They are small snakes 1 to 2 feet long. Some have a marked snout adapted for burrowing, the head being small. The belly-plates are narrow. They are all earth-snakes, living by choice beneath the soil. They move slowly and are very timid. The back is brown or black and in some spotted. They feed on insects, worms and

grubs. They do not attempt to bite. I have found them in daytime in the gardens of the bungalows and hospitals in Belgaum in the Bombay Presidency.

They may be called 'Rough-tailed earth-snakes' (Fig. 47). Usually people are so ignorant about identifying a snake that I was told that this snake was a Phoorsa and therefore poisonous until I caught one and showed that it was not so.

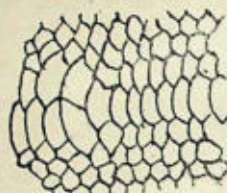


Fig. 48. Belly-scales of a Rough-tailed earth-snake.

There are 44 kinds of snakes in this family found in India and Ceylon, the distinctions amongst the species being based on the character and number of the scales on the head, the back and the belly (Fig. 48).

CHAPTER XVII

Earth Snakes

There are various earth-snakes, that is, those which live practically on or in the ground. They belong to the families of non-poisonous snakes already described and include all burrowing snakes. They feed on insects and worms. But there are two other common earth-snakes in India called the Russell's Earth-snake and John's Earth-snake, which belong to the family of Boas and are allied to Pythons in their appearance and habits. The plates on their belly do not run right across, as in most other land-snakes, but are broad enough to cover the middle part of the belly as in the Python (Fig. 11). Their body is thick and the tail very short. They rather prefer sandy soil, and hence they are more like land-snakes, though found on or under the ground. The genus *Eryx*, to which these two snakes belong, consists of 7 species, 2 of which are found in India. These are described below.

I

Russell's Earth-snake or Red Earth Boa or Common Earth-snake (*Eryx conicus*) *or Red Sand Boa*

This is quite a common snake. It is thick and round, from 1 to 2½ feet long. Its tail is very short, sharply tapering, and conical, and is only 1 to 1½ inches long. The head shows practically no shields, being mostly covered by small scales. It is grey with yellowish-brown blotches on the back forming a sort of irregular chain. Some specimens are of a dark-brown or blackish colour, with irregular grey stripes across the back. The young are more brilliantly coloured. The snake has a projecting snout, with the mouth placed under it. The snout is adapted for burrowing into the ground. The neck is practically absent, so that the head

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merges into the body without any narrowing. Superficially it looks somewhat like a baby-Python (Figs. 49 and 50). The markings on the back may lead one to mistake it for a Russell's Viper, but its belly-plates are narrow unlike those of the latter. The eyes are very small, the pupil being vertically elliptical and the iris speckled yellow.

It burrows and lives in holes, which are not very deep. A live specimen was brought to me, caught by prisoners as they were digging in the jail garden at Dhulia in the Bombay Presidency. Whilst being handled, it gave birth to two live young ones, and on dissection fully developed embryos were found inside. This shows that it does not lay eggs but brings forth its young alive.

It is an extremely sluggish snake and is not uncommonly seen in a snake-charmer's basket. It is an ugly snake. It prefers to inhabit sandy places. It has the habit of hiding its head beneath the body for some time. It lives on small mammals like mice and squirrels, differing in this respect from the other burrowing earth-snakes. It kills its prey by constriction and begins to swallow it only when life is crushed out of the victim.

These snakes are remarkably jealous, and two will fight for the same prey though there may be plenty of similar other prey round about.

In Marathi this snake is called 'Kandor' or 'Kander'. Around Bombay it is called 'Kakria'. In some parts of the Madras Presidency it is called 'Mannuni' or 'Mannuli pambu'.

It is a very common snake, and one should be able to recognise it. It grows to 2 ft. 9 in., and is found practically all over India, in the plains as well as in the hills. It is stated to be a desert snake, but is common elsewhere in places with heavy rainfall and luxuriant forest growth such as Khanda in the Western Ghats in the Bombay Presidency. It



Fig. 49. Russell's Earth Snake.



Fig. 50. Russell's Earth Snake.

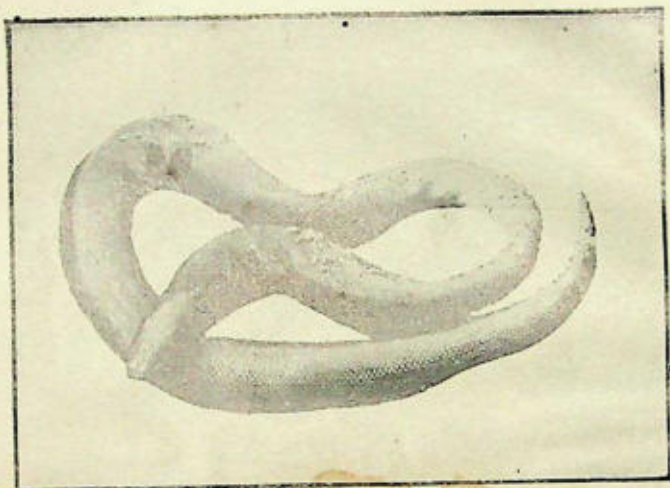


Fig. 51. John's Earth Snake.

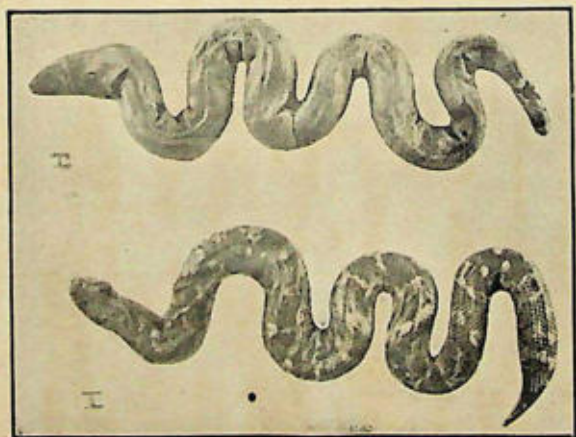


Fig. 52. Top—John's Earth Snake.
Below—Russell's Earth Snake.

is by nature sluggish, but occasionally strikes and bites fiercely. It is perfectly non-poisonous. Its movements are usually slow, almost amounting to a crawl.

II

John's Earth-snake or the Black Earth Boa

(*Eryx johnii*) or Red sand Snake.

This is another common snake not uncommonly found in a snake-charmer's basket. It is commonly called the double-headed snake, for its tail is very short and blunt (Fig. 51). The tail does not taper to a point, as it does in the majority of other land-snakes, and hence the tail-end appears somewhat like the head. It has narrow belly-plates or ventrals and is non-poisonous.

It is dark brown or black in colour. It may have irregular blotches or bars on the back. It grows to a length of 4 feet. The body is heavy and stout. The mouth is placed under the projecting snout. The vent opening near the tail end looks like the mouth in shape and size. There is no neck, the head merging into the body as in a Russell's Earth-snake (Fig. 52). It also burrows. It is usually a sluggish snake. Unless observed closely, the eyes are not clearly visible. The eyes are very small, with vertically elliptical pupils, and the iris is speckled yellow. The apparent resemblance of the tail to the head gives the reptile the appearance of a two-headed snake, and in most vernaculars it is called 'Dutondya' (=with two mouths) or 'Do-moo-samp' or 'Irutalei' (Tamil), under the belief that it has really two heads. It is no wonder, therefore, if grotesque stories have originated from such a belief. One such story is that the snake moves in the direction of one or the other head and feeds also with the one or the other mouth, alternately every six months!

This snake feeds on rats, mice and squirrels like the Russell's Earth-snake, and both these kill their prey by con-

striction. So these snakes can be regarded as a connecting link between the Burrowing Snakes and the Constrictors, having the characteristics of both.

Young specimens are of a brown colour with black bands across the back near the tail. As the snake grows, the bands gradually disappear, and thereafter the colour of the back is a uniform black.

This snake also is common in the plains and hills, and one should be able to recognise it. Its back is covered with a number of small smooth scales, and there is a groove along the spine. Its upper jaw projects beyond the chin and has in front a marked horizontal ridge adapted for burrowing. It is inoffensive and sometimes buries its head under the body. It moves slowly and clumsily. It is liable to frequent thirst and lives near water.

CHAPTER XVIII

(Constrictors. Family-Boidæ)

These snakes can grow to a very big size. They include the well-known Boas and Anacondas of America and the Pythons of the Old World. The Python in the Malay States has been known to attain a length of nearly 33 feet. Some of these snakes prefer wooded places, some sandy tracts, whilst others are partly aquatic. The snakes of this group kill their prey and prefer warm-blooded animals. The snake coils round its victim, crushes it into an unrecognisable, sausage-like mass and then swallows it. Sheep, calves and various small game are its usual prey. It also feeds on birds and other reptiles. The female lays eggs and coils herself around them.

Though snakes are limbless creatures, these particular kinds possess vestiges of pelvic bones and bones of hind limbs. They have usually thick massive bodies, and the tail is short. The eyes are small, with vertical pupils. They are very sluggish by nature. They conceal themselves in trees, in water or underground and lie in wait for the prey till it comes within reach. Then they throw their agile, rope-like coils round the victim with the quickness of lightning and kill it by constriction. The Python's muscular power is so great that even tigers and cows have been known to fall victims to its deadly coils.

These snakes are found in south-eastern Europe, Central and Southern Asia, Africa, America and Australia.

They are divided into two groups: Pythons and Boas.

I

Pythons or Rock Snakes (Pythoninæ)

The name Python is of Greek origin and is traceable to the huge serpent or monster in Greek mythology, slain by Apollo in the Pythian vale near Mount Parnassus. Milton refers to the Python in *Paradise Lost*, Book X, lines 528-532.

Pythons are huge snakes attaining a length of 10 to 15 feet or even up to 33 feet. The head is as broad as the body. The eyes are of a moderate size, with vertical pupils. The nostrils are large and placed high up on the snout, so that the snake can breathe with facility while swimming or staying in water. The body is round and massive, and the tail short and prehensile.

These snakes live on trees or near water and are found in rocky countries. They come out at night.

4 Species of Pythons are found in Africa and 3 in Asia. In South Africa, Python steak grilled in a glowing fire is regarded as a savoury dish and is eaten in hunting camps.

One variety of the Australian Python has a beautiful appearance and is called the Carpet Snake. It grows to 6 feet. It lives mostly in trees. The colour of the back is black with yellow dots, and the belly is yellow.

1. Indian Python (Python molurus)

This is a well-known and common snake found in India. It is known in most vernaculars as Ajar. In Tamil it is called 'Periya pambu' or 'Malai pambu'. In Sinhalese it is known as 'Pimbera'. Probably the South American word Anaconda is derived from Sinhalese "Anai" (elephant) and 'Kondra' (which vanquished).

It is a large stout snake 8 to 16 feet long and may occasionally grow to 25 feet. It is a heavy animal and has been

known to weigh as much as 250 lbs. Its body is round. The plates on its belly are broad only in the middle, and they do not cover the entire width of the belly, thus differing from those in the majority of other land-snakes (Fig. 11).

The head and back are covered with somewhat diamond-shaped patches of a brownish or greyish colour, divided from one another by narrow buff-coloured lines.

This snake is found in or on rocky slopes of low hills. It may also be found near rivers and jheels in open rocky country. It lives near water and feeds on mammals like deer and on birds. It has been known to eat a full-grown leopard. In jungles it lives on trees, sometimes at a great height. It climbs quickly and stealthily and with the tail twisted round a branch and the body suspended, awaits the approach of unwary animals (see page ix).

The Python is liable to frequent thirst. It swims with remarkable ease and can remain entirely under water for 15 minutes or even longer. It possesses tremendous strength. It is usually very lethargic and moves slowly. One often sees it in a snake-charmer's collection, and its big size, the handsome patches on its back and its quiet disposition make it a valuable addition to his stock (Figs. 53 and 54).

Its eyes are like a cat's. It is active and alert by day as well as at night.

The female lays 8 to 100 eggs in a clutch. They resemble the eggs of a goose but are much bigger, being $3\frac{1}{2}$ " long and $2\frac{1}{2}$ " broad. The young measure 2 feet or more in length. A Python in Regent's Park, London, has lived 19 years.

The flesh of a Python, like that of some other snakes, is eaten by many Burmans and is esteemed a delicacy amongst the Karens.

2. Reticulate Python (*Python reticulatus*)

This is a species of Python allied to the common Python. It does not occur within the limits of India proper. It is found in the dense jungles of Burma, Malay States, Siam and Nicobar Islands. In Siam it is frequently found near human habitations and very often in the city and suburbs of Bangkok. Like the Indian Python, it prefers the vicinity of water.

The back is of a light or dark brown colour, with a continuous series of large, black, ovate marks along the middle from the neck to the vent and also along the sides. In some snakes the marks may continue to the tail. There is a black median line from the snout to the nape, and another from the gape of the mouth to the eye, which may extend further to the front part of the body. The belly is dirty white or yellow, with brown spots on the sides. These marks are quite distinctive of this variety and will enable one to distinguish it easily from the common Indian Python.

It is a timid, lethargic, harmless snake, and does not bite or escape when disturbed.

It kills its prey like the other Pythons by constriction and then swallows it. It feeds on deer, dogs, pigs, cats, fowls and ducks.

It is one of the two largest snakes in the world attaining a length of 30 feet.

II

Boas (*Boinæ*)

There are some 50 species of these snakes found mainly in Central and South America, but some occur in Greece, Southern Asia, Africa, Madagascar, etc. The most important of these are the Boa Constrictor and the Anaconda, both of South America. In India the Red Earth

Boa and John's Earth-snake, already described, belong to this group.

The Boa Constrictor grows to 10 feet or more. It is pale brown with dark spots above, the belly being yellowish.

The Anaconda is peculiarly adapted to the well-watered South American forests, being both aquatic and arboreal in its habits. It is reported to grow to a length of 30 feet or more. It lies just at the surface of the water or hangs from a tree over the water and suddenly seizes unwary prey. It hunts chiefly at night, lying in water in wait for animals which come to drink. Its back is marked with a double row of large, black, oval spots.

CHAPTER XIX

Iridescent Earth Snake

(*Xenopeltis unicolor* Family—Xenopeltidae)

This snake grows to 4 feet. It is of a uniform girth throughout. The head is spatulate. There is no neck. The eyes are remarkably small. The pupil is vertically elliptical, but the iris is so dark that the pupil is discernible with difficulty in a live specimen. The nostrils are small. The tail is short, $1/11$ th — $1/10$ th of the length of the body. The back is coffee-brown. The scales are very bright, and when light falls on them they become brilliantly iridescent with emerald green, copper, blood-red, purple and electric blue. The young have a whitish head or collar which disappears in the adult stage. The upper lip and upper parts are white, with slate-grey streaks. The tail is streaked or mottled on the under surface.

It is a burrowing snake living entirely under the soil and comes out only in search of prey. It is found in Burma and the Malay Peninsula (Fig. 55).

Curiously enough, this snake is commonly mistaken for a krait. Its only point of resemblance to the latter is its glossy black colour. But from the unstriped black krait it is easily distinguished owing to the fact that, unlike the former, it has no enlarged central scales on the back, the belly-plates are narrow, and the shields under the tail are divided and not entire.

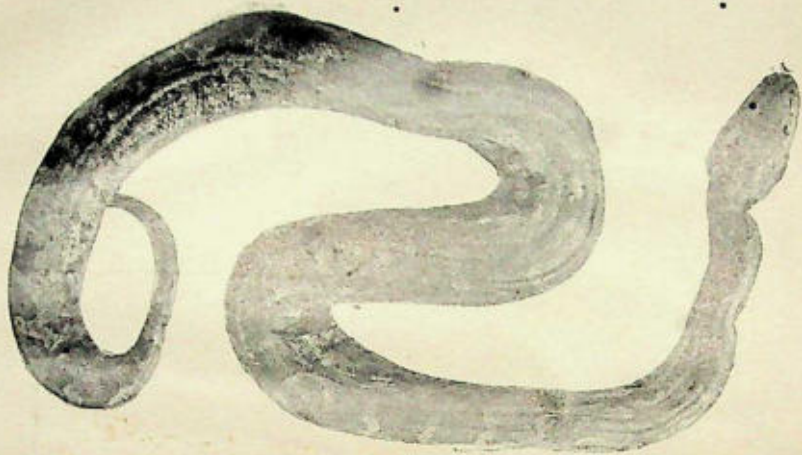


Fig. 53. Indian Python.

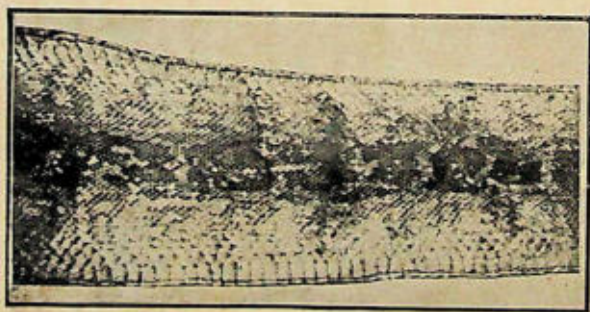


Fig. 54. A piece of skin of an Indian Python, stretched out.

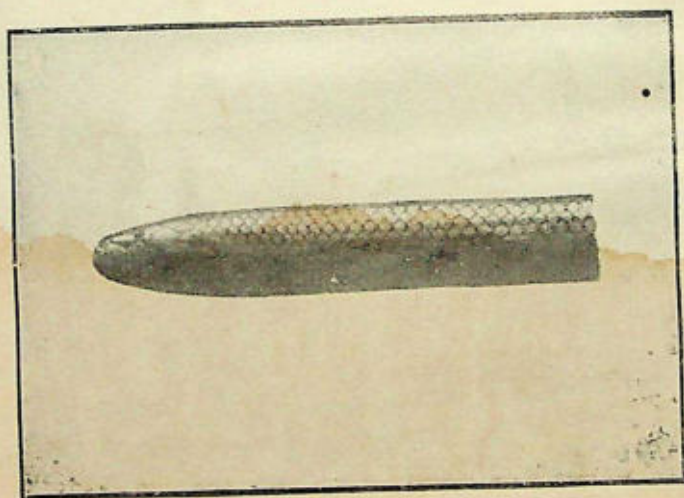


Fig. 55. Iridescent Earth Snake (Head and front part).

CHAPTER XX

Slug Snakes

Out of the nine families the only family of snakes that has not been mentioned yet is the *Amblycephalidae*, popularly known as the Broad-headed or Blunt-headed Snakes or Slug Snakes. They are non-poisonous. They look like the majority of Colubrine snakes, in that their ventrals are broad and they have head shields. But there is no median mental groove between the sublinguals of either side (Fig. 56). Instead there are three pairs of large, roughly



Fig. 56. Under-part of the head of a Slug Snake showing the sublinguals and the absence of the Mental groove.

symmetrical shields which are the anterior, middle and posterior sublinguals. Behind the posterior sublinguals is the first ventral plate. These snakes are found in Burma, South-eastern Asia and South America. In India this family is represented by 5 species, which occur in Assam

and the Eastern Himalayas. The above characteristic of the sublingual shields is sufficient for identification of these snakes, and as they are non-poisonous and confined to a limited tract of India, no further description of them need be given here.

All the snakes described hereafter belong to the family of *Colubridae* and are harmless to man. Nearly all the land snakes in this family have shields on the head and broad plates on the belly. The dangerously poisonous species, namely, the Cobra and the Krait, have been already described.

CHAPTER XXI

Water Snakes

These are non-poisonous snakes found usually in or near fresh water. They feed on fish and frogs. They swim with ease, and their nostrils are placed more on the top than on the side of the snout, which enables them to remain for a long time in water breathing freely. In land-snakes, the nostrils are situated more on the side of the snout. Some of the water-snakes are here mentioned.

Rasp-skinned Water Snake (*Chersydrus granulatus*)

This snake has a characteristic appearance and occurs around the Indian coast in fair abundance (Fig. 57).

The young snake is banded like a zebra, the bands being alternately yellow and black. In the adult the bands are deep brown and pale buff. There are no enlarged shields on the top of the head, but only scales. The body is covered with very small scales which have a harsh keel on them. The nostrils are placed on the top of the snout very close to each other and are ring-like. The scales on the belly are long and very narrow.

It is a very inoffensive snake. Fishermen around Bombay often catch it, and when seized it does not bite but tries to get free. It moves in water with activity, but on land moves very slowly and with difficulty. It grows to about 4 feet. The young are born alive.

It is a marine snake and is always found near the coast. It travels 3 to 4 miles up tidal rivers.

Dog-faced Water Snake (*Cerberus rhyncops*)

The back of this snake when under water appears bluish-grey, but when dry, light grey. It is crossed by a number of

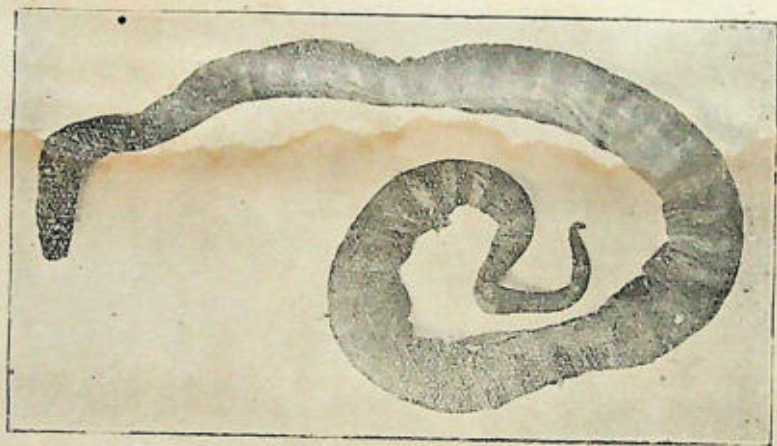


Fig. 57. Rasp-skinned Water-snake.

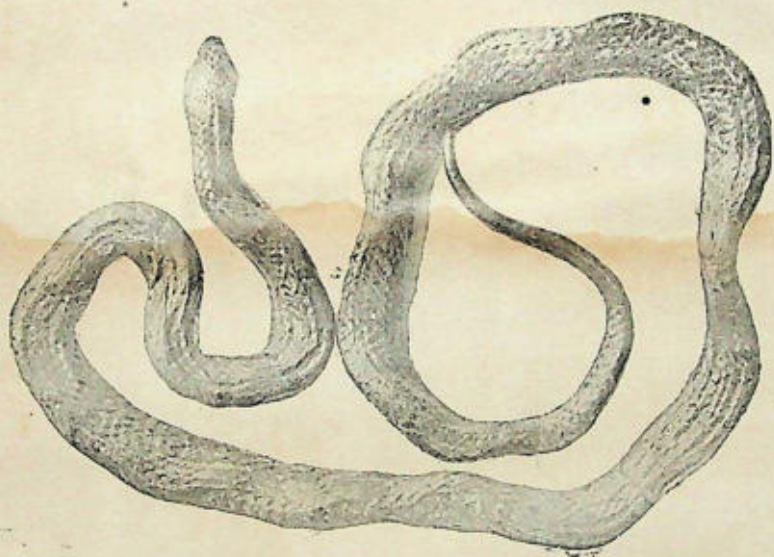


Fig. 58. Dog-faced Water-snake.

ill-defined dark bars which are less distinct towards the end of the tail. They may, however, be broken up into spots. The belly is buff-coloured, with greenish-black spots. The body is stout and rough, and the scales on the back are keeled. The back is dull in colour, but the belly is shiny. The ventrals or belly-plates are well developed and number 132 to 160. The subcaudals are divided and number 49 to 72.

The head is grey and has shields on it. The upper lip and chin are buff. The lower jaw is unusually prominent, giving the snake's face the appearance of a dog's (Fig. 58). There is a dark streak behind the eye running backwards. The eyes are small with vertically elliptical pupils, the iris being speckled yellow. The nostrils are like narrow slits much like those of sea-snakes. The tail is short and tapering and is about $\frac{1}{5}$ th of the reptile's total length. The snake is 2 to 3 feet long, but may grow to 4 feet or more.

It is usually found in brackish waters of tidal rivers, creeks and estuaries. It is also found in the sea in the close proximity of the coast, and it frequents fresh water too. It swims with great ease. In tidal rivers, with receding tide, numbers of these snakes are stranded in the mud. It feeds exclusively on fish and is voracious. Though of a forbidding appearance, it is inoffensive, non-poisonous and lethargic; but when caught or brought to bay, it pushes forward its tongue and hisses. When picked up, it coils itself tightly round the hand. When excited, it bites viciously and emits a disagreeable odour. Its movement is curious, for it looks as if moving sideways. The body is first thrown forward in a curve in advance of the head and then the head is moved, and before the latter extends completely, the body is again thrown forward.

It is very common on the coast of Burma and is found all along the Indian coast from Mekran to Sind and as far as the Malay coast. It is also found in Ceylon waters. In Sinhalese it is called "Diyabariya."

The young are born alive.

Gerard's Water Snake (*Gerardia prevostiana*)

This is a small but fairly stout snake with a short tail. It grows to about 2 feet. The nostrils are placed on the top of the snout. The eyes are small with vertically elliptical pupils. The snake is olive-green when wet, and grey when dry. The head, which is covered with shields, is coloured like the back, and the lips are yellow. The belly is buff-coloured.

It is entirely aquatic, haunting tidal rivers and estuaries, and often wanders out along the coasts. Like the dog-faced water-snake, it is rather lethargic on land and not inclined to bite and is often stranded ashore by the receding tide. It is found all along the western coast of India, but not in large numbers.

Schneider's Water Snake (*Hypsirhina enhydris*)

This snake is found in Peninsular India, Orissa, Bengal, Assam, North-eastern India and Burma and along the east coast of India. On the east coast round about Vizagapatam it is called *Mutta pam* or *Ally pam*, which means a mud-snake. It grows to 2 feet or more. Its nostrils are transverse slits and are placed on the top of the snout. The eyes are small with vertically elliptical pupils, and their margins are studded with golden-yellow specks. The body is smooth, glossy and round. The back is dark olive-green or olive-brown, usually with a pale stripe down it on both sides. The belly is lemon-yellow with a dark line on the sides. The snake looks externally like the Olivaceous Keel-back. It is entirely aquatic and frequents rivers, estuaries, lakes and marshy ground, and is sometimes found in irrigated fields.

Siebold's Water Snake (*Hypsirhina sieboldi*)

This snake resembles Schneider's Water Snake. It grows to 2 ft. 6 in. Its costals are in 27 to 33 rows. Ventrals are 143-158. Its subcaudals number 43-56. It is found in Peninsular India, on the Malabar Coast, in the Ganges river-

system and other regions in Upper India. It has been found embedded in the mud in the Jumna river at Delhi and Agra. It is buff or greenish in colour, with yellowish half rings across and curved zigzag lines along the sides.

There are a few other snakes which have some of the characteristics of water-snakes, such as the situation of the nostrils on the top of the snout. They usually feed on fish and frogs and are found near water, being evidently adapted for aquatic life. They are all non-poisonous. The chief among them are the Olivaceous Keel-back (*Helicops schistosus*) and the Chequered Keel-back (*Tropidonotus piscator*). Both these are described under Keel-backs, the scales on their back being keeled or ridged in the middle.

CHAPTER XXII

Rat Snakes or Dhamans

These snakes are so called owing to their being fond of rats. They are active and strong. The body is long and robust, and the reptile may grow to over 8 feet. When irritated, it strikes fiercely upwards as if with a whipcord. The term *Dhaman* is Sanskrit and means a 'rope.' The snake has large eyes. The pupil is round with golden-yellow specks all around it. In some the tail is fairly long, being one-third of the whole length of the snake. These snakes are usually out in day time.

The female lays eggs.

There are 20 kinds of this snake, of which 10 occur in India. They are found practically all over the world, in Europe, Asia, North and West Africa (Senegambia) and North and Central America.

Common Rat Snake or Dhaman (*Zamenis mucosus*)

The Dhaman is found all over India, Ceylon, Afghanistan, Burma, Malay Peninsula, Java, Southern China and practically throughout the East (Figs. 59 and 60). It prefers the plains, but is also found in the hills upto an elevation of 6,000 feet or more.

It is a robust and formidable snake with a long body and a long tail. The Greek word *zamenis* means 'very strong.' It grows to 8 feet or more, with a girth of about 4 inches. The tail is about one-quarter of the total length of the snake and the tail-shields are divided. The eyes and nostrils are large.

The body is greenish or greenish-brown. The scales on its front part are of a uniform colour, but many of those in



Fig. 59. Dhaman or Common Rat-snake. 1



Fig. 60. Snakeman with Dhamans round his neck.

the back parts towards the tail are bordered in an irregular manner so as to form a reticulate pattern of a cross-bar type. The shields on the margin of the lips, and the scales on the side of the throat and on the under surface of the tail have also black borders. The belly is whitish or yellowish, the yellow colour being prominent near the throat. The black marking on the lip-shields is distinctive.

The colour of the young is grey or bluish, and though deeper than in the adult, the marking, the irregular cross bars and the general appearance are similar.

The dhaman is a very common snake and is found in all surroundings. It has been found in the proximity of houses, in cities and villages. When living near human habitations, it retires in the day to some quiet retreat. It is fond of old masonry, and holes in old walls or brick-wells. In houses and bungalows it may live in the basement or in the ceiling.

When living in unpopulated areas, it goes about freely during the day. It is found in trees and bushes, in decaying vegetable matter, in paddy fields, and on the open ground of golf links wherever there is a heap.

It is a good swimmer. It is fond of toads and frogs and hence is very often found in the vicinity of water. It also feeds on lizards and birds. It is a skilful climber, and when there is a great agitation amongst birds on the top of a high tree during the day, this snake may often be the cause of it. Once in Dhulia in the Bombay Presidency, about midday, a big dhaman was found to be the cause of commotion among the birds on the top of a tall peepal tree (*Ficus religiosa*). The snake was over 30 feet up and was shot down.

It tries to escape in the presence of man when possible, but, if brought to bay, will attack with vigour and fury. In spite of its size and ferocity, however, it should be remembered that it is a non-poisonous and harmless snake. When it strikes, it does so with great force and viciousness, aiming

high up at the face of its foe. It always directs its blow high up towards the face, and when striking flattens its head a little and makes a peculiar hissing noise. The dhaman flattens itself in a direction contrary to that manifested by the Cobra, the spine being arched about the neck, and the throat markedly pouched. It is very fast in its movements and glides over rough ground with great swiftness.

The Burmans and some of the wild tribes of India eat the dhaman. In Tamil it is called 'saray pambu,' in Sinhalese 'Garandiya.'

Scales — Costals in midbody in 17 rows. Ventrals—180-213. Subcaudals — divided, 95-146.

There are various beliefs associated with the dhaman which, needless to say, are false. One such is that it is the male Cobra. Cobras and dhamans are snakes of totally different kinds, and no hybrids are known. Both are of similar habits and may be found in similar surroundings, and hence if they are found together at any time, it is purely an accident. The dhaman, it is believed, sucks the udders of a cow dry, and then kills it with its poison, or it pushes its tail into the cow's nostril and then suddenly withdraws it, killing the beast! Still another belief is that its bite causes blindness in persons of over 40 years of age.

This snake is seen by cowherds very often in the plains and open country. Its active habits, robust body and ferocity have given rise to all the strange stories associated with it. Some pretend that the rat-snake cannot bite; it coils round the leg and lashes with its tail.

The fat is used externally for leprosy.

Shaw's Rat Snake or Banded Dhaman or Fasciolated Rat Snake (*Zamenis fasciolatus*)

This snake (Fig. 61) is specially mentioned, as in size, girth, colour and general appearance it looks somewhat like the Indian Cobra and is commonly mistaken for it, but it

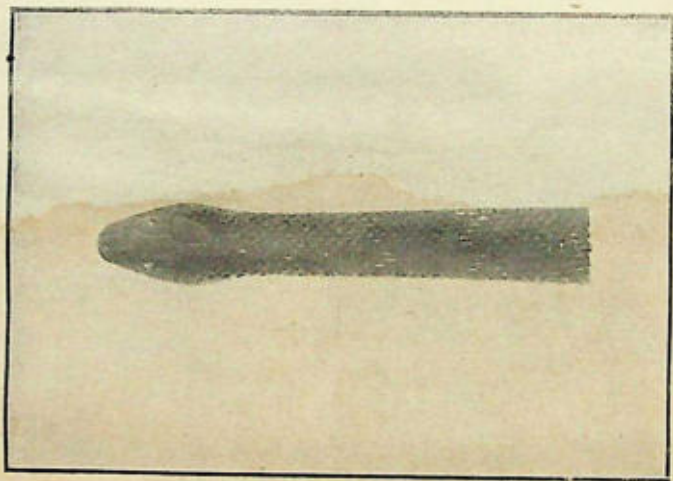


Fig. 61. Fasciolated Rat-snake (Head and front part).

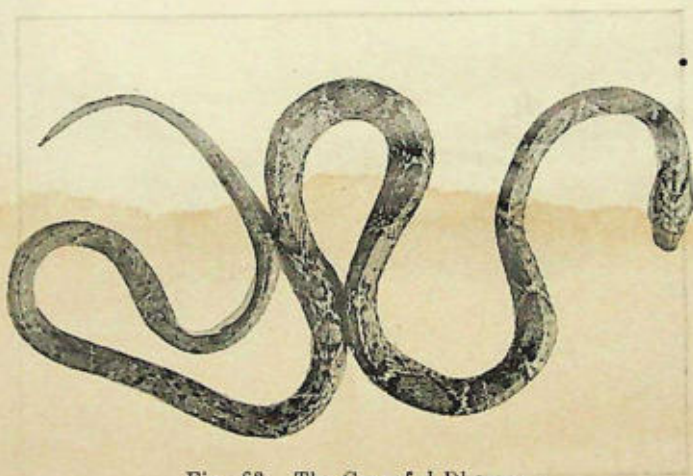


Fig. 62. The Graceful Dhaman.

has not the shield characteristics of the Cobra. The third upper-lip-shield in this rat-snake is not big and does not touch the eye, nor is there a wedge-shaped shield between the fourth and the fifth shields of the lower lip. It has also a row of teeth along the margin of the upper jaw, but has no fangs.

It has an elongate, round and robust body and a long tail. In colour it is either light brown or deep brown. Some are almost yellowish. Young ones are beautifully marked with cross-bars of black and white towards the head, but these disappear behind the middle or tail-end of the body. As the snake gets older, these bars disappear, and they are totally absent in the adults, which are of a uniform colour and appear like Cobras. The belly is whitish or yellowish.

It occurs in India and Ceylon. It is sometimes found in populated areas. When molested, it becomes fierce. When alarmed, it erects the front part of its body and flattens the rest of it somewhat like a Cobra.

It is an active and alert snake, moving about usually during the day. It ordinarily grows to about 4 feet. One killed in Ahmednagar measured 4 ft. 6 inches, probably a record length.

Scales — Midbody costals in 23 rows. Ventrals — 191-232. Subcaudals — divided, 73-92.

Gray's Rat Snake (*Zamenis ventrimaculatus*)

This snake is dirty yellowish-green or brown in colour. The front part of the body may be marked with spots, cross-bars or both, which fade away in adults. In some there is a reddish stripe along the spine. There are irregular series of round spots on the edge of the plates in the front part of the belly. It grows to 3 or 4 feet. It has been found in Bombay, Poona, Deolali and Sind and also occurs in North-western India, Persia and Arabia.

Scales — Ventrals 199-246. Subcaudals — 82-145.

The Graceful Dhaman (*Zamenis gracilis*)

This is a slender snake common in the Deccan (Fig. 62). It is very common in Ahmednagar. It has been found in Bombay, Poona, Satara, Central Provinces and Sind.

It grows to 2 feet or more and is greyish in colour, with white and black stripes on the head and back. There are two or three white half rings on the head, bordered with black. The stripes towards the vent are mostly black and thin and made up of small spots. The white stripes, which are more marked towards the end of the head, may bifurcate on the sides of the back.

Scales — Midbody costals in 21 rows. Ventrals — 206-228. Subcaudals — 118-127.

Royal Snake (*Zamenis diadema*)

This is found in the arid parts of India like Cutch, Sind, Rajputana, the Punjab, the N. W. Frontier Province and Chitral. It also occurs in some parts of the United Provinces and in Baluchistan, Afghanistan, Persia and Arabia.

It grows to 5 or 6 feet, but may attain a length of 7 feet.

It is usually light brown in colour with three series of large dark spots on the back. As these spots resemble superficially those of a Russell's Viper, this snake is occasionally mistaken for it. But on the head of the former there are small scales but no shields as in this reptile. Another type of this snake is lighter in colour, buff or pale brown, and has dark, irregular, small spots on the body. The belly is often pink, with dark spots on the sides. The head may be light brown or scarlet, mottled with dark marks, and in the head-shields there are two rows of prefrontals. Most other land-snakes with shields on the head have only one row or pair of prefrontals.

This snake is usually quiet, but occasionally hisses and expands and contracts its body like a Cobra. It lives in

the crevices of loose stones. It feeds on rats, mice and squirrels. The female lays eggs.

Scales — Midbody Dorsal rows 25-33. Scales somewhat keeled. Ventrals — 210-278. Subcaudals — divided, 65-110.

There are 5 other kinds of dhamans occurring in India and other parts of Asia, viz.—

1. Schlegel's Rat Snake (*Zamenis korros*), found in Burma, Eastern Bengal, Assam and the Eastern Himalayas.

2. Karelin's Rat Snake (*Zamenis karelini*), found in Baluchistan, Afghanistan and Persia.

3. Geoffrey's Rat Snake (*Zamenis florulentus*), found in Baluchistan (Quetta).

4. Ravergier's Rat Snake (*Zamenis ravergieri*), found in Chitral, the N. W. Frontier Province and Baluchistan.

5. Murray's Rat Snake (*Zamenis arenarius*), found in North-western India, Sind and Baluchistan.

CHAPTER XXIII

Tree Snakes

These are usually long and slender, with a long tail. They prefer to live in trees, shrubs or bushes, but may also be found on the ground usually near trees. Their colour is generally brown or greenish in adaptation to their surroundings, so that they are camouflaged in foliage or on the dried branches of trees.

It is a common belief that these snakes can fly from one tree to another. What they do is to spring or leap. The belly-plates are peculiarly keeled or ridged, so that when they contract their muscles, the plates become concave and enable them to spring, the action being similar to what a man does when he takes a jump. The belly, becoming concave, buoys the snake up, so as to break the force with which it strikes the ground or a branch, the force of gravity being thus retarded.

Tree-snakes may be roughly divided into —

1. Whip-snakes or Long-nosed Tree-snakes.
2. Cat-snakes or Broad-headed Tree-snakes.
3. Bronze-backs.
4. Ornate Tree-snakes.

I. Whip Snakes or Long-nosed Tree-snakes

There are 8 kinds of these. They vary from 2 to 6 feet in length. The head is narrow with a long snout which rapidly narrows to a point, giving the head a typical appearance. The eyes are rather large, with golden-yellow specks around the pupil, which is horizontally elliptical. The horizontal character of the pupil is peculiar to these snakes. The tail is round and very long, appearing like the lash of a whip.

These snakes are arboreal (usually found in trees and bushes). They are active and diurnal, being hardly ever out at night. The young are born alive.

Whip-snakes are slightly poisonous, their bite producing a mild local effect, but no general constitutional symptoms like fever, malaise, vomiting, etc.

They are found in South-eastern Asia. Two common ones found in India and Ceylon are the Common Whip-snake and the Brown Speckled Whip-snake.

Common Green Whip Snake (*Dryophis mycterizans*)

This is a snake of a bright green colour, with an elongate body. It grows to over 6 feet. The long snout ends in an elongated, fleshy appendage. Hence its head is characteristic. The eyes are rather large, and the iris (the membrane round the pupil) is speckled golden-yellow. The pupil is horizontal and elongate. The tail is sometimes more than one-third of the total length of the snake and is relatively longer than in any other snake in India except the Brown Speckled Whip-snake (Figs. 63, 63a and 64).

The body and tail are very markedly slender and long. The back is grass-green, but the colour of the belly, though also green, is of a lighter shade. The belly has on each side a narrow white or bluish stripe. The green colour is only due to minute specks of yellow on a bright blue skin. They can be seen on the scales of the back with a lens. If a dead snake is preserved in spirit, the latter dissolves the yellow colour and turns yellow and not green. Some rare specimens are brown in colour, and occasionally the belly may be grey.

This snake is most frequently seen in low bushes and shrubs. It can climb tall trees and has been seen on the tops of cocoanut palms by tappers for toddy. On bushes and trees it moves with great speed. It rests on the top-

most boughs of bushes and escapes notice, being mistaken for a green twig. Hence it can seize an unwary bird or lizard from such a point of vantage.

It is generally fierce and bites freely. Indians and Sinhalese believe that it strikes always at the eyes and at no other part of a person facing it. Hence the Sinhalese and Tamil names for this snake respectively mean 'Eye-plucker' (Ehetulla), and 'Snake that thrusts at the eye' (Kankutti pambu). Unlike most other snakes, it opens its jaws when it means to frighten and strike. Other snakes open their jaws only at the moment of biting. In Marathi it is called 'Naneti.'

It is completely diurnal in its habits. It eats mice, birds, lizards and sometimes frogs and even other snakes.

It frequently grows to a length of 5 feet and may even grow to over 6 feet. The young are born alive, 3 to 22 in a brood. The salivary secretion of this snake causes symptoms similar to those of Cobra-poison. It is, therefore, probably slightly poisonous. If the snake bites a human being, the symptoms of poisoning do not usually appear. There may be great swelling of the part bitten, but it subsides in a day or two and no constitutional symptoms occur.

This snake is found all over India, Ceylon, Burma and Siam. It occurs in the hills up to an elevation of 6,000 feet. It is found in gardens as well as in jungles, and is very common in some parts of the Madras Presidency.

Scales—The Costals are 15 behind head, 15 in midbody and 9 to 11 in front of the tail. The vertebral row is enlarged. Subcaudals are divided, 127 to 174 in number. The Anal is divided. The Ventrals are rounded and number 168 to 206.

This snake is easily identified by its horizontal pupil, elongated fleshy appendage at the tip of the snout and a white or yellow line on the flanks.

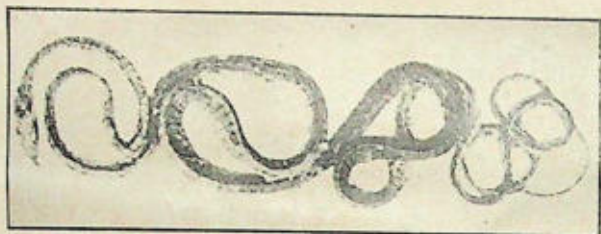


Fig. 63. Green Whip-snake (Coiled).

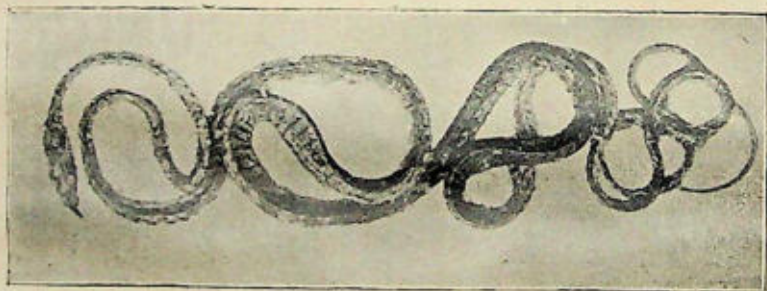


Fig. 63a. Green Whip-snake (Coiled).

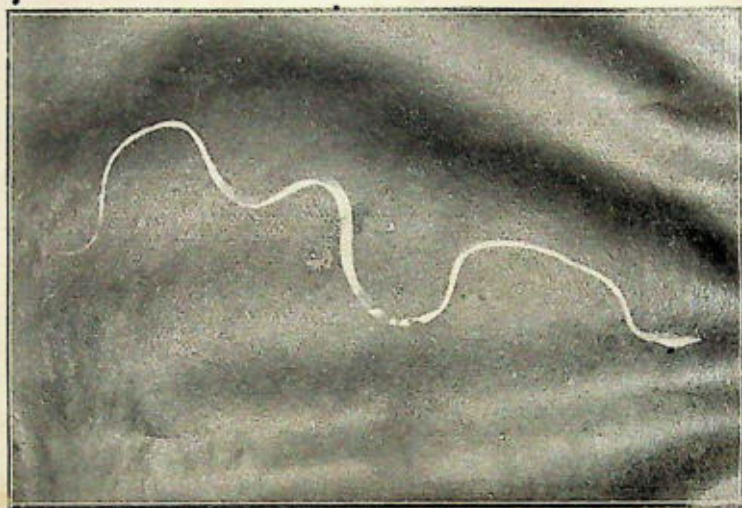


Fig. 64. Green Whip-snake.



Fig. 65. Common Brown Tree-snake.

Brown Speckled Whip Snake (*Dryophis pulvirentus*)

This is just like the Common Whip-snake except that its colour is brown instead of green, speckled in darker shades. There is no stripe on the sides of the belly as in the common whip-snake.

It frequents bushes and scrubby plants rather than trees. It grows to $5\frac{1}{2}$ ft. The tail is more than $\frac{1}{3}$ rd of the total length of the snake. It is found in Southern India and Ceylon. In Sinhalese it is called 'Henakandaya.'

II. Cat Snakes or Broad-headed Tree Snakes

These snakes have large eyes with vertical pupils, and are fierce by nature. They are arboreal in their habits and mainly come out at night. They grow from 3 to 7 feet in length. They have a depressed and somewhat triangular head with a markedly narrow neck, thus resembling vipers to a certain extent. The tail is long, being $\frac{1}{5}$ th to $\frac{1}{4}$ th of the whole length of the snake. The pupil is vertical like that of a cat.

There are 17 species found in India.

Common Brown Tree Snake or Gamma Snake (*Dipsadomorphus trigonatus*) or Common Indian Cat-snake

This snake has all the characteristics of a Cat-snake. It is a small reptile and grows to about 3 feet in length. The body is slender and elongate, but thick in the middle (Fig. 65). The back is of a light yellowish-brown or sandy colour, with a series of dark, more or less distinct marks on it resembling the Greek letter Gamma, which fade towards the end of the tail. Hence it is very often called the Gamma Snake. The region between the arms of the Gamma is whitish. The head also has brownish or yellowish markings. The belly is white, with brown spots on the sides. The tail is long and very tapering. The eyes are large, with a vertical pupil and yellow iris. It is essentially a tree-snake, being found on bushes, shrubs or trees near the

ground. It easily climbs even tall trees. In Gujarat in the Bombay Presidency, it is said to be very commonly seen on the tops of cactus hedges. It is found all over India. It has a superficial resemblance to the Saw-scaled Viper (Phoorsa), for which it is sometimes mistaken, though with a little care no such mistake can be made as it has shields on the head, while the Phoorsa has small scales on the head. It is a fierce snake and usually comes out at night. One comes across it not rarely on creepers on the trellis-work of the verandahs of bungalows. It intently watches the offending object and at the first opportunity strikes at it again and again. It feeds freely on small birds and lizards.

It is a non-poisonous snake. The female lays eggs, 3 to 11 in number.

Scales—Costals 21 midbody, Ventrals--206-256. Anal--entire. Subcaudals divided, 75-96.

III. Indian Bronze Backed Tree Snake (*Dendrelaphis tristis*) or Seba's Bronze Back

This is a graceful snake. It grows to 4 feet and has a very long tail which is one-third of the total length of the reptile. It has a long rounded snout. The body is slender and elongate. The back is of bronze colour, and each of the scales on the back is bordered bluish-black. There is usually a dark lateral stripe on the back extending from the head to near the root of the tail. The back in some specimens is bluish-black with a light yellow stripe on each side. The upper lip is yellow. The belly is yellow and ridged.

It lives mostly in bushes and trees and on the borders of rice-fields. At rest it looks very much like a branch. This and the other brown tree-snakes always prefer to lie on dry branches of trees, and they escape detection owing to their protective colouring.

It is an active and fierce snake and sometimes strikes viciously. It usually moves about in the day. It is swift in its movements and climbs trees very fast. It feeds chiefly on lizards and small birds. The female lays eggs.

It is found in Peninsular India, the Eastern Himalayas, Assam, Ceylon, etc. It is called 'Rooka' in Marathi, and 'Goobra' about Hyderabad (Deccan). In Tamil it is often called 'Komberi muken' and in Sinhalese 'Haldanda'.

The vertebral scales down the middle of the back are enlarged. This and the ridged sides of the ventrals are characteristic of the snake.

**Eastern Bronze Back (*Dendrophis pictus*
or *Himalo-Malayan Bronze Back*)**

The back of this snake is bronze brown, with a faint dark line and a yellow stripe on the sides, extending from the head to the vent. The sides of the face are yellow. The belly is yellowish or green. When it inflates its body, the back scales show blue and black colours. The tongue is red with black tips.

It grows to 4 ft. 3 in. and has a long tail, $\frac{1}{3}$ or more of the total length of the snake. It is found in the Eastern Himalayas, Sikkim, the Andamans, Malay States, some parts of Burma and probably also in Eastern Bengal and Assam. It is arboreal and is found on trees, bushes, on creepers on verandahs, on trellis-work, screens, etc. It is timid and inoffensive. It usually feeds on frogs. It can leap from tree to tree.

Scales—The vertebrals are enlarged and nearly as broad as they are long in the middle of the body. The ventrals are ridged on either side.

Costals Midbody—15 rows. Anal—divided. Subcaudals—divided, 131-153.

IV. Gold and Black Tree Snake (*Chrysopelea ornata*)
or Golden Tree Snake or Ornate Tree Snake

This is one of the ornate tree-snakes and is found in the western hills of Southern India, the Eastern Himalayas, Bengal, Assam, Burma, Ceylon and the Malay Peninsula up to an elevation of about 1,500 feet. It grows to 4½ feet. The eyes are large with round pupils. The neck is distinctly narrow. The tail is about one-quarter of the total length. The plates on the belly have sharp keels laterally. The belly is yellow or whitish-olive in colour, with a small black spot laterally on each plate. The back is greenish-yellow or pale green, with more or less distinct dark cross-bars. The scales may be streaked with black. In some specimens there is a series of large red or orange spots along the spine, separated by two cross-bars. This reptile is beautifully coloured, and hence the name Ornate Tree-snake.

It is diurnal in its habits and is sometimes met with in the burning heat of the sun even on very hot days. It is frequently seen in the grass or between low bushes or on bushes or trees. It is met with on trellis-work round tennis courts or verandahs. It is essentially an arboreal snake. It feeds mainly on the common house-lizard called the Gecko and is frequently found around or even inside houses. It kills its prey by constriction.

It is a bold and fierce snake and bites viciously, though it hardly secretes any poison. It has been seen to give a tough fight to the big Burmese lizard called the Tuctoo which grows to over 1 foot.

This snake is strikingly beautiful, whether seen at rest or moving about. It is very graceful and quick in its movements from branch to branch and climbs a tree with extreme ease. It can leap from one tree to another. It is an expert acrobat in this respect and is specially provided with ability to spring or glide.

In Sinhalese it is called 'Mal-karawala.'

CHAPTER X·XIV

Sand Snakes (*Psammophis*)

These consist of 17 kinds or species of snakes, of which 13 are found in Africa and 4 in India. One species (*P. schokari*) is found in Sind and the Punjab, another (*P. leithei*) in the United Provinces, Punjab, Central India, Rajputana, etc., and the third (*P. longifrons*) in the tropical parts of India including the Presidencies of Madras and Bombay and the Central Provinces. The fourth will be described as a type and is called :

Indo-Burmese Sand Snake (*Psammophis condaranus*)

It is common in the Western Himalayas and has been recorded from the Ganges basin, some parts of Burma, Madras Presidency, Deccan, Rajputana, Cutch, Sind, Punjab and the United Provinces. It is a slender and graceful snake, with a fairly long oval head. The eyes are small and the pupils round. The iris is brown, edged with yellow. The back is blackish, with four long, thin, coloured lines from head to tail. These lines may be brown, light green or yellow. The upper lip is yellow. The belly is yellowish, with a thin dark red line along each side of the ventrals.

It grows to 3 feet or more, the tail being $\frac{1}{4}$ to $\frac{1}{3}$ of the entire length. It is diurnal in its habits and feeds on frogs, lizards or other snakes. It is active and vicious. It frequents grass lands, open jungle and paddy fields and is found also in desert areas. It is partly arboreal.

Scales — Dorsal Midbody 17. Ventrals — 156-188. Anal-divided. Subcaudals — divided, 64-93.

CHAPTER XXV

Wolf Snakes (*Lycodon*)

These are so called from their having large teeth near the front of both the upper and the lower jaws, which reminds one of the sharp canine teeth in wolves, dogs and foxes. These snakes are only about 2 feet in length. The eyes are entirely black when the snake is alive, so that the pupil, which is vertical, is not easily made out. The tail is somewhat short. They are active and fierce snakes and are seen nearly always on open ground and usually at night. They are non-poisonous. They feed on lizards, small rats, etc., and hence are often found near houses. The female lays eggs.

There are about 20 kinds of these snakes, of which 9 are found in India. The one that is usually seen in or about human habitations is the Common Wolf-snake. It may practically be looked upon as a house-dweller.

1. Common Wolf Snake (*Lycodon aulicus*)

This snake is very common in or near houses (Figs. 66 and 66a). *Aulicus* is a latin word and means a 'house-dweller.' A typical common wolf-snake is usually of a brown colour, the shade varying from light to dark brown. Rarely it is of a black colour. It is about 2 feet long. Its body is slender and somewhat flat, and the tail is tapering. The back is crossed by bars which are whitish or yellowish-white. There is usually a collar of the same colour round the neck. These bars may extend over the whole length of the body or may be confined to the front part towards the head. They usually commence near the head where they are very distinct (Fig. 67), but they gradually become indistinct towards the tail until they disappear towards its end. The number of these white cross-bars in most specimens is from 9 to 18.

They may be fewer, but are rarely absent altogether. They may extend right across the back to the belly or may expand in the flanks and enclose little portions of the back of the snake. They are most defined in the anterior part of the body, but break up more and more in the posterior. The belly is white. The ventral plates have a slight ridge on their sides or are angulated.

This snake is very often mistaken for a krait. Its superficial resemblance to the latter is very marked. But the white bars on the back of the krait, which is a dangerously poisonous snake, extend to nearly the end of the tail, and do not begin near the head but at some distance from it. In the wolf-snake, the white cross-bars begin near the head and are more marked in the front portion of the body, while in the krait the bars are more marked in the hind part or on the tail. If there is any doubt about the disposition of the white bars on the back, it would be well to remember that the subcaudals are divided in a wolf-snake and entire in a krait.

These distinctions between the common wolf-snake and the krait should be borne in mind, for unnecessary alarm is caused at the sight of a wolf-snake, though it is non-poisonous. About 50 per cent of the snakes seen in or near houses are wolf-snakes.

It is a house-dweller and is found very often in bungalows or out-houses. It is found also in densely populated parts of a town like bazars and business quarters. It gets into the crevices of loose brickwork and is found in the masonry of walls or foundations of houses, where it lies concealed during the day. It comes out at night and feeds on mice and lizards, and hence its presence in the proximity of human habitations. It coils itself and shelters during the day in holes in the ground or in any convenient dark place in a house. It has been found under boxes or packages in a store-room, or in almirahs, behind discarded articles, behind

out-houses, beneath flower-pots, under stacks of wood or brick, behind bundles of paper in offices, in fact, any where it can conveniently shelter itself.

It is an active and fierce snake. When discovered, it usually tries to slip away, but if obstructed or an attempt is made to catch it, it strikes boldly and bites fiercely. Col. Wall, I. M. S. (RET.), has been bitten many times in trying to capture it. When in the open it lies coiled, and from this position it frequently strikes suddenly and fiercely at the object of its fury. It is decidedly nocturnal. I saw one on the verandah of my bungalow at Belgaum at 9 p. m., and another at 8 p. m. in my dressing room where it was moving about. It immediately hid itself behind a chest of drawers, but was speedily dealt with. These snakes are good climbers and can even climb vertically if the surface is slightly rough. I have seen them twice at 10 o'clock at night in the roof of the galvanized iron latrines of servants in the compound of the Civil Surgeon's bungalow at Sholapur. One was found coiled in a privy pan in my bungalow at Ahmednagar, and another was found hidden behind some old files, in a window in the clerk's office at the Civil Hospital, during the day.

The female lays eggs, 4 to 7 in number, and these are usually deposited between February and July. The young are 6 to 7 inches long, and in colour and markings are exactly like the adults. They grow double their length at the end of the first year and are about 18 to 20 inches long at the end of the second year. The adult grows to about $2\frac{1}{2}$ feet, though most specimens are about 2 feet long, and the greatest length recorded is 2 feet 9 inches.

It is a common snake found all over India and Ceylon and also in the Andamans, Malay Peninsula, Indo-China and the Philippines.

In some Indian vernaculars it is called Kawdya or Kawri-wala; in Tamil it is known as 'Suvar pambu' (= wall-snake).

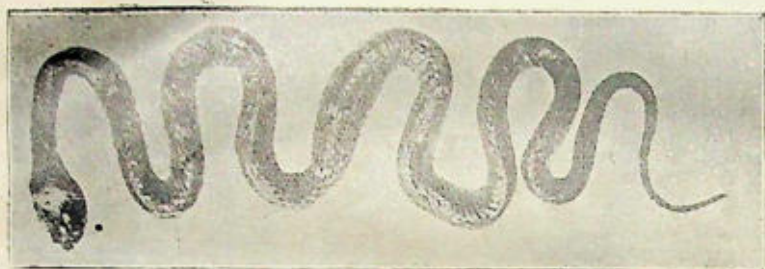


Fig. 66. Common Wolf-snake,



Fig. 66a. Common Wolf-snake.

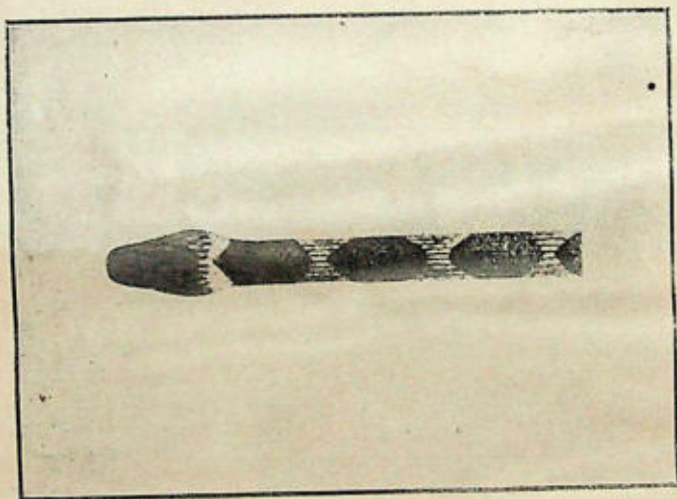


Fig. 67. Common Wolf-snake (Head and front part showing markings).

Fr. J. F. Caius found in the stomach of a female wolf-snake an undigested Musk-Rat or Grey Musk-Shrew, *Crocidura Carulea* (June 1915).

Scales — Costals 17 in Midbody, Ventrals 170-224. Subcaudals—divided, 56-80. Supralabials—9.

2. Striped Wolf Snake or Shaw's Wolf Snake (*Lycodon striatus*)

It is a small snake, about 18 inches long. It has 11 to 18 white or yellow cross-bars on the body, the ground colour of the back being dark-brown or black. These bars are occasionally thicker than in the other kinds of wolf-snakes, and are like those in the common wolf-snake. They are distinct towards the head, and broken or less regular on the tail. The belly is pearly white and has no spots. The head is dark-brown or black, and the upper lip is white.

Its haunts are the same as those of the common wolf-snake, but it does not seem to be a climber. Unlike the latter, it is timid. When provoked, it coils itself and hides its head without striking. It is a nocturnal snake.

It lays eggs, 2 to 4 in number.

In external appearance it looks very much like the common wolf-snake except that it has 8 shields on the upper lip up to the gape of the mouth, whilst the common wolf-snake has 9 in this region.

This snake is found in Assam, the Eastern Himalayas and Burma.

3. Yellow-spotted Wolf Snake (*Lycodon flavomaculatus*)

This snake is found near Nāsik and in Sangli in the Bombay Presidency and in Berar. Instead of the white bars seen in the common wolf-snake, it has small yellowish spots on the back, but these are sometimes replaced by distinct yellowish cross-bars. The colour of this snake is

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3. Yellow-spotted Wolf Snake (*Lycodon flavomaculatus*)

This snake is found near Nasik and in Sangli in the Bombay Presidency and in Berar. Instead of the white bars seen in the common wolf-snake, it has small yellowish spots on the back, but these are sometimes replaced by distinct yellowish cross-bars. The colour of this snake is

dark rather than brownish. When the snake is put in spirit, the spots lose their yellow colour after 24 hours and thereafter turn white.

Other species of wolf-snakes are :—

4. Gunther's Wolf-snake (*Lycodon anamallensis*) found in the Western Ghats (Anamalais, Wynaad). It is very much like the common wolf-snake and the striped wolf-snake.

5. Twin-spotted Wolf-snake (*Lycodon jara*), found in Bengal, Assam, the Eastern Himalayas and Burma.

6. Beddome's Wolf-snake (*Lycodon travancoricus*), found in the hills of Western India (Matheran), east coast of Madras Presidency and in the Central Provinces.

7. Cantor's Wolf-snake (*Lycodon atropurpureus*), found in Bengal and Burma.

8. Anderson's Wolf-snake (*Lycodon fasciatus*), found in Assam, the Eastern Himalayas and Burma.

9. Mackinnon's Wolf-snake (*Lycodon mackinnoni*), found in the Western Himalayas (Mussoorie and Naini Tal).

The general appearance of the last six resembles that of the common wolf-snake, but the differentiation of the species is based on the number of rows of scales on the back and the number of ventral plates and subcaudal shields.

CHAPTER XXVI

Keel-backs

The snakes in this group have a well-marked keel on each scale of the back, a characteristic distinctive of them (Fig. 68).

In most other snakes the scales are smooth and flat, and the back is even, smooth and glossy. In Keel-backs, due to the ridge on the scales, the back is somewhat rough.

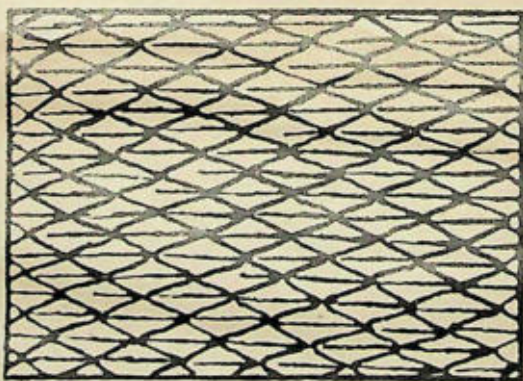


Fig. 68. Back showing keeled scales.

Some vipers also have their back-scales keeled, and these have already been described in the chapters on vipers; but most vipers have small scales on the head and other distinctive characteristics.

There are many species of these snakes, but those described hereafter are the more important and common ones.

1. Chequered Keel-back or Chequered Water-snake or
Common Pond-snake (*Tropidonotus piscator*)

This snake is of a moderate size with a rather short and stout body, and grows to 3 feet or more. The tail is long, being $\frac{1}{4}$ to $\frac{1}{3}$ of the total length. The pupils are round, and the part around them is speckled greenish gold. The nostrils are placed high on the snout. It is a common snake seen in the vicinity of water, near ponds, tanks, paddy fields and rivers. Hence in some places it is called Paniwada; in Marathi it is called 'Diwad'; it is the 'tannir pambu' or 'tannir sarai' of the Tamil country. In Sinhalese it is called 'Diya polonga.' It should be considered as one of the fresh-water snakes, already described.

The back is somewhat rough owing to the scales on it being keeled. In colour it varies from yellow to very dark olive-brown. A narrow, oblique, black streak runs from behind each eye. There are rows of black square spots on the back looking like a chequer. The belly is cream-coloured.

It is a very vicious snake somewhat like the Echis or Phoorsa (saw-scaled viper). It usually bites quickly and tenaciously. When it strikes, it erects its body somewhat like a Cobra. A good many cases of snake-bite in the open country, especially near water, are probably due to this snake. It is, however, not poisonous. It is usually seen in the daytime. It is an active snake and can jump clear off the ground. It swims with great facility and vigour. It feeds mainly on frogs and frequently on fish. It does not constrict the frog or wait till it is dead, but it seizes one properly, begins to swallow it at once, and the frog goes in squeaking. This snake retires in the hot weather and comes out when the monsoon bursts.

The female is very prolific, and lays eggs, 50 to 75 or more in a clutch.

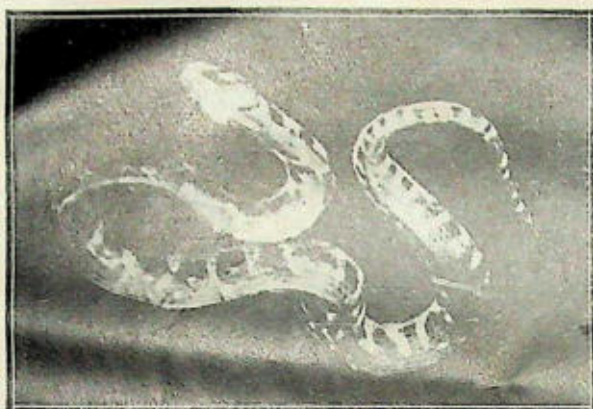


Fig. 69. Chequered Keel-back.

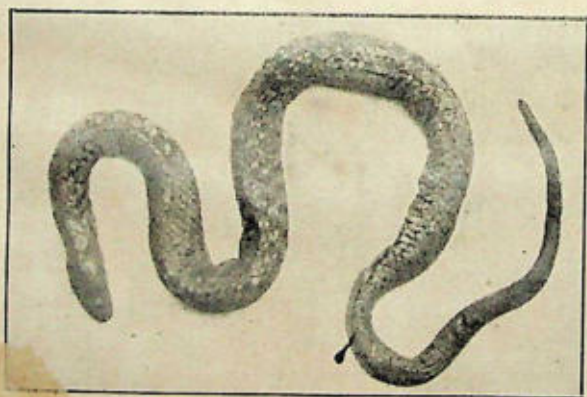


Fig. 70. Chequered Keel-back.



Fig. 70a. Chequered Keel-back.

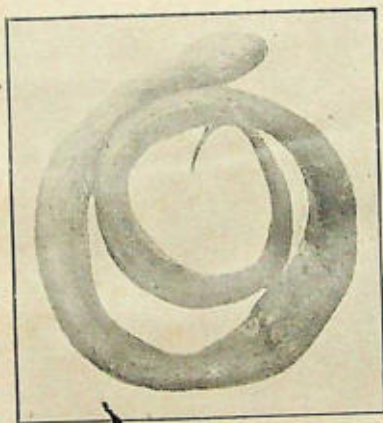


Fig. 71. Green Keel-back.

This variety of keel-back is very common all over India. It is essentially a snake of the plains, but is also found in hills up to an elevation of 6,300 feet.

It is one of the common snakes one should be well acquainted with and be able to identify (Fig. 69, 70 and 70 a).

Scales—Costals in Midbody in 19 rows. Ventrals—125-152. Anal—divided. Subcaudals—divided, 64-95.

2. Green Keel-back (*Macropisthodon plumbicolor*)

This snake (Figs. 71 and 72) grows 2 to 3 feet in length. Its body is rather stout and heavy. The back is rough owing to its scales being markedly ridged in the middle. The tail is short.

The back is grass-green, with some irregular dark spots or scattered whitish spots on it. The green colour is not due to a green pigment, but to a yellow one on a blue or lead-coloured background, as in the case of whip-snakes. A black streak runs backwards from behind each eye. The chin, throat and belly are white or buff, but the belly may be green or blackish. The green colour of the snake is protective, as it frequents low vegetation and grass.

Young specimens differ markedly from the adults as regards the black markings. They have a broad yellow collar on the neck with black edges, the angle of the collar pointing forward. They have also black stripes on the back.

This snake does not usually climb trees or bushes. It frequently enters houses, and I saw a good many in the Civil Surgeon's bungalow at Dhulia in West Khandesh and at Ahmednagar when I was stationed there. When I was at Nasik, it was often found on the go-links there.

It is dull, lethargic and perfectly harmless. When alarmed, it may erect the forepart of its body and flatten its neck like a Cobra. It is therefore sometimes popularly known as the Green Cobra. It is generally seen during the day, and

sometimes also at night. It feeds usually on frogs and toads, being partial to the latter. Fr. Caius has recorded snails (May 1916) in its bill of fare. In Tamil it is known as 'Pacha naga' and in Sinhalese 'Pala polongu.'

It is a common snake in the elevated parts of India, and is mostly found at elevations of 2,000 to 6,000 feet, but when found at a lower level, it will always be in the close vicinity of hills.

Scales—Midbody Costals 21-27 rows. Ventrals—144-163. Anal—Divided. Subcaudals—divided, 34-50.

3. Buff Striped Keel-back (*Tropidonotus stolatus*)

This is a small, slender, elongate and graceful snake with a long tapering tail, about a quarter of its total length (Fig. 73). It grows 2 to 2½ feet. It is greenish-brown and has two buff or yellow parallel stripes along the back extending from the neck to the end of the tail. There are a number of black cross-bars on the back broken by these yellow lines, which are more marked towards the head. The body is darker towards the end of the tail. The back is rough, due to the scales being keeled. The belly is white, with black spots on the sides. The eyes are large with round pupils, and the iris has yellow flecks. When the snake is fresh after casting its skin, it looks like a dandy owing to its variegated colours.

When it is excited, it raises the forepart of its body and inflates itself, revealing a pale blue colour on the edges of the scales towards the head. In one variety the blue colour is replaced by a vermilion red. When excited and half erect, it looks graceful and beautiful. I saw one in this posture in the Body Guard Lines at Alipore in Calcutta.

It feeds mainly on frogs and toads and lives near water. It is seen in rice fields, grassy cultivated lands, gardens and grass farms, and sometimes around bungalows near plants grown in pots. It takes shelter in holes in the ground or



Fig. 72. Green Keel-back swallowing a frog.

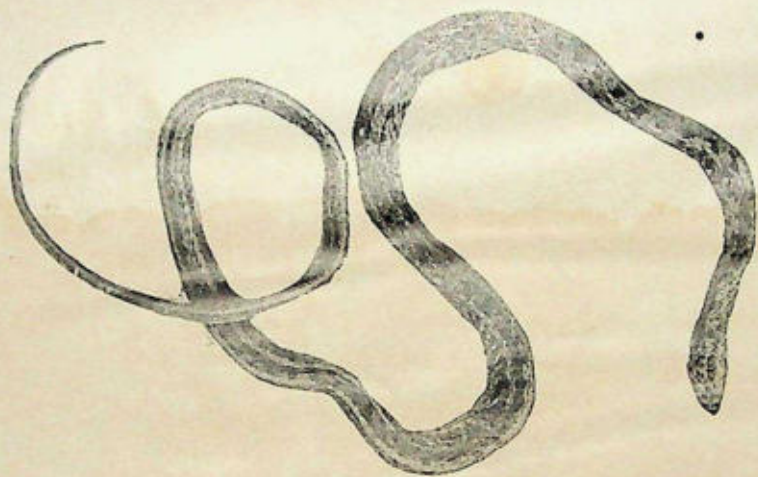


Fig. 73. Buff-striped Keel-back.

in the masonry of walls, in drains, etc. It is very fond of lying in water. It is inoffensive and harmless. It is essentially diurnal in its habits. It retires in the hot weather and comes out in the rainy season.

The female lays eggs, usually 5 to 10 in number.

It occurs all over India, usually in the plains, but has been found at elevations of over 5,000 feet. It is known as 'Kaliyan-kutty' and 'Nikkattan pambu' in Tamil and 'Ahara kukka' in Sinhalese.

Scales — Costals in Midbody in 19 rows. Ventrals—120-161. Anal—divided. Subcaudals—divided, 46-89.

4 Olivaceous Keel-back (*Helicops schistosus*)

It is a small snake growing to 2½ feet. The eyes have round pupils, and it moves its eyeballs very actively. The nostrils are like slits and are placed rather high as in true fresh-water snakes. The body is round and fairly robust. The back is rough owing to keeled scales. The tail is fairly long. The body is deep olive-green. The belly is of a uniform yellow colour, the flanks being tinged with a light pink.

It prefers the vicinity of water and lives usually near rivers, tanks, ponds or even smaller collections of water. It is inoffensive, though occasionally it shows ferocity and markedly flattens its neck cobra-wise. It feeds on frogs and fish. It is completely diurnal in its habits.

The female lays eggs. It is a common snake found in the plains, as also at elevations up to 3,000 feet. It is common at Bangalore.

Scales — Midbody Costals in 19 rows. Ventrals—129-157. Anal—divided. Subcaudals—divided, 55-85. Its peculiarity is that it has a single internasal shield.

CHAPTER XXVII

Kukri Snakes or Filleted Ground Snakes

These are small, non-poisonous land-snakes growing 1 to 2 feet long. They have few teeth as compared with other snakes. Some of the back teeth in the upper jaw are flattened before coming to a point, and resemble to a certain extent the blade of a Gurkha's kukri. Hence the name of these snakes. They are active and are not timid. They move about mostly in the day. They feed mainly on lizards and their eggs and occasionally on the spawn of frogs.

They occur in Southern Asia including the Malay States and in Egypt. There are about 40 kinds, of which 23 occur in India. Some of these are mentioned below.

1. Common or Banded Kukri Snake (*Simotes arnensis*)

The back of this snake (Fig. 74) is of a brownish colour fading somewhat in the flanks, and is crossed with black bars, which on the sides break up into streaks of varying width. The interspaces between the bars are always longer than the bars themselves. The bars vary from 20 to 60 in number, including 6 to 12 on the tail. The belly is usually white, but may be spotted black or brown.

There are three distinct black marks on the head. In an allied snake, which is also harmless, there are only two.

It is found frequently in bungalows and out-houses and in masonry and is more often seen during the rains. When molested, it will bite, but its bite produces no harm. When excited, it inflates its body to a remarkable extent. It grows to 2 feet or a little more. It climbs with great ease. It occurs all over India and is common in Bihar. It is also found in Ceylon. It usually prefers the plains, but has been found at an elevation of 5,500 feet. The female lays eggs.

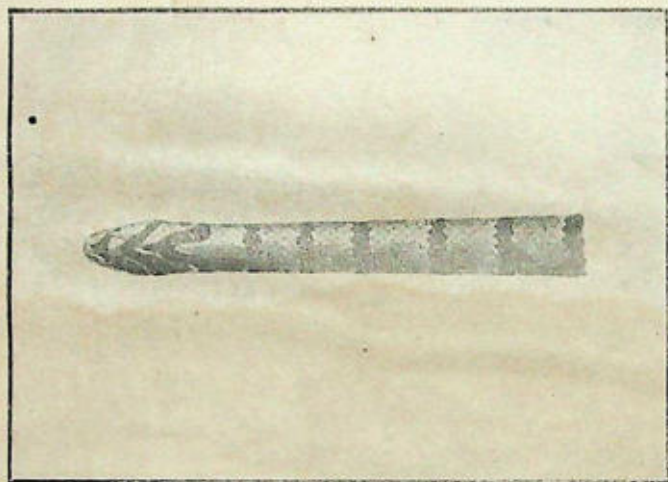


Fig. 74. Common Kukri-snake (Head and front part showing markings).



Fig. 75. Trinket-snake.

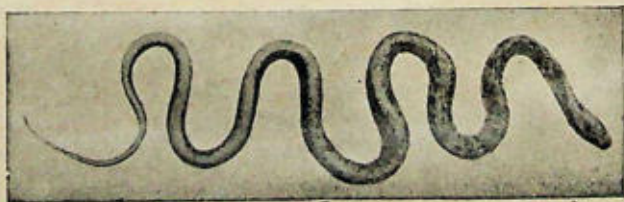


Fig. 75a. Trinket-snake.

Scales—Midbody Costals in 17 rows. Ventrals—164-202.
Anal—divided. Subcaudals—divided, 41-59.

2. Light-barred Kukri Snake (*Simotes albolineatus*)

This is similar to the common Kukri snake, but the bars are of light colour in the middle, though heavily bordered with black. There are 17 to 25 of such bars on the body and 4 to 8 on the tail.

It is found in Bengal, Assam, the Eastern Himalayas and Burma. It grows 2 to 3 feet long.

Scales—Ventrals—177-208. Subcaudals—divided, 47-69.

3. Variegated Kukri Snake (*Oligodon subgriseus*)

This snake resembles the common Kukri snake in most respects, but differs in colour and markings. The back is buff or brown, with black bars across or large black spots down it. There are two black marks on the head. The belly is without spots. It grows up to 2 feet.

It is found in gardens or houses or amongst pot-plants. It frequents damp spots to obtain frogs' spawn. It is usually inoffensive, but when molested, may bite. It is found in India and Ceylon. It usually prefers the plains, but can be found at elevations up to 6,000 feet or more. Its subcaudal shields are divided and number 29 to 56.

There are other kinds in this group of Kukri Snakes, some of which are peculiar to Ceylon, some to Burma and some to Assam and the Eastern Himalayas.

CHAPTER XXVIII

Other Snakes

1. Trinket Snake (*Coluber helena*)

This snake (Figs. 75, and 75a) is common in India and is usually found at places over 1,500 feet above sea-level. It has a narrow head, large nostrils and moderately large eyes. The pupils are either round or horizontally elliptical, the region around them being speckled golden yellow. The body is somewhat slender and smooth. There are black cross-bands on the back which enclose three or more white islets of a reticulated pattern, looking like little trinkets. On the neck there are two black stripes extending to the throat. The ground colour of the back is brown, greenish or greenish black. The trinkets may extend to the tail. In young specimens they are present towards the front part of the body (Fig. 76) and disappear near the middle, but there is a long black line on either side in the rear of the back.

This snake is technically called *Coluber helena*, *Coluber* in Latin meaning 'a snake', and *helena* in Greek meaning 'beautiful'. In Tamil it is called 'Kattu pambu' and in Sinhalese 'Mudu karawala.'

This snake is found in or near fairly thin jungle, and is also common in populated areas. It is bold, active and fierce, but is non-poisonous. When striking, it so quickly uncoils itself and snaps at the prey that it appears as if it is leaping. It winds its coils round the prey when it seizes it, and bites viciously. In delivering its stroke, it resembles very much the common rat-snake or dhaman. It is fond of rats, mice and other small mammals and also feeds on lizards, frogs and even other snakes. It grows usually 3 to 4 feet but may reach a length of 5 feet or more.

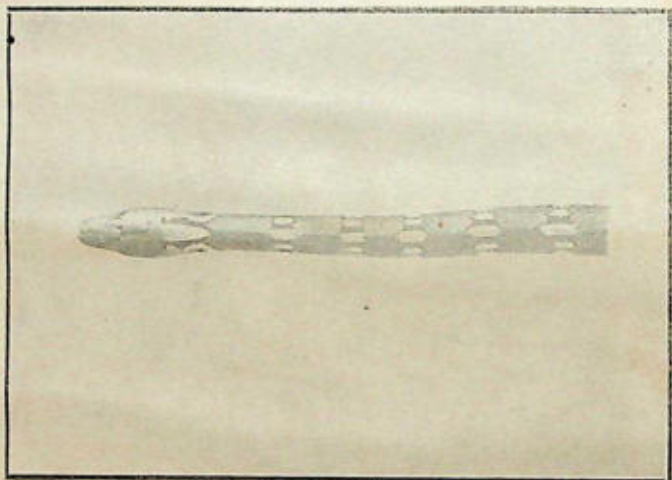
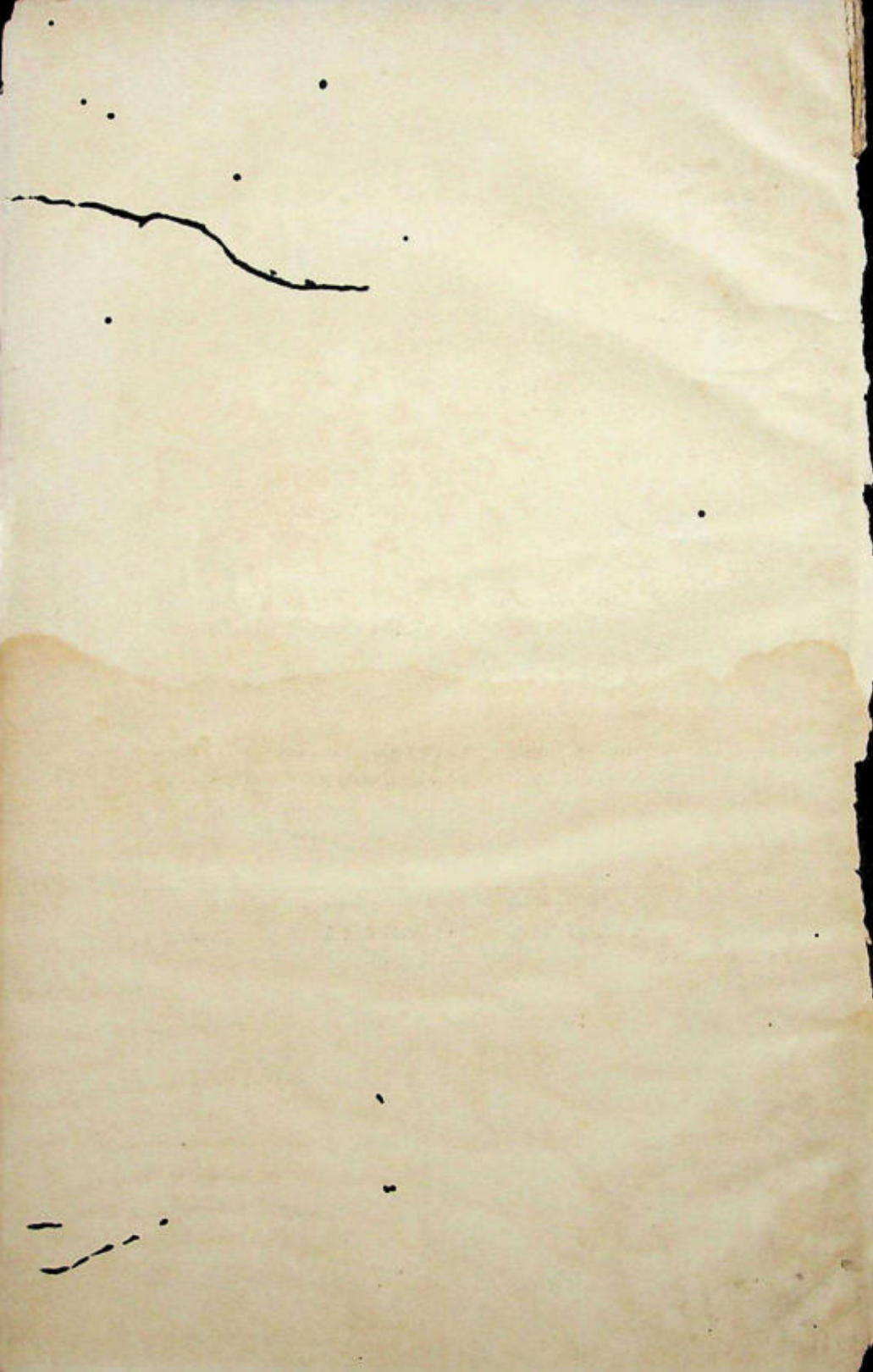


Fig. 76. Trinket-Snake (Head and front part showing markings.)



It occurs all over India and in Ceylon. In the Deccan I have found it to be very common at Sholapur, Pandharpur and Ahmednagar, which are over 1,500 feet above sea-level. I have found it also at Dhulia (West Khandesh) which is under 900 feet above the sea, but here it was evidently brought down to the nullahs from the hills around, some of which are 1,000 feet higher than Dhulia.

Scales—Midbody Costals in 23-29 rows. Ventrals—217-265. Anal—entire. Subcaudals—divided, 73-100.

There are 45 species of the genus *Coluber* found in Asia, Europe and America, of which about a dozen occur within Indian limits. The species other than those mentioned in this book are confined mostly to the Himalayas, Assam, Abor Hills and Burma, except the Copper-headed Coluber, which will be described next.

2. Copper-headed Rat Snake (*Coluber radiatus*)

The snake is found in Bengal, Assam, the Eastern Himalayas, Burma, Siam, Malay Peninsula and southern China. It is fairly common in some parts of India, and, though usually seen in low lands, may be found up to an elevation of 5,000 feet. In Upper Assam it is called 'Goom phitti'. It grows 5 to 6 feet long, but may reach 7 feet. The tail is about 1/6th of the total length of the reptile. It is a handsome snake with distinctive markings. The eyes are of a moderate size, the pupils round, and the iris golden brown. Three black lines radiate from the eye like the spokes of a wheel, and hence the name *radiatus*. The head is copper-coloured or dull orange. There is a black stripe across the back of the head. The ground colour of the back brownish, and there are longitudinal black stripes on its front part, usually three on each side. There are no such stripes in the posterior part. The belly is whitish or pale yellow, often mottled with grey towards the tail, whose under surface may

also be similarly mottled. The young are coloured and marked similar to the adults.

It is usually seen in open fields near jungles, and is occasionally found in houses which it enters in search of rats. It is a bold snake and strikes viciously when suddenly approached or brought to bay, erecting the forepart of its body.

Scales — Back rows—behind the head 19, Midbody 19, posteriorly 17, median back rows keeled. Anal—entire. Ventrals 224–250. Subcaudals 83–106, divided. This disposition of the scales and the black transverse stripe on the head make the identification of the snake easy.

3. Gunther's Reed Snake (*Ablabes calamaria*)

This is a small snake growing to 18 inches in length. It has a slender, round body of the same girth throughout. The tail is about a quarter of its total length and ends in a fine point.

It is green in colour. It has long lines along the back extending from near the head right up to the tail. Two of these lines, one on either side, are blackish. Similar black lines, but fainter, may be present above or below these. There is a dark patch on the back of the head. All these markings and lines become fainter as the snake grows older.

It is found in the hills of India. It has been recorded from Mahabaleshwar, the Nilgiris, Bangalore and in the Himalayas from Almora, Buxa Duars, etc. It is common around Bangalore.

4. Bridal Snake (*Dryocalamus nympha*)

This reptile superficially resembles a wolf-snake. The back is dark brown and shiny. There are 35 to 50 white or yellowish cross-bars on the body and the tail, which are well marked and spaced wide apart in the anterior part of the body. There is a similar bar on the head. The belly is cream-coloured. It is a handsome snake and grows to 18

inches. It occurs in Orissa, Southern India and Ceylon. It is found in the plains as well as in the hills.

Scales — Midbody Costals in 13 rows. Ventrals—200-243. Anal—divided. Subcaudals—divided, 65-88.

5. **Many-toothed Spot-bellied Snake**—Jerdon's Polyodont
(*Polyodontophis subpunctatus*)

This snake grows to about 2 feet. It is non-poisonous. The back is greyish with dark brown spots. Sometimes a series of dark spots pass down its middle. The belly is whitish, and the plates on it have a dark spot on either side. The head is black, and the lips are yellow. There is a black band bordered with yellow on the nape of the neck.

It has numerous very small teeth in both jaws. It is found in peninsular India. It is said to be found in or near hills. I saw one at Nasik and some specimens at Nagpur. Superficially it looks somewhat like the slender coral snake except that the belly has no coral red colour.

Scales — Midbody Costals in 17 rows. Ventrals—151-214. Anal—divided. Subcaudals—divided, 42-76.

CHAPTER XXIX

Snakes in Britain, South Africa and Australia

Snakes in Britain

The Common Viper in Britain is called *Vipera berus*. It is the only poisonous snake found there. There are two other snakes found in Britain, both of which are harmless. They are :—

1. Ring or Grass Snake (*Tropidonotus natrix*).

This is greenish, with dark spots on the back and sides and a bright yellow band round the neck. The belly is black and grey. It is about 3 feet in length, but may grow to 5 feet or more. When brought to bay, it hisses and strikes, but usually does not bite. It is not found in Scotland.

This snake is harmless and helps in keeping down mice. It is generally found near water and in marshy ground. It is a good swimmer. It feeds on frogs, toads, fish and mice, frogs being the favourite prey. The female lays eggs, 20 to 30 in number; they are soft, parchment-like, whitish yellow, and are laid in strings or chains. Rich vegetable soil, heaps of weeds, and chiefly dunghills, are favourite localities for these eggs.

The Grass-snake, as noted above, is perfectly harmless, and never bites, although it occasionally assumes a very defiant air and a venomous-looking attitude. Its only defence however, consists of the awful contents of the cloaca and the anal glands, the most abominable and penetrating odour of which remains indescribable.

The range extends over the whole of Middle Europe, Algeria, West and Central Asia.

2. Smooth Snake (*Coronella austriaca*)

This is a rare snake in Great Britain, though plentiful on the Continent. It is about 2 feet long. It is brownish-yellow or reddish-brown in colour. It feeds on lizards and mice. When faced by an enemy, it emits a disagreeable odour and assumes a ferocious attitude by erecting itself on its tail, hissing and darting out its tongue, but it is quite harmless. The young are born alive.

African Snakes

Some of the important poisonous snakes of Africa are the Naja or Cobra, Ringhal, Coral Snake, Garter Snake, Tree-Cobra or Mamba and various kinds of vipers, the chief of which is the Puff Adder. In addition there are other poisonous snakes which cause serious, though not fatal, symptoms in man. These are the back-fanged Boomslang and Schaapsteker.

Among the Cobras there are yellow, brown and black varieties. Some of these and the Ringhals are called Spitting Cobras, as they have the power of spitting venom, that is, they eject it in a spray to some distance. If this spray reaches an unbroken skin, it of course does no harm, but if it enters the eye, severe inflammation of the eye may occur.

There is a peculiar snake in Africa called the Egg-eating Snake (*Dasyveltis scabra*). This snake feeds only on eggs, and after swallowing the egg, it breaks it within and throws out the shell by means of teeth-like projections on its spine.

Snakes in Australia

The best-known species of dangerous snakes in Australia are the Copperhead, the Brown Snake, the Tiger Snake, the Black Snake and the Death Adder, all belonging to the family of *Colubridæ*. There are no vipers in Australia.

CHAPTER XXX

Is a Snake Poisonous or Harmless ?

It is necessary to know whether a snake is poisonous or otherwise, and whether a person bitten by one has poison injected in him or not. When it is realised that the deaths from snake-bite in India are nearly ten times the number of those due to all the wild animals put together such as tigers, panthers, bears and crocodiles, the importance of the subject will be better appreciated. As many as 100 deaths occur daily in the whole of India from snake-bite alone. It must be remembered that this appalling mortality is not all due to snake-poisoning, for a part of it is due to fright and ignorance. A knowledge of how to distinguish a poisonous snake from a harmless one is therefore essential. Even a layman can acquire this knowledge with a little effort.

When a land-snake that has bitten a person is killed or seen and is found to be neither a Viper nor a Krait nor a Cobra, he can rest assured that not much harm will come to him and that the bite will not be fatal. If the chief points of distinction among these three big groups of poisonous snakes are remembered, their identification is easy. All vipers have broad plates on the belly (Fig. 9) and either small scales on the head (Fig. 13) or a pit between the nose and the eye (Fig. 26). If a snake has small scales on the belly similar to those on the back (Fig. 10) as in the small worm-like Blind Snakes, it is definitely harmless. If the scales or plates on the belly are narrow, that is, they are not broad enough to extend right across the belly, but cover only the middle of it (Fig. 11) as in the Python, the Double-headed snake and the Russell's Earth-snake, the snake is decidedly non-poisonous, however big and terrifying it may seem to be.

Most of the land-snakes one comes across have broad belly-plates, but they may be poisonous or non-poisonous. It is advisable to bear in mind that all poisonous snakes have broad plates on the belly, though the reverse is not true. But all snakes which have small or narrow belly-plates are non-poisonous. Again the reverse is not true. All land-snakes have a round and tapering tail. Sea-snakes, which are all poisonous, have a flat tail, and casualties from their bite can only occur in the open sea or near the shore.

When a land-snake is killed and is seen to have broad belly-plates, the next thing is to look at the scales on the top of the head. If these scales are small or there is a pit between the nose and the eye, the snake is a viper and is therefore poisonous. There is no mistaking it. Those features are easily discerned even if the head is smashed. If a snake with broad belly-plates has neither of these characteristics of a Viper, then proceed to find out if it is a Cobra or a Krait. The Cobra has an expansible neck or hood, which cannot be mistaken for anything else when the snake is alive. The mark of a spectacle or monocle may be present on the neck. The third upper-lip-shield is very big and touches the shield of the nose and the eye, a characteristic which the Cobra shares with the coral snake. If there are two or three series of dark plates on the under surface of the neck, it is a Cobra. The Cobra has shields on the head and no small scales, the latter being confined only to vipers. The Indian Cobra has also a small wedge-shaped shield between the 4th and the 5th lower-lip-shields called the 'cuneate.' A King Cobra has two big occipital shields behind the parietals on the head. If the snake killed has not these characteristics, it is not a Cobra. The question then is whether it is a Krait. As mentioned in the relative chapter, the Krait is usually of a dark colour, with the scales along the middle of the back enlarged and hexagonal. The common Krait has also white bands across the back, which begin at some distance from the head and extend nearly to the end of the tail. The Banded Krait has definite broad,

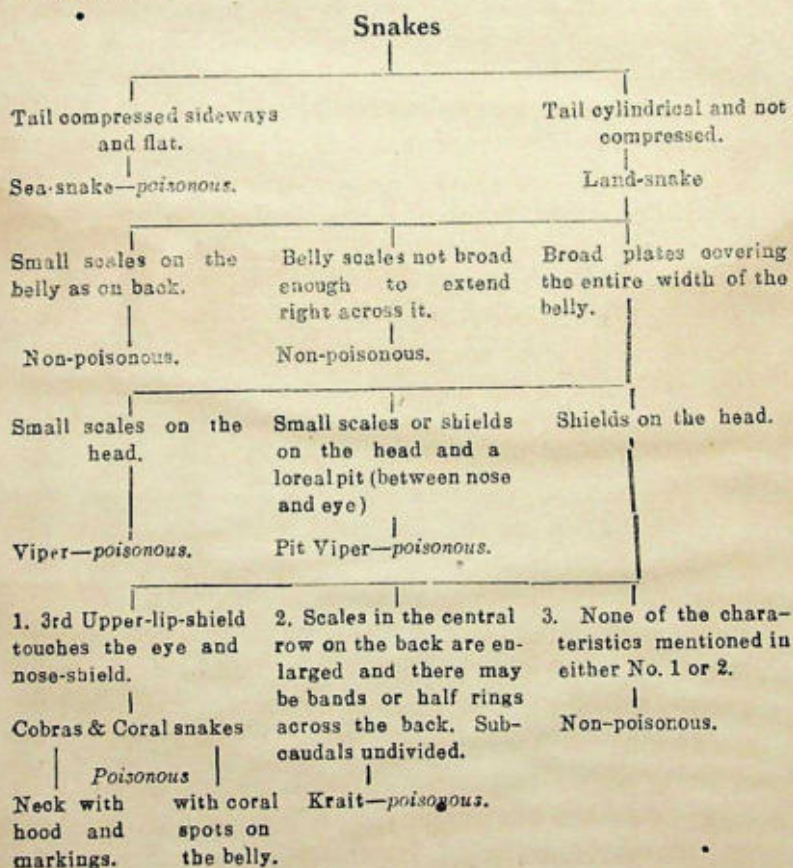
yellow and black bands on the back. If, then, the snake is not a Viper, a Cobra, a Coral snake, a Krait or a Sea-snake, it definitely belongs to a non-poisonous kind. All other snakes, however big and fierce they may appear, are non-poisonous.

There is one more point to be remembered. Non-poisonous snakes have a row of teeth along each margin of the upper jaw, whilst in poisonous snakes these teeth are replaced by one or two poison-fangs in the front. If a pin is passed along the margin of the upper jaw inside the mouth, a number of indentations or teeth will be struck in the front part of the jaw if the snake is non-poisonous, whilst only one or two of these will be struck if the snake is poisonous. If the mouth of a Cobra, a Krait or a Viper is opened, this can be easily verified. It should also be borne in mind that all poisonous snakes and nearly all non-poisonous ones have two rows of teeth on the palate. So if the pin is passed deeper into the mouth, one or two rows of teeth will be struck in nearly all snakes, whether poisonous or non-poisonous. These teeth should not be mistaken for the marginal teeth of the upper jaw. Care should be taken not to pass the pin right inside the mouth, but it should be moved just inside and along the side of the upper jaw. In Vipers and Cobras there are no teeth along the margin in the back part of the upper jaw, but in Kraits there are four teeth in this part behind the poison-fangs. But in these snakes there are no teeth in the front part of the upper jaw except the fangs, whilst in nearly all non-poisonous snakes there are a number of small teeth in this part. This point, though not difficult to verify, has not so far been stressed by other writers on snakes, but I have found it an infallible means of distinguishing a poisonous snake from a non-poisonous one except in cases where the head is badly smashed.

Col. Wall, after studying thousands of Indian snakes, drew up a chart which has been published by the Bombay Natural History Society. It is from this that the above-

mentioned points of distinction between the poisonous and non-poisonous snakes of India have been taken. He gives the broad distinctions, based mainly on the scale characteristics, between the chief kinds of poisonous snakes, i. e., sea-snakes and the four big groups of land-snakes, namely, Vipers (with or without pit), Cobras, Coral snakes and Kraits. It is a very useful chart, and this as well as the pocket-size prints of it can be obtained from the Society.

The following table summarizes, for ready reference, the points of distinction between poisonous and non-poisonous snakes :—



It often happens that a person is bitten by a snake and which is not killed or seen. Even in such cases it is possible to infer from the character of the bite and the condition of the bitten part, whether the snake is a poisonous or non-poisonous one. As has been mentioned before, poisonous snakes have only fangs and no other teeth on the front part of the margin of the upper jaw, and when they bite, the fangs penetrate or scratch the skin. So there will usually be only two punctures on the skin a small distance apart, the distance varying with the width of the snake's mouth. A non-poisonous snake has a set of teeth on the side of the upper jaw of a more or less similar type, and its bite may leave many puncture marks. The bite of a poisonous snake is usually a stab, and the puncture may be deeper than that from the bite of a non-poisonous snake, as the fangs of the former are longer and better developed than ordinary teeth.

These punctures may not be easily discernible to the naked eye, but if seen carefully or with a lens, they can be made out. A poisonous snake may inflict just an oblique bite, in which case instead of two punctures there may be only one or just a scratch. For in many cases, the snake's mouth is too small to grip a limb or other part and has to operate obliquely, with the result that the recurving fangs slip off after tearing or scratching the skin instead of puncturing the part.

There are other local symptoms resulting from a bite which will show whether poison has been injected or not. Whenever any mechanical injury like a bite occurs, there will be some pain. But when poison is injected, pain is sure to be felt either immediately or shortly after. The pain is severe and is of a stinging or burning character, and persists for a long time. Pain of this type is usually associated with snake-poisoning. Naturally the intensity of the pain will vary with the amount of poison injected, and hence the larger the dose, the more intense will be the pain. In

Cobra-bite, the part begins to get numb after some time owing to paralysis of the nerves.

The part bitten will swell almost at once if poison has been injected, but if no swelling results even after some interval, there is good reason to infer that no poison has entered with the bite.

When a person receives even a minor cut, some blood oozes out, and a clot is formed on the wound after a few minutes. But this clotting power of the blood is very markedly reduced in snake-poisoning. The blood, instead of clotting on the punctures, continuously oozes out in the form of a thin, reddish, serous discharge for some hours. If the bite is by a non-poisonous snake, the punctures will be sealed up with clot in a short time. If poison is injected in a bite, the part around it often becomes greenish or bluish, sometimes purple, in a few minutes, and looks as if bruised. This is due to some bleeding occurring under the skin round about the bite. If no poison has been injected, no such discoloration or swelling or bleeding follows. All these local signs are more pronounced in a Viper-bite than in the bite of any other poisonous snake.

It should be noted that a ligature tightly applied to the limb soon after the bite will mask all these signs to a certain extent, as some swelling is always caused by the ligature itself in the part below it.

CHAPTER XXXI

Treatment for Snake-Bite

Snake-venom is very potent and is carried up and absorbed into the body within a few minutes. So such measures as are possible should be promptly taken if they are to have any effect. When you see a bitten person, decide quickly whether poison has been injected in the bite. If the snake was seen or has been killed and is available for examination, you can find out from the details given in the preceding chapters whether or not it is a poisonous one. So also from the local signs in the bitten part you can infer whether poison has been injected or not. If you are certain that it has not, cheer up the patient, allay his fears and tell him that no harm will come from the bite. No treatment is needed in such cases. The wound may be washed with clean water, covered with a clean handkerchief and tied up. This procedure will prevent the entry of dirt into the wound. The person may then be sent to a doctor if he so desires. But if there is a certainty or suspicion that poison has been injected in the bite, first aid treatment should be promptly given and the person sent to a doctor. This first treatment consists in applying a ligature and then cutting into the punctures freely and deep with a clean knife, so as to let the blood flow out freely. "The cut should be made along the length of the limb and not across, so as to avoid cutting many or large blood-vessels." When the blood flows, some of the poison will flow out with it. Then wash the part well with clean water or any antiseptic lotion. The object is to wash out as much of the poison as possible. Some poison has already been absorbed into the person's system, but the washing out of the wound may just prevent sufficient poison being absorbed to kill the person, or in other words, render the dose sublethal or non-fatal. A small quantity of potassium

permanganate may be moistened and well rubbed into the wound as an antiseptic. In villages it is usually available from the village headman who stocks it for use if cholera breaks out. A few hints about applying a ligature should be noted. It can be made from a handkerchief or any other piece of cloth. It should be tied at some distance above the bite on a fleshy part between the part bitten and the heart and should be tight enough to prevent blood-circulation in the limb. This will prevent the poison from circulating and being absorbed into the system. The ligature should not be kept too long, not more than 15 or 20 minutes, as otherwise the limb might become gangrenous owing to the blood supply being cut off. When the ligature has been applied, foment the bitten part and take the person to the nearest hospital, where his symptoms will be studied and Antivenene injected into his system. Antivenene is now-a-days stocked in most hospitals and dispensaries. When injected, it neutralises the poison of the Cobra or Russell's Viper. It is an absolute specific against the poisons of these two snakes and is sure to save the life of the patient if injected in time. Even if injected after some delay, it may prove effective. When there is the least doubt that snake-poisoning has occurred, Antivenene should be injected, as it neutralises the snake-poison, and by itself is non-poisonous and harmless.

It has not been possible so far to prepare Antivenene for Krait or Phoorsa poisoning. It is difficult to obtain the poisons of these snakes in sufficient quantity, as they do not thrive in captivity. This difficulty will be overcome when a snake-farm is started in Bombay.

At the Haffkine Institute in Bombay a number of Cobras and Russell's Vipers are confined. These are made to bite on a piece of rubber tissue tied around the rim of a glass. When the fangs puncture the rubber, the poison drops into the glass. This is collected and dried in a vacuum desiccator. This dried venom is yellowish like amber. It is then sent to Kasauli (Punjab), where it is dissolved and injected

into horses in gradually increasing doses, until they become immune to the particular poison. This means that, even if a large dose of the poison is injected into an immunised horse, he will not feel any ill effects. This is due to a large number of antibodies or substances formed in the horse's blood, powerful enough to neutralise the snake-poison. A quantity of this blood is removed from the horse, the portion that clots is separated and the serum that remains is bottled and issued. This is Antivenene.

It should be remembered that, if a person is bitten by a poisonous snake, it does not necessarily mean that he will die if not treated. The snake might have bitten some animal just before and used up all its poison at the time. In that case no poison could enter his body and there would not be any local signs on the part bitten such as swelling, discoloration or oozing of blood. Or it might happen that the snake, not getting a good bite, could not inject enough poison to kill the person, though it might be enough to produce local signs in the part bitten and other symptoms. Or the bite might have been inflicted on a part covered by clothes and a good deal of the poison might have spilt itself on the garment and only a negligible quantity entered the limb, which might bring about signs and symptoms of a mild character, but not death. Experience shows that even in cases of bite by poisonous snakes, 50 per cent or more survive.

Out of nearly 300 kinds of land-snakes found in India, 40 are poisonous. Some of the poisonous kinds like the Cobra are seen more often and hence contribute in a larger number to snake-bite cases than the others. Thus, roughly, one out of every five cases of snake-bite in India may be attributed to a poisonous snake. Again, as above mentioned, the bite of a poisonous snake may not be fatal in half the number of cases. So, altogether, about 90 out of every 100 persons bitten by snakes survive without any treatment. It is these very cases that are claimed by the so-called snake-doctors as cures, and various roots, herbs,

leaves, stones, charms, incantations etc. are accredited with curative properties in cases of snake-bite, which is usually regarded as synonymous with snake-poisoning. Most of these so-called remedies have been subjected to a thorough test against snake-poison, and not one of them has proved to be of any avail. If any one thinks that he has a remedy for snake-poisoning, he should send a sample or the formula to the Haffkine Institute at Parel, Bombay, where there are all facilities for testing its efficacy.

Charms and incantations may have a psychological effect on a bitten person by soothing his nerves, allaying his fears and so strengthening his heart-muscle, but nothing more.

The so-called snake-stones which some snake-men exhibit are usually pieces of burnt bone or pumice or porous chalk. Gallstones of animals and lumps of some kind of gum like benzoin are also shown as snake-stones. As they all have some adhesive and absorptive power, they are made to stick to the bitten part, but they have no action on snake-poison.

Dr. K. S. Mhaskar and Rev. Father J. F. Caius have experimented with about 500 so-called medicines for snake-poisoning. They have tested all known plant remedies and their combinations at the Pharmacological Laboratory of the Haffkine Institute, Bombay, and found that none of these have any neutralising or curative effect against snake-poison. The results of their experiments have been published in Memoir No. 19 of January 1931 of the Indian Medical Research Memoirs under the title *Indian Plant Remedies used in Snake-bite*, which can be had from Thacker, Spink & Co., Calcutta.

It is often asked how, if snake-venom is a potent poison which circulates in the body very quickly, medical aid can ever reach a person in time. But it should be remembered that, though snake-poison is absorbed rapidly, death usually does not occur till after some hours. In Cobra-bite death takes place after 5 to 8 hours in most cases. Of course,

a person may die earlier or later according to the amount of poison injected. So if a person gets Antivenene treatment within a few hours of the bite, there is always a chance of the poison being neutralised and his life saved. Though cases of snake-bite usually occur in remote villages, fields or jungles, many of these places may be within a few hours' reach of a dispensary in these days of quick transport. And if every dispensary is made to stock Antivenene and the doctor in charge knows when and how to use it, some lives can certainly be saved.

In treating a case of snake-poisoning, three chief points should be remembered:—

1. The poison should be neutralised on the spot. This is done by cutting into the punctures, washing the wound and rubbing into it permanganate of potash.

2. The circulation of the poison should be prevented. This is done by applying a ligature.

3. The effect of the poison should be counteracted. The poison already absorbed into the body produces some symptoms, but these can only be counteracted by the injection of Antivenene.

CHAPTER XXXII

Protection against Snakes

Dogs and cats have a strong antipathy for reptiles, especially snakes. Dogs cannot see well in the dark, but their sense of smell enables them to detect the presence of a snake. Cats can see well in the dark, and they are fond of rats and mice. Snakes enter houses usually in search of these rodents, and so cats are useful in killing snakes in or around houses. They attack even poisonous snakes. They repeatedly rush at a snake and make a noise which attracts our attention and enables us to notice the presence of the reptile.

Some snakes live in or near houses. Hence it is important that the compounds of houses should be kept free of jungle, tall grass, ants' nests, broken masonry, rubbish heaps, etc., and that out-houses, fowl-houses, etc. should not be too close to the dwelling. Thatched roofs and ceiling-cloth should always be considered unsafe, as snakes are fond of living in them. They also live in old deserted buildings with holes and crevices and overgrown with grass and other vegetation, especially if water is anywhere near. Well-built houses usually have no refuge for them. As snakes are generally ground-animals, one should not sleep on the ground in the open or in small huts, but use cots or charpoyas. Tall grass or thick vegetation should not be allowed to grow in the gardens, as these may harbour snakes. Gravel paths round a building are a protection against them. Snakes sometimes crawl into houses through drains from bathrooms or other rooms. Such drains should have fine metal gauze fixed at the openings. In snake-infested places, flower-pots should not be kept on verandahs.

When going into the jungle for shikar or on other work, one should wear long boots and leggings, gaiters or putties for protection, and while going over a dilapidated building, should always have boots on and keep one's hands away from crevices, corners or holes.

Where snakes are common, it is always advisable to carry a light when going out at night, to avoid treading on a snake and being bitten. Villagers going out at night usually carry a stout stick with which they strike heavily on the ground as they walk along. This is a useful precaution. A snake hears sounds conveyed through the ground and glides away from one's path.

It is advisable for people living in or going about snake-infested places to have a Brunton's lancet and potash permanganate crystals. The lancet and crystals can be had packed in a small wooden tube, which can be easily carried in one's pocket. In case of a bite, a deep cut should at once be made into the bitten part and the crystals rubbed in it. If there is the least suspicion of the snake being poisonous, a doctor or an hospital should be sought immediately. In snake-infested districts Antivenene should be kept by every doctor and in every dispensary. But it is still better that one should carry a bottle of this preparation in case the doctor consulted has not got it at the moment. Antivenene can be obtained from the Central Research Institute at Kasauli (Punjab), and a sealed tube containing 40 c. c. or less costs about Rs. 3.

Snakes have several enemies. Birds of prey and many of the smaller carnivorous animals feed upon young snakes and frequently attack and eat the adults. Many kinds of snakes are cannibals and swallow their own young besides those of others.

Certain animals like the mongoose, meercat, hedgehog and pig kill and eat snakes, but none of them are immune

to snake-poison. If a venomous snake bites any of them on the mouth or skin and injects its poison, they die. The Secretary-bird, the Stork, the Honey Buzzard, the Road-runner and some other birds kill and eat snakes. These snake-eaters avoid the fangs of the reptiles by their agility and quickness of movement, mode of attack, and natural defensive coverings such as thick long hair or spines on the body or widely expansible wings. The pig is practically immune to the venom, as its body is protected by thick layers of fat.

CHAPTER XXXIII

Identification of a Snake

It is only by scientific methods that a snake can be correctly identified. The disposition, size, number and characteristics of the scales on the belly, the head and the back, enable one to find out the family, the subfamily, the genus and ultimately the species to which the snake belongs. The colour of a snake is no guide to its identification, as the colour is usually adapted to the surroundings. Thus a Cobra may be black, wheat-coloured, brown, grey, red, green or even whitish. Again, the size of a snake is no guide either, as it must vary with its age. The markings on a snake also vary in the same kind. Thus a Cobra may have on the neck a ring mark (monocle) or a double ring (spectacle) mark, or no mark at all. Also in some snakes the young have quite different markings or even colour from those which they acquire in the adult stage. It will thus be seen that the apparent external characteristics of a snake may mislead one in precisely identifying it. But to lay persons these features will appeal most, and the majority will neither have the time nor the inclination to go into details about the scales. For such people the following information will be useful for identification of the more common snakes in India.

If the tail of a snake is found to be flat and compressed like the blade of an oar, it is a sea-snake (Fig. 43) and therefore poisonous. If the tail is rounded, it is a land-snake.

If the belly-scales of a land-snake are found to be similar to those on the back (Fig. 10) and the snake is about a foot long or less and appears somewhat like a worm, it is a blind burrowing snake and is harmless. If the

scales on the belly are narrow or, if broad, are not broad enough to cover its entire width (Fig. 11), then the snake is most probably one of the burrowing varieties or a Python and is non-poisonous. If the tail ends in a blunt disc (Fig. 47), that is, does not taper, it is not a Python but one of the burrowing earth-snakes and is harmless. The belly-plates in the Python group are narrow (of medium breadth) (Fig. 11). Three important snakes in this group deserve notice. If the tail is blunt and looks somewhat like the head, and the snake is 2 to 4 feet long, it is probably John's earth-snake or the so-called Double-headed snake (Fig. 51). It may be dark or light and may have irregular patches or no markings at all. Russell's earth-snake may be grey or brown, with yellowish or dark patches on the back (Fig. 49). The tail is short, but pointed. The Python is a big snake, 6 to 8 feet long or more, with yellow irregular patches, forming a four-sided pattern, on the back (Figs. 53 and 54). All these snakes are non-poisonous.

If a snake is found to have very broad belly-plates extending right across the belly (Fig. 9), then the head should be examined. If there is no mental groove beneath the chin, it is a slug snake (Fig. 56). If the mental groove is present, it belongs to the family of *Viperidae* or *Colubridae*. If there is a pit between the nose and the eye, it is a Pit-viper (Fig. 26). As in all Vipers, its head will be triangular. As to what kind of Pit-viper it is, it will not be difficult to find out from the descriptions of the common kinds of Pit-vipers of India given in Chapter X. But for ordinary purposes it is enough to know that it is a Pit-viper and is poisonous. If there is no pit between the nose and the eye, the scales on the head should be observed. If they are small like those on the back (Fig. 13), it is a Pitless Viper and is highly poisonous. If it is a big snake and has a row of black rings on the middle of the back with another row along the sides, it is a Russell's Viper (Figs. 18 and 19). If, on the contrary, it is of a small size, about 2 feet long,

or less, and has no black rings on the back or sides, but has a whitish mark like a bird's foot-print on the head and white sinuous lines on the sides of the back (Fig. 22), it is a Saw-scaled Viper (*Echis* or *Phoorsa*). These two are the most important among Pitless Vipers. If it is neither of these, it will be easy to find out what other kind of Pitless Viper it is from the description given in Chapter IX.

If, in spite of having broad belly-plates, the snake is not a Viper with or without a pit, but has shields on the head, one has to find out if it is a Cobra or a Coral Snake or a Krait. The distinctive characteristics of all these have already been mentioned, but bear repetition. In Cobras and Coral Snakes the third upper-lip-shield touches the eye and the nose-shield (Fig. 35). In addition, the Common Indian Cobra has a small shield wedged in between the fourth and fifth lower-lip-shields and an expansible neck with or without a monocle or spectacle mark on it, and may have dark plates on the under surface of the neck. The King Cobra is usually a big snake with a well-marked hood and has often white or yellowish cross-bars or chevrons on the body (Fig. 36), but no such marks on the neck as the common Cobra may have. The shields on the under surface of the tail of the ordinary Cobra are divided throughout (Fig. 12), whilst in the King Cobra they are divided towards the end but entire towards the root of the tail. Both the common Cobra and the King Cobra are very poisonous and dangerous.

But if the snake has the third upper-lip-shield touching the eye and the nose-shield and yet is not a common Cobra or King Cobra, then most probably it is a Coral Snake (with pink or other colour on its body somewhere). This snake is usually small and, though poisonous, is not dangerously so to man. It is usually found in hills. A description of the different species of Coral Snakes has already been given in Chapter XII.

If a land-snake has broad belly-plates but is not a Viper, and has shields on the head but is not a Cobra or a Coral Snake, it has to be ascertained whether it is a Krait, as this is the only poisonous kind of snake that remains to be considered. If the back is dark, with whitish bars beginning at some distance from the head and continuing nearly to the end of the tail, if the scales along the middle of the back are distinctly bigger than those on the sides and are more or less hexagonal, and if the shields on the under surface of the tail are entire, it is probably the common Krait (Fig. 41). In this connection, the points of distinction between the wolf-snake and the common Krait, emphasised earlier in this book, should be borne in mind. If the scales along the middle of the back are enlarged, it is a Krait, and if the snake is of a fairly large size and has broad yellow or white bands, it is a banded Krait (Fig. 42). All Kraits are very poisonous.

If a land-snake with broad belly plates has not the characteristics of a Viper, Cobra or Krait, then it is of a non-poisonous kind. If a pin is passed along the margin of its upper jaw, it will be found that there are many teeth in the front part of the jaw. All the above mentioned poisonous groups—Cobras, Coral Snakes, Kraits and Vipers—have fangs in that place instead of a number of teeth.

When it is seen that a land-snake, though having broad belly-plates, is of a non-poisonous kind the shape, size and general configuration of its body will enable one to identify it. One should note whether it is long and slender, or broad and stout, what its colour is, whether it has markings on the body and, if so, of what pattern and colour, what the characteristics of the scales on the body are, whether they are juxtaposed or are imbricate, and whether they are keeled or smooth. If the scales are distinctly keeled, it is one of those Keel-backs, described already (Chapter XXVI), either a green Keel-back or a buff-striped one, or a chequered Keel-back. The green Keel-back is a grass snake, absolutely grass-green, with practically no markings on the body (Fig. 71), though the

young have black linear markings. The buff-striped Keel-back is a handsome snake with long straight lines extending from the head to the tail (Fig. 73). The chequered Keel-back (Figs. 69 and 70) is a rather big stout snake found near water. Snakes which are long and slender and have a rather long tail are usually Tree-snakes. They are brownish or green in colour. If the snake is brownish and has markings made up of white and black spots on the back resembling the Greek letter Gamma, it is a Gamma snake (Fig. 65). If there are trinket-like markings on the back, it is a Trinket Snake (Fig. 76). It has a long body which is less slender than that of a Tree-snake. If the snake is green or brown and has a very long body with a tail like a whip-lash, it is a Whip-snake (Fig. 63).

If the snake is thick and sluggish, with the nostril near the top of the snout, it is probably a fresh-water snake, described already. If the snake is big, long and thick and is yellowish or dark, it is a Rat-snake or Dhaman (Figs. 59 and 60). The common Rat-snake has black markings irregularly arranged on the back. The belly is yellow, and the lip-shields have black edges. This snake is 4 to 8 feet long.

If the snake is brown with black bars across the back, it is a Kukri-snake (Fig. 74), but if it is brown with white bars or arches across the back, it is probably a Wolf-snake (Figs. 66 and 67) which is easily distinguished from a Krait.

These are some of the snakes more commonly found in India.

If a snake is caught and is found difficult to identify, it may be sent to the Bombay Natural History Society, 6 Apollo Street, Bombay. The Society gladly undertakes the identification of all snakes sent to it. The snake should be washed in water, bottled in spirit and then sent to the Society. A description of it on the lines given below should be kept by the sender. The Society will

identify it, and the description kept by him will enable him easily to identify the same type again.

In attempting to describe a snake, some such method as the following should be adopted:—

1. Place, date and time of capture. When killed?
2. Length of the snake including tail. Length of the tail. Whether the tail is flat, rounded, pointed, blunt, truncate or spiny.
3. Scales on the back — number of longitudinal rows in midbody; character of the scales — whether smooth or keeled, contiguous or overlapping, rounded, oval or rhombic. Vertebral scales — whether enlarged or not.
4. Ventrals — whether broad or narrow; Their number and colour; whether ridged or angulate at the sides. Anal — whether single or bifid, etc. Subcaudals — whether single or divided, and their number? If there are spots on the belly, their colour and position.
5. Head — whether distinct from the neck or not, broad or narrow, high or flat.
 - Eyes — whether large, moderate or small.
 - Pupil — whether round, vertically elliptical or horizontally elliptical.
 - Iris — its colour.
 - Nostrils — their position (whether on sides or on top of snout.)
 - Head-shields — any peculiarities from normal type; whether there are coloured streaks or bands on them, and if so, their position.
 - Upper labials — their number.
 - Lower labials — their number; sublinguals — whether normal or not; whether the mental groove is present.

6. Body — ground colour of the back ; whether there is any colour-pattern on the back such as stripes or streaks and, if so, their position.

Longitudinal markings — whether stripes or streaks, their number, breadth, position and colour. If there are series of spots or rings, their size, disposition and number.

Transverse markings — whether there are cross-bars or bands on the head ; whether there are any rings, and if so, their number and where they begin.

Many persons are loth to send any specimen by post, because they consider that it entails the trouble of sending it in bottle and spirit, which means extra care in packing. But if a specimen is preserved in methylated spirit for a week or ten days, it is quite safe to send it in a tin. Take some tow or rough cotton-wool. Dip it in spirit and then rinse it out. Put a little of this tow at the bottom of the tin, then transfer the specimen from the bottle to the tin, put some more rinsed tow or cotton-wool on the top and close the tin. The tin contains no liquid and can be sent by post like any ordinary tin if properly covered up.

CHAPTER XXXIV

Snake Mythology and Folklore

The aboriginal and Dravidian races of India have for ages been devout worshippers of the serpent. As serpents have the power of inflicting death, they became objects of wonder, fear and veneration to the Aryan races. Most of the objects of worship in Hindu mythology had their origin in the mysterious powers attributed to them which, not being explainable, were looked upon with awe. To prevent the use or abuse of these powers, these objects had to be propitiated and they were worshipped in the belief that by such means their wrath would be appeased. In the early ages of mankind, the human mind invested snakes with supernatural qualities owing to their death-dealing power, and they shared with the stars, the planets and meteorological phenomena the awe and veneration of the superstitious. The mysterious power of inflicting death possessed by poisonous snakes, their gliding motion and their periodical casting of the skin inspired dread and probably led to their worship in idol form. This feeling was exploited by the priests in all ages, and even to this day it is exploited by priests in charge of temples and by the so-called snake-man, as the uncivilized man and even civilized men, many of whom are not less ignorant in this matter, still entertain a holy dread for snakes.

Most probably priest-craft is responsible for the serpent being connected with phallus worship and so acquiring still greater religious significance. The Cobra's power of erecting its body from a flat position and flaccid state probably explain its association with the phallic or genital symbol.

The imaginary existence of a double-headed snake (John's earth-snake), which is believed to move forward or backward with equal facility alternately every six months, is

probably connected with a solar myth. The tail of this snake is blunt and looks somewhat like its head. Snake-charmers take advantage of this fact, and making a slit at the end of its tail, give the tail the appearance of a mouth, to exploit the credulity of ignorant people. Similarly Indian jugglers manufacture two-headed snakes from Russell's Earth-snake by grafting a head on the tail. Both these earth-snakes are said to cause leprosy by mere contact. In such cases, catch the snake that licked or otherwise touched the patient; cut off a piece of the tail and put it in a plantain leaf; make the patient eat it without his or her knowledge. Cure follows. (Fr. Caius)

In many parts of India the harmless dhaman is considered to be a male Cobra; should any one see dhaman and Cobra together he loses his eyesight. The dhaman is a big and rather aggressive snake, and one variety very much resembles the cobra in colour and external characteristics and is often mistaken for it. There are many curious stories associated with the dhaman—that it sucks cattle dry and then kills them; that, if it strikes at the eye of a person, he becomes blind, and that even its shadow kills cattle. Like its Indian congener, the European *Zamenis viridiflavus* is believed to suck cows and to remain sucking to the udder until the udder is dried up; this snake is also credited with the power of emitting a special whistling sound which has a very fascinating effect on birds. Nay more, every French peasant is persuaded that the young of the Grass-snake are hatched from eggs laid by old cocks, and that the adults suck the udders of cows or the breasts of women. But this snake is not poisonous.

The Cobra or Nag is still worshipped by the majority of Hindus. The lower classes of Hindus, especially, will never kill a Cobra when they see one, as they believe that killing it would bring ill luck on them. They will even offer milk and eggs to propitiate it. On the Nag Panchami day in the Hindu calendar snake-charmers carry Cobras in their baskets and

visit Hindu localities, and Hindu women of all classes invariably offer milk to these snakes. Cobras are said to preside over the generation of male children, and he who kills a cobra will have no male issue for 20 generations. One who dreams he has been bitten by a Cobra is proof against snake-bite and knows moreover thereby that his wife has conceived.

In Indian folklore the Cobra is the subject of many beliefs. One such is that of a stone which provides the snake with a bluish light when it is about to make a meal at night; that jewel is much used by the snake when it grows old and its sight becomes dim. In Europe, where there is no Cobra, the toad has been promoted to the dignity of jewel-bearer.

Which like the toad, ugly and venomous,
Wears yet a precious jewel in his head.

(Shakespeare: "*As you like it*"; II, i, 13).

That some snakes follow a person for a long time if molested and even recognise him by his voice is another tale associated with them. The Cobra is so vindictive that it waits days, even years, to take its revenge on an offender. The whip-snake is also a very vindictive reptile; when it has struck its victim, it ascends a high tree and there it remains till it sees the smoke from the funeral pyre, when it comes down. Some people believe that, if a snake is cut in two and yet escapes, the anterior half remains alive and the snake gradually grows to its former length. Others believe that, with every bite of a human being by a snake, its tail gets shorter, and that, if they come across a snake with a short tail, this is the reason for its shortness.

There are various legends about snakes in India, interwoven with the religion and history of the Hindus. Hence destruction of snakes is looked upon with disfavour by them. Snakes, however, are helpful in keeping down the rodent population. Unless correct scientific knowledge about them

is spread among the people, an atmosphere of mystification and superstition will always prevail amongst the general public on the subject.

India is known as the country, *par excellence*, of snake-charmers. In Bengal there exists a caste called Mal whose occupation is to catch and sell snakes. They do not perform any tricks with the snakes. The so-called snake-charmers come from another caste in Bengal called Sangis or Tubriwallahs. They play a low, plaintive and monotonous tune on a sort of clarinet usually made of gourd. The music is in no way a protection from bite, and they avoid being bitten owing to their perfect knowledge of the habits and movements of the snake. Still accidents do happen, and we occasionally hear of deaths among these men from snake-bite.

CHAPTER XXXV

Geographical Distribution of Snakes in India

It will be useful to summarise the general distribution of the various kinds of snakes in India and the countries round about, as it will give the reader an idea of the geographical distribution of the 320 species that are likely to be found in various parts of India. We owe the names and other information to Col. F. Wall, I. M. S. (ret.), and they are given in the Bombay Natural History Society's Journals.

Of the small worm-like snakes—the Blind Burrowing Snakes (*Typhlops*)—so far the following 18 kinds have been found within Indian limits :—

Wall's Blind Snake, found in Eastern Himalayas, Sikkim and around Darjeeling; Mackinnon's Blind Snake in N. W. Frontier Province, Western Himalayas, Burma and Peninsular India; Stoliczka's Blind Snake in Western and Eastern Himalayas, peninsular India and Ceylon; Beddome's Blind Snake in the Western and Eastern Ghats; the Common Blind Snake, found all over India and also in other parts of Asia, in Africa, South America and the Pacific islands; Limbrick's Blind Snake in Southern India; Jerdon's Blind Snake in Eastern Himalayas, Assam hills and Burma; Thurston's Blind Snake in Western Ghats south of Goa; Diard's Blind Snake in Eastern Himalayas, Assam, Burma and Siam; Grey Blind Snake and Theobald's Blind Snake in Assam; Oates' Blind Snake in Andaman and Cocos Islands; Andaman Blind Snake in Andaman Islands; Jan's Blind Snake and Pied Blind Snake in Ceylon; Peter's Blind Snake in Himalayas; Gunther's Blind Snake in United Provinces and Assam, and Indian Beaked Blind Snake in Peninsular India south of the Ganges basin and south of Rajputana.

Of the second family of Blind Burrowing Snakes (*Glauconia*), there are two kinds—(1) Blandford's Blind Snake, found in the Punjab, Sind, N. W. Frontier Province and Baluchistan, and (2) Jan's Beaked Blind Snake, found in Sind, Baluchistan, Persia and northern Africa.

The third family of snake—the *Boidæ*—is divided into two subfamilies:—Pythons and Boas. Of pythons there are two kinds found within Indian limits. The Indian python is found in Peninsular India, Bengal, Himalayas, Assam, Burma, Siam, Java and Ceylon. The reticulate python is found in Burma, Siam, Malay islands and Nicobar Islands.

Of Boas, two kinds are found in India. These are Russell's Earth-snake or Schneider's Earth Boa, found in Peninsular India, Baluchistan, Ganges valley and Lower Bengal, and John's Earth-snake or Linne's Earth Boa, found in Peninsular India, Baluchistan, Sind and the Punjab.

Of the fourth family of snakes—the *Ilysiidæ* or Earth-snakes, two kinds are found within Indian limits. One is Laurenti's Earth-snake found in Burma, Malay Peninsula and Indo-China, and the other Linne's Earth-snake, found in Ceylon.

Of the fifth family of snakes—the *Uropeltidæ* (also Earth Snakes), there are 44 kinds found within Indian limits. They are all small snakes, 1 to 2 feet long, with a very short tail ending in a peculiar shield, and hence are called Rough-tailed Earth-Snakes. They are mostly confined to hills and are found in Southern India and Ceylon. This family has 8 genera and 44 species. Of these 9 are confined to Ceylon. Of the remaining 35, about 30 are found in the Western Ghats and the rest in the hills of Western and Southern India.

The sixth family of snakes, the *Xenopeltidæ* has only one species, *Xenopeltis unicolor* or the Iridescent Earth-snake. This is found only in Burma.

The seventh family of snakes is the *Amblycephalidae* or Slug Snakes. It has 5 species which are confined to Assam, Burma and the Eastern Himalayas.

The eighth family of snakes is the *Viperidae*, of which there are 19 kinds within Indian limits. These consist of 12 kinds of Pit-vipers and 7 kinds of Pitless Vipers, particulars about which have been given in previous chapters. One of the Pit-vipers, the Green Tie, is confined to Ceylon.

The kinds of Indian snakes in these eight families are 95 in number.

The ninth family, the *Colubridæ*, contains the majority of Indian snakes. It has 225 species or kinds, of which 23 are sea-snakes (which are now subdivided into 29), and 202 are land-snakes. Of the land-snakes, the poisonous ones consist of 2 kinds of Cobras, 7 of coral snakes, and 10 of Kraits. The remaining 183 are non-poisonous. There are 7 subfamilies in the *Colubridæ*, of which the sea-snakes and poisonous land-snakes mentioned above form two, called the *Hydrophiinæ* and the *Elapinæ* respectively. The snakes in these two subfamilies have their front teeth hollowed, and these are the poison-fangs.

The next three subfamilies consist of snakes in which the teeth in the posterior part of the mouth are somewhat grooved, but which have no special poison glands, duct or fangs.

Most of the Tree Snakes belong to a subfamily in the *Colubridæ* called the *Dipsadinæ*, and consist of 7 genera with 29 species. This subfamily includes the Sand-snakes also, which are allied to tree-snakes. Of this subfamily, the Argus Cat-snake is found in Eastern Bengal and Burma; the Tawny Cat-snake in Burma and the Andamans; Barnes' Cat-snake in Ceylon; Wall's Cat-snake in Assam; Gunther's Cat-snake and Beddome's Cat-snake in Ceylon and the Western Ghats from Matheran to Travancore, the latter being also recorded from Ganjam district in the Madras Presidency. The Common Cat-snake or Gamma Snake

(described in Chapter XXIII) is found from Peninsular India to the Himalayas and in Punjab, Sind, Baluchistan, N. W. Frontier Province, the Western and Eastern Himalayas, Bengal and Ceylon; Gray's Cat-snake in Bengal, Assam and Burma; the Himalayan Cat-snake in the Himalayas; Stoliczka's Cat-snake and the Collared Cat-snake in the Eastern Himalayas and Assam, the latter being also found in the Western Ghats south of the Goa gap; Dighton's Cat-snake in the Western Ghats; the Andaman Cat-snake in the Andaman Islands; the Green Cat-snake and Boie's Cat-snake in Assam, Burma and the Eastern Himalayas. Forsten's Cat-snake, which is a big reptile growing to over 4 feet, is found in Peninsular India, the Western Ghats, Ganges valley, Orissa, Bengal, the Western and Eastern Himalayas and Ceylon. I have found it to be common at Matheran in the Western Ghats.

Of the Sand-snakes, 4 have been mentioned in Chapter XXIV. Another one, Brandl's Sand-snake, is found in Baluchistan, Afghanistan, Persia and Turkestan. The Mock Viper, which is also a member of this subfamily and has been described in Chapter X, is found in the Eastern Himalayas, Assam and Burma.

Of the genus of Whip-snakes in this subfamily, 2 have been described in Chapter XXIII, viz., the Common and the Brown-Speckled, Whip-snakes. Of the 4 others, Perrotet's and Beddome's Whip-snakes are found in the Western Ghats, the former in North Kanara and the Nilgiris and the latter from the Nilgiris to Travancore; Gunther's Whip-snake in Eastern Bengal, Assam and Burma, and Boie's Whip-snake in the Eastern Himalayas, Assam and Burma.

The Gold and Black Tree-snake or Ornate Snake also has been described before (Chapter XXIII).

The Fresh-water Snakes belong to another subfamily in the *Colubridæ* called the *Homalopsinæ*. This subfamily consists of 8 genera containing 11 species. Of these, the

Dog-faced Water-snake, Gerard's, Schneider's and Siebold's Water-snakes, have been described in Chapter XXI. Of the rest, Boie's, Linne's and Blandford's Water-snakes are found in Burma; Fordon's Water-snake in Bengal and the rivers and coasts of the Sunderbans; Cantor's Water-snake in the rivers of Burma and in the Andamans; Gray's Water-snake in the coastal and tidal rivers of Burma, and Blandford's Cat-snake (which is allied to these water-snakes) in Sind, Baluchistan and Persia.

The fifth subfamily in the *Colubridæ*, the *Elachistodontinæ*, contains, so far as known at present, only one snake called Westermann's Snake, which has been recorded from Purnea, Jalpaiguri and a few other parts of Bengal.

The sixth and seventh subfamilies in the *Colubridæ* consist of snakes whose teeth are not grooved at all. One subfamily, the *Acrochordinæ*, contains 2 genera with only one species in each. The Rasp-skinned Water-snake (described in Chapter XXI) is one of these, and the other is Stoliczka's Snake, found in Assam. The seventh subfamily, the *Colubrinæ*, consists of 33 genera containing 140 kinds of snakes altogether. These are mentioned below.

There are four kinds of *Polyodonts* (many-toothed snakes) found in India. One of these, Jerdon's Polyodont, mentioned in Chapter XXVIII, is found in peninsular India; Cantor's Polyodont in the Western Himalayas, the Ganges basin, Bihar, Central India, C. P. and Lower Burma; Gunther's Polyodont in Burma and the Nicobar Islands, and Gray's Polyodont in the Western and Eastern Himalayas, Bengal and Burma.

There are 24 kinds of Keel-backs, of which 4 have been described in Chapter XXVI, viz., the Chequered, the Green, the Buff-Striped and the Olivaceous Keel-backs. Of the rest, the Painted Keel-back is found in Assam and the Ganges valley; the Assam Keel-back, Peal's, Wall's and Gunther's Keel-backs in Assam; Anderson's Keel-back in the Eastern

Himalayas and Burma; Boie's Keel-back in Burma, Siam and the Malay Peninsula; Venning's, Leonard's, Schlegel's and the Black-Banded Keel-backs in Burma; Schlater's Keel-back in the Nicobar Islands; the Burmese Keel-back in Lower Burma; Blyth's Keel-back in Assam and the Western and Eastern Himalayas; the Orange Collared Keel-back in Assam and the Eastern Himalayas; the Ceylon Keel-back in Ceylon; Beddome's Keel-back in the Western Ghats; the Vermilion-necked Keel-back in the Eastern Himalayas and Burma; Firth's Keel-back in the Eastern Himalayas, and Jerdon's Keel-back in the Western Ghats.

There are two snakes allied to these Keel-backs, one called Phayre's Snake found in Burma, and the other called the Moek Cobra (*Pseudoxenodon angusticeps*), which grows to 4 ft. or more and is found in the Eastern Himalayas, Assam and Burma.

There are 10 kinds of snakes in 2 genera which are called Rough-sides. These are small snakes, ordinarily a little over 1 foot in length. The Black-bellied Rough-side is found in the Himalayas and Assam; the Rose-bellied Rough-side in Sikkim; the Yellow-bellied Rough-side in the Eastern Himalayas and Bengal; Cantor's Rough-side in Assam and Bengal, and Wall's Rough-side in the Western Himalayas. The other 5 are confined to Ceylon.

There are two Smooth Snakes of the genus *Rhabdops*, one being Beddome's Smooth Snake found in the Western Ghats, and the other Blyth's Smooth Snake found in Assam.

Blakeway's Snake (genus *Plagiopholis*) is found in Burma; Gunther's and Perrotet's Dwarf Snakes (genus *Xylophis*) in the southern parts of the Western Ghats; the Black-spined Snake (genus *Haplocercus*) in Ceylon; Blyth's Snake (genus *Blythia*) in Assam and Burma, and the Arrow-head Snake (*Trirhinopholis*) in Burma.

Of the genus *Lycodon*, to which belong Wolf-snakes, 9 kinds have been described in Chapter XXV. There are 3

other Wolf-snakes belonging to different genera. Two of these belong to the genus *Dinodon*, viz., Gammie's Wolf-snake found in the Eastern Himalayas and Darjeeling, and Jerdon's Wolf-snake found in the Eastern Himalayas, Assam and Burma. The third, the Ceylon Wolf-snake (genus *Ceraspis*), is confined to Ceylon.

Of an allied genus, the *Dryocalamus*, one kind called the Bridal Snake (*Dryocalamus nympha*) has already been described in Chapter XXVIII. There are two other bridal snakes in this genus, viz., Davidson's Bridal Snake found in Burma, and the Scarce Bridal Snake found in peninsular India, Orissa, Ceylon and the hills of Southern India.

There are 13 Rat-snakes, of which 10 belong to the genus *Zamenis*. These have been described in Chapter XXII. There are 3 others of allied genera, viz., Blyth's Rat-snake found in the Eastern Himalayas and Assam, and Selater's and Cantor's Rat-snakes found in Burma.

There are 3 desert-snakes of the genus *Lytrohincus*, viz., Ridgeway's Desert-snake found in Afghanistan and Baluchistan, Gunther's Desert-snake found in Sind and the Punjab, and Maynard's Desert-snake found on the Perso-Baluch frontier.

The genus *Coluber*, of which 2 species (the Trinket Snake and the Copper-headed Rat-snake) have been described in Chapter XXVIII, contains 12 species altogether. The other 10 occur mostly in Assam, the Eastern Himalayas and Burma. Gray's *Coluber* is found in Assam; Blyth's and Cope's *Colubers* in Assam, the Eastern Himalayas and Burma; the Broad-headed *Coluber* in Assam, the Eastern Himalayas, Burma and the Andamans; Schlegel's *Coluber* in Burma and the Andamans; Leonard's *Coluber* in Assam and Burma; Cantor's *Coluber* in Assam and the Eastern Himalayas; Anandale's *Coluber* in the Abor hills; Hodgson's *Coluber* in Assam and the Himalayas, and Boie's *Coluber* in the Eastern Himalayas, Darjeeling, Burma and the Andamans.

The Bronze-backs are tree-snakes, but belong to the subfamily *Colubrinae*, as their teeth are solid and not grooved. They belong to two genera, and two of them, Seba's and the Eastern Bronze-backs, have been described in Chapter XXIII. There are 9 others. Of these, Gunther's Bronze-back is found in Southern India and Ceylon; Warner's Bronze-back in Ceylon; Gore's Bronze-back in the Eastern Himalayas, Assam and Burma; Beddome's Bronze-back in the hills of Southern India; Wall's Bronze-back in Bengal, Assam, North-eastern India and Burma; Boulenger's Bronze-back in the Western Ghats and Ceylon; the Biloreate Bronze-back in Assam; Fea's Bronze-back in Burma, and Gray's Bronze-back in Southern India.

Leith's Smooth Snake (*Coronella brachyura*) is a single species of the genus *Coronella*, which was till recently considered to be rare as only three specimens from Poona and Berar had been known. But it is not an uncommon snake, as Dr. Lindberg of the Barsi Light Railway got 10 specimens near Kurduwadi in Sholapur district, and I got one at Visapur in Ahmednagar district, this specimen being now kept in the British Museum.

There are 25 species of Kukri Snakes, of which 3 have been described in Chapter XXVI, and 2 are confined to Ceylon. Of the others, Boulenger's, Hampton's, Macdougall's Fea's, the Ornate and the Crimson-tailed Kukri-snakes are found in Burma; Gray's Kukri-snake in Eastern Bengal, Assam and Burma; Elliot's Kukri-snake in Southern India; Wall's Kukri-snake in the Eastern Himalayas; the Short-tailed Kukri-snake in the Western Ghats; the Violaceous Kukri-snake in the Eastern Himalayas, Eastern Bengal, Assam and Burma; Theobald's Kukri-snake in Assam and Burma; the Red-bellied Kukri-snake in Assam and the Eastern Himalayas; Beddome's, Gunther's and Jerdon's Kukri-snakes in the Western Ghats; the Pigmented Kukri-snake (*Oligodon melanozonatus*) and the Red-spined Kukri-snake in Assam; Woodmason's Kukri-snake in the Andaman and Nicobar

Islands; the Large-spotted Kukri-snake in Assam and the Eastern Himalayas, and Schlegel's Kukri-snake in Bengal the Eastern Himalayas, Assam and Burma.

Of the genus *Contia* there are 3 species: Anderson's *Contia* found in the Western Himalayas, North-West Frontier Province, Baluchistan and Persia; Walter's *Contia* in Sind, and McMahon's *Contia* in Baluchistan.

There is a genus of Smooth Snakes, the *Lipopeltis*, which contains 8 species, nearly all of which are hill snakes. Theobald's Smooth Snake is found in Burma; Stoliczka's in Assam, the Eastern Himalayas and Sikkim; Doria's and Jerdon's Smooth Snakes in Assam and Burma; Gunther's Smooth Snake (referred to as Gunther's Reed Snake in Chapter XXVIII) in the Eastern and Western Himalayas and the hills of Peninsular India; Rapp's Smooth Snake in the Western and Eastern Himalayas; Hampton's Smooth Snake in Burma, and the Nicobar Smooth Snake in the Nicobar Islands.

Dumeril's Snake belongs to the genus *Calamaria* and is found in Assam and Burma.

CHAPTER XXXVI

A World Survey of Dangerous Snakes and their Enemies

The interest of the lay reader in the subject of snakes will, it is hoped, have been sufficiently awakened or stimulated, after a perusal of the foregoing chapters, to warrant a short further digression from the limited geographical scope of this book. He has already seen, from the author's brief references from time to time, that there are arresting varieties of the serpent race in other parts of the world too. It is proposed, in this chapter, to place before the reader something like a list, free from any technical details, of such snakes as occur outside the boundaries of India and are either very dangerous to or are capable of inflicting appreciable harm on man, and also of animals which are known to be deadly enemies of the race.

It has already been seen that there are some kinds of serpents found in India which also occur elsewhere. The common Cobra is likewise found in Ceylon, Burma, Siam, the Malay Peninsula, Indo-China, the Chinese island of Chusan and the Malay Archipelago; the King Cobra in Burma and the Malay Peninsula; the gliding, back-fanged colubrid called the Flying Snake or Ornate Tree-snake, in the Malay jungles; the Echis or Saw-scaled Viper in Ceylon, Turkestan, Mesopotamia and northern Africa; Russell's Viper in Ceylon, Burma, Siam, Sumatra and Java; the Levantine Viper in the Near East, south-eastern Europe and northern Africa, and the *Python molurus* in Burma and Ceylon.

In Burma and the Malay States is found the burrowing White Striped Coral Snake, remarkable for the enormous development of its fangs. It is the largest in the whole genus and grows to 5 feet.

Of the 10 species of Cobras in the world, 8 are found outside India, of which one is peculiar to the Philippines. 7 species occur in Africa, the most widely distributed being the Egyptian Cobra and the Black-necked Cobra. The Cape Cobra is found in the Cape Province of South Africa. A particularly interesting species is the Ringhal or Spitting Snake of South Africa, which occurs nowhere else in the world. It is only 2 to 3 feet long. It differs from all other cobras in being viviparous. It spits venom when excited. By compressing the poison-glands it forces out the venom through the fangs and simultaneously sends out a blast of air. The poison is ejected, mixed with saliva, in the form of a spray to a distance of 6 to 8 feet, and if it strikes the eye of a man or an animal, it causes intense irritation which may result in temporary and in rare cases even permanent blindness. In captivity the reptile evinces great ferocity, so that the attendants wear goggles when approaching its cage.

The most dreaded snake in tropical and South Africa is the Mamba or Tree Cobra. It occurs in two varieties: black and green. The green mamba grows to a length of 9 feet, and the black one to as much as 13 feet. The Black Mamba, which is the more fierce and aggressive of the two, is the largest venomous snake in Africa and the world's largest poisonous serpent next to the King Cobra. The venom of the mamba is of a deadly character. In South Africa there are two dangerous back-fanged colubrids, the Boomslang or Tree Snake and the Schaapsteker. The poison of both is more virulent than that of any other snake in Africa, but their bite does not usually cause appreciable harm to man, as, being back-fanged, these snakes find it difficult to get a good grip of a human limb so as to be able to inject a lethal dose of venom. Of back-fanged serpents, the Berg Boomslang of South Africa is the largest in the world, attaining a length of 9 feet. Both the mamba and the boomslang can vertically expand their neck by inflating the windpipe. The boomslang can also puff up its body by inhalation of air.

Australia has about 105 species of poisonous snakes, all colubrids. In all there are 5 genera of a deadly type, all of which are fore-fanged. Arranged in the order of deadliness, they are: the Taipan or Giant Brown Snake, the Death Adder (maximum length 3 ft.), the Tiger Snake (length $5\frac{1}{2}$ ft.), the Black Snake (6 or 7 ft.), and the Copperhead or Superb Snake (5 ft.). The Taipan is the largest of poisonous snakes in Australia and grows to a length of 10 ft. or more. It is savage and aggressive. The fangs in a large specimen are about half an inch long, and at a single bite it can inject a maximum dose of 35 drops of venom, sufficient to kill 20 persons or more. There are also many species of back-fanged colubrids in Australia.

Of the 55 species of Seasnakes, 25 are found outside the Indian waters, one being confined to a *fresh-water lake* in Luzon in the Philippines.

Three important Pitless Vipers occurring in Asia outside India are: Smith's Horned Viper, about 3 ft. long, found in Waziristan; the Perso-Baluch Horned Viper of Persia and Baluchistan, which is a little over 2 ft. in length, and the Coloured Echis of Arabia and Palestine. The first of these has a long pointed spine standing up over each eye, and the second a single projection above the eyes. The 'horns' are only elongated, horny scales of the head.

There are several kinds of Pitless Vipers in Africa and 7 in Europe, but there are none in America and no vipers of any kind in Australia. The European representatives include the Common Viper or Adder, and the Asp, a snake closely allied to the former, but with the snout somewhat turned up. The Adder is the only poisonous snake found in Great Britain. It ranges 'from Wales to the Saghalién Island and from Caithness to north of Spain', and has been met with at an elevation of 9,000 ft. It occurs also in the northern parts of Scandinavia and is the only venomous snake found beyond the Arctic Circle. It is viviparous. It is seldom more than

3 ft. in length. Its bite is rarely fatal to man. The Asp is found all over southern Europe, and in large numbers in the Alpine regions.

The Asp is also met with in Libya and in the vicinity of the Nile in Egypt. In Egypt there is a small kind of horned viper, about 2 ft. long, called the Horned Adder or Horned Asp. The Coloured Echis is also found in this country. The *Atheris*, a tree-snake closely allied to the Echis or Saw-scaled Viper, is found farther south in Africa where vegetation is luxuriant. South Africa has very dangerous representatives of the viperine subfamily. One of these is the Puff Adder, which is also found in Central and East Africa. It reaches a length of 5 ft. and is as thick as a man's arm. It is one of the deadliest of vipers. When disturbed or provoked, it inflates the upper part of its body and hisses fiercely. Of all snakes in Africa, its hiss is the loudest and most fearful. When in pursuit of prey, it makes considerable springs. There is another viper in South Africa whose poison is quite as powerful as the Puff Adder's. It is the Berg Adder, which inhabits the mountainous regions. It is found as high up as 11,000 feet above the sea, and this probably forms the world's elevation record for the habitat of a poisonous snake. Two large, venomous, desert species of the horned viper, commonly known as Horned Puff-adders, occur in South Africa, viz., *Bitis nasicornis*, which has a beautiful coloration, and *Bitis rhinoceros*. The former is heavily built and attains a length of 6 feet or more. It is the largest Pitless Viper in the world. It has two spines on the snout, one in front of either nostril, projecting obliquely forward. In *Bitis rhinoceros*, both the 'horns' shoot upward from between the nostrils. Three other important kinds of vipers in this Continent may be mentioned: the Night Adder (or Demon Adder) and the *Atractaspis*, a small burrowing genus, both found in tropical and South Africa, and the Gaboon Viper which inhabits the forest tracts of Africa.

Of the 65 kinds of Pit Vipers in the world, 43 are found in America, and 9 in countries of Asia outside India which include one in the Caspian region called *Ancistrodon halys*, two in Japan named Mamushi and Labu, and an arboreal species of south-eastern Asia belonging to the genus *Trimeresurus*.

The vast majority of poisonous snakes in America are Pit Vipers. The best-known is the Rattlesnake, of which there are 13 known species. There are two genera: (1) *Sistrurus*, with 2 species, confined to the southern United States and northern Mexico, both being small, not exceeding 2½ ft. in length. (2) *Crotalus*. The tail terminates in a series of articulated, horny, cup-shaped shells, numbering 21 or more in a full-grown specimen, and when disturbed or irritated, the snake vibrates these with such rapidity as to produce a rattling sound, which may be heard 60 feet away. All rattlesnakes inflate their body and rattle the tail when provoked or brought to bay, so as to strike terror into the hearts of their aggressors. But in rainy weather the interspaces of the rattles are often filled with water, and when this is the case, the tail does not rattle. The most dreaded species in the rattler group is the surly, quick-tempered, Diamond-backed Rattlesnake of Texas and the swamps of Florida. It is so named from the markings on the back resembling the facets of a diamond. The Banded Timber Rattlesnake, with black longitudinal bands on its head and neck, occurs in the eastern United States. These two are the largest members of the group and attain a length of 8 feet. The Prairie Rattler is a species found all over the great prairie lands from Canada to Texas. *Crotalus terrificus* ranges from Mexico to Argentina. It is the only member of the true rattler group found in South America. The Striped Rattler is another dangerous species. It has black stripes across the back. There is also a small species called the Sidewinder, which lives in the deserts of south-western United States. It has a pair of blunt hornlike

projections above the eyes and appears to be the American replica of the Horned Viper of the Old World. Although all rattlesnakes are poisonous, the Hopi Indians of Arizona have for ages been trained to handle them skilfully and fearlessly without harm. In the United States is another aggressive snake called the Copperhead, Copper-belly or Red Viper. It is allied to the rattler, but has no rattles.

Central America, the West Indies and tropical South America are other regions of the New World where venomous snakes abound. The most dreaded among these is the Jararaca, a fierce and aggressive serpent, about 6 feet long. It is the deadliest snake in Brazil and accounts for over 50 per cent of the deaths from snake-bite in that country. The second most deadly snake in Brazil is *Crotalus terrificus*, which is followed by the aggressive Water Moccasin (or Water Viper) and the Fer-de-lance respectively. The Water Moccasin has a white rim round the neck and is also called the Cotton Mouth. It is found also in the southern United States. It is the terror of the river fishermen in Brazil. The Fer-de-lance is a yellow, lance-headed snake, 5 to 7 feet long. Like the Puff Adder of Africa, it executes considerable springs when in pursuit of prey. It infests the sugar plantations in Brazil. Its tail ends in a horny spine, which scrapes harshly against rough objects. The venom of this snake is greenish in colour and causes blood to flow from the victim's eyelids. The giant Bushmaster is still another terrible snake of Brazil. It has enormous fangs and is highly venomous. Its tail terminates in a horny spine, which makes a rustling noise as the snake moves. The Bushmaster usually attains a length of 8 feet, but occasionally grows up to 12 feet. It is thus the largest member of the Viper family in the world and the largest of venomous serpents in America. As in the sugar plantations, danger lurks also in the coffee plantations of Brazil, which are infested by another species of snake called *Bothrops alternata*.

The principal species of pythons occurring outside India are the Reticulated Python of the Malay Peninsula and Indo-China, which grows to a length of 30 feet; the Rock Python of tropical and South Africa; the West African Python, and the Australian Scrub Python of North Queensland. The last-named reaches a length of 20 feet or more and is the largest snake in Australia. The python does not occur in Europe, but America possesses two forms allied to it in the Boa Constrictor and the Anaconda.

The Boa Constrictor ranges from tropical Mexico to Brazil. It is often found in plantations where it goes in search of rats. In the Amazon region it reaches a length of 20 feet. In Brazil, the three Guianas and north-eastern Peru there is a formidable and cunning species of boa called the Anaconda or Sucuraju. It is both aquatic and arboreal in its habits. It is the largest snake in the New World, and in the Amazon basin grows to a length of 30 ft. All boas, unlike pythons, are viviparous, the young being about 3 feet long at birth. Like the python, the boa is a non-poisonous snake, having no poison apparatus, but it has long, powerful teeth and can inflict a tenacious bite. A snake-charmer at the annual fair of 1935 at Maubeuge in northern France had a terrifying experience. He was placing a 14-foot boa back into its cage, when it suddenly threw its coils round him and buried its teeth into his face. Hearing his cries, his brother and sister rushed to his rescue. He was released from the serpent's coils, but its teeth were embedded in his cheeks so deep that they had to be broken off and the pieces that remained behind had to be removed by a surgeon.

The weight of a python is remarkable. A 19-foot specimen killed in Cooch Behar many years ago is said to have weighed 200 pounds. Mr. John Hagenback of circus fame had a 28-foot reticulated python, which weighed 250 pounds.

In the economy of Nature a wise provision has been made to prevent a too rapid and excessive multiplication of

the serpent population. The chief enemies of the Indian Cobra are the mongoose, the adjutant-bird, the fowl, the boar and the deer. The last two kill it by crushing its head under their feet. The adjutant-bird is a large, voracious species of stork, with an enormous, powerful, dagger-like bill. Many young cobras are destroyed by fowls after being hatched. When a mongoose sees a snake, it becomes excited and erects its long, stiff hair, and the reptile would find it difficult to drive its fangs through this covering and the thick skin possessed by the animal, especially owing to the latter's quick sight and agility of movement. The snake rears its crest and lashes out fiercely at its foe, directing its aim more particularly at the snout, which is a vulnerable part of the animal, and if it succeeds in inflicting a bite here, the mungoose succumbs to the poison as quickly as any other animal when bitten.

A large number of species of the genus to which the mungoose belongs occur in southern Asia including the Philippines and all over Africa. In northern Africa the principal enemy of the cobra is the ichneumon, known as the Egyptian mungoose. It not only destroys the snake's eggs, but also its young as well as adults. Like the mungoose, it is easily domesticated. The Egyptian ibis, a large wading bird allied to the stork, is noted as a voracious snake-eater, though it preys on small reptiles.

The deadliest enemy of all snakes in southern Africa is the secretary-bird, a bird of prey with remarkably long legs and a hooked beak. It stands nearly 4 feet high. It is fearless and hunts the reptiles on foot. It strikes at the most venomous serpent again and again with its sharp talons. Its long legs and the extreme celerity with which it leaps aside after each stroke enable it to keep out of reach of the snake's fangs. Other powerful enemies of snakes in South Africa are the honey ratel or honey-badger (a mammal allied to the bear), the hairy stink cat or meercat, and a bird of prey called the jackal buzzard. The paws of the honey ratel are armed with

long, curved claws, and it has a tough, thick skin which is impervious to the fangs of a serpent. It kills and devours even the most poisonous snakes including the cobra and the puff-adder. In attacking a snake, it rushes with the head lowered and receives the reptile's stroke on the back where the hair is longest and the skin toughest. A species of ratel is also found throughout India, chiefly in the hilly regions.

In Great Britain one of the enemies of the adder is the hedgehog, remarkable for its armature of spines which are sharp, hard and elastic. In attacking the snake, it rolls itself up, then uncurls and bites the reptile, curling up again and repeating the whole procedure till the snake's back is broken. It next passes the whole body of the victim successively through its jaws, cracking and breaking the reptile's bones and finally eats it.

The bitterest foes of the rattlesnake of America are the road-runner or chaparral cock, the domestic hog, and the South American peccary, an animal allied to the hog. The road-runner is a species of ground cuckoo. It never hesitates to attack a snake when it sees one. It runs swiftly on the ground with the head lowered, and strikes at the reptile's head with its sharp beak, and then jumps aside, quick as lightning, to avoid its fangs. The bird is almost invariably the victor. After killing the snake, it makes a meal of it. The hog and the peccary also kill and eat the rattler. They are not afraid of attacking the snake, as their skins are thick and their venous system is protected by deep layers of fat, which makes it impossible for the venom to enter a vein in the event of a bite. The American snakes have still another formidable enemy in the cangamba or white heron, the American replica of the adjutant-bird of India.

Seasnakes are attacked and eaten by rapacious fishes, and while basking in the sun on rocks or on the shore, often fall victims to birds of prey. Their principal enemy among fishes is the shark, and among birds the erne or sea-eagle.

The boa constrictor of America has an enemy in the rapacious harpy eagle, the largest predatory bird in America. It has an enormous bill and powerful talons, and preys upon young boas among other animals.

There are several other birds of prey in various parts of the world, which destroy large numbers of snakes every year.

A remarkable instance of a swarm of red ants in a South African jungle attacking a full-grown puff-adder, stinging it to death and making a clean meal of its flesh, all in the space of about an hour, is narrated by Mr. Fitzsimons in his work, *The Snakes of South Africa*. Many snakes attack and devour snakes of other kinds, and some of them like the cobra, the king cobra and Russell's viper are cannibals and devour smaller members of their own group, genus or species. Sometimes non-poisonous snakes attack and devour poisonous members of the race. At the Butantan Institute at San Paulo in Brazil, a species of non-poisonous snake is specially bred, as it chiefly feeds on the deadly jararaca. Colonel Wall, in his book, *The Snakes of Ceylon*, refers to a fight witnessed by some coolies in a jungle in Burma, between an 8-foot python and a king cobra over 10 feet long. The python, though the smaller of the two, had closed its jaws on the hamadryad and secured it fast, when the coolies came and killed the combatants. If the battle had been allowed to continue, the hamadryad might not have escaped alive.

R. K. GOLIKERE

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INDEX

(Figures refer to Pages).

A

- Ablabes calamaria, 112, 149 (see Smooth Snake, Gunther's)
 Acrochordinae, 145
 Adder, 152
 Ajar 74-75, 142 (see Python molurus)
 Ally pam or Mutta Pam 82, 145 (see Water snake, Schneider's)
 Amblycephalidae 79, 143 (see Slug Snakes)
 Anaconda, 73 76, 77, 156
 Anal or Anal Shield (of a snake), 20
 Anamalai Viper, 42
 Ancistrodon halys, 154
 " himalayanus, 42 (see Brown or Common Himalayan Viper)
 " hypnale, 43 (see Hump-nosed Viper)
 " millardi, 43 (see Millard's Viper)
 Antivenena, 15-6, 52-3, 60, 64, 124-6, 129
 Arrow-head Snake, 146
 Asp, 152-3
 Aspidelaps, 57
 Atheris, 153
 Atractaspis, 153
 Auditory Medium in Snakes, 7
 Azemiops feae, 38 (see Fea's Viper)

B

- Bamboo Snake, 41 (see Green Pit-Viper)
 Berg Adder, 30, 39, 153
 Berg Boomslang, 151
 Bitis atropos, 30, 39, 153 (see Berg Adder)
 " arietans, 5, 30, 38-9, 153 (see Puff-Adder)
 " caudalis, 39, 153 (see Horned Puff Adder)
 " cornuta, 30, 39, 153 (see Horned Adder)
 " nasicornis, 153
 " rhinoceros, 153
 Black Snake, 152
 Black-spined Snake, 146
 Blakeway's Snake, 146

- Blind Snakes, 6, 65-6, 141-2
 Blind Snake, Andaman, 141
 " " Beddome's, 141
 " " Blandford's, 142
 " " Common, 141
 " " Dixon's, 141
 " " Gray, 141
 Blind Snake, Gunther's, 141
 " " Indian Beaked, 141
 " " Jan's, 141
 " " Jan's Beaked, 142
 " " Jerdon's, 141
 " " Limerick's, 141
 " " Mackinnon's, 141
 " " Oates', 141
 " " Peter's, 141
 " " Pied, 141
 " " Stoliezka's, 141
 " " Theobald's, 141
 " " Thurston's, 141
 " " Wall's, 141
 Blind Worm, 8 (see Slow-worm)
 Blunt-headed or Broad-headed Snakes, 79, 143 (see Slug Snakes)
 Blyth's Snake, 146
 Boas, 73, 76-7, 142
 Boa Constrictor, 76, 156
 Boidae, 73-7, 142 (see Constrictors)
 Boinae, 76-7 (see Boas)
 Boomslang, 151
 Bothrops alternata, 155
 Bridal Snake, 112-3, 147
 " " Davidson's, 147
 " " Scarce, 147
 Bronze-backs, 90
 Bronze-back, Beddome s. 148
 " Biloreate, 148
 " Boulenger's, 148
 " Eastern or Himalo-Malayan, 95, 148
 " Fea's, 148
 " Gore's, 148
 " Gray's, 148
 " Gunther's, 148
 " Seba's, 94, 148
 " Wall's, 148
 " Warner's, 148
 Brown or Common Himalayan Viper, 42-3
 Bungarus caeruleus, 28, 59-61 (see common Krait)

Bungarus fasciatus, 28, 61-2 (see Krait, Banded)
 Burrowing Snakes, 25-6, 67-8
 Bushmaster, 155

C

Calamaria, 149
 • *Calliophis bibroni*, 55 (see Coral Snake, Bibron's)
Calliophis maclellandi, 55-6 (see Coral Snake, Maclelland's)
Calliophis maculiceps, 56 (see Coral Snake, Small-spotted)
Calliophis trimaculatus, 56 (see Coral Snake, Slender)
 Cantor's Viper, 42
 Cape Cobra, 151
 Carpet Snake, 74
 Cat Snake, 90, 93 (see Tree-snake, Broad-headed)
 Cat-snakes, 90, 93, 143-4
 Cat-snake, Andaman, 144
 " Argus, 143
 " Barnes', 1-3
 " Beddome's, 143
 " Blandford's, 145
 " Boie's, 144
 " Collared, 144
 " Common Indian 26, 93-4, 143-4 (see Tree-snake, Common Brown)
 " Dighton's, 144
 " Forsten's, 144
 " Gray's, 144
 " Green, 144
 " Gunther's, 143
 " Himalayan, 144
 " Stoliczka's, 144
 " Tawny, 143
 " Wall's, 143
Causus defilippi, 38 (see Night Adder, Snouted)
 " rhombeatus, 30, 38, 153 (see Night Adder)
 Ceraspis, 147
 Cerberus rhyncops, 80-1, 145 (see Water-snake, Dog-faced)
 Chain Viper, 31 (see Russell's Viper)
 Chakshushrawa, 51
Chersydrus granulatus, 80, 145 (see Water-snake, Rasp-skinned)
Chrysopelea ornata 90, 96 (see Tree-snake, Ornate)
 Cobra, Black-necked, 151
 " Egyptian, 151
 " Indian, 1, 14-6, 27-8, 45-53, 150
 Cobra, Spitting, 115, 151
 Coluber, Anandale's, 147

Coluber, Blyth's, 147
 " Boie's, 147
 " Broad-headed, 147
 " Cantor's, 147
 " Cope's, 147
 " Gray's, 147
 " helena, 110-1 (see Trinket Snake)
 " Hodgson's, 147
 Coluber, Leonard's, 147
 " radiatus, 111-2 (see Rat-snake, Copper-headed)
 " Schlegel's, 147
 Colubridae, 24-5, 131, 143-5
 Colubrinae, 145
 Common Viper, 39, 114, 152
 Constrictors, 73-7, 142
 Contia, Anderson's, 149
 " McMahon's, 149
 " Walter's, 149
 Copper-belly, 152, 155 (see Copperhead)
 Copperhead, 115, 152, 155
 Coral Snake, 55-7, 115
 Coral Snake, Belted, 55
 " " Bibron's, 55
 " " Gunther's 56
 " " Maclelland's, 55-6
 " " Slender, 56
 " " Small-spotted, 56
 " " White Striped, 55, 150
Coronella austriaca, 115 (see Smooth Snake)
 " brachyura, 148 (see Smooth Snake, Leith's)
 Costals (Scales), 18
 Cotton MOUTH, 155 (see Water Moccasin)
 Crotalinae, 79, 40-4 (see Pit Vipers)
 Crotalus, 154
Crotalus terrificus, 154-5
 Cuneate Shield, 46

D

Daboia, 31 (see Russell's Viper)
Dasyplepis scabra, 115 (see Egg-eating Snake)
 Death Adder, 152
 Demon Adder, 30, 38, 153 (see Night Adder)
Dendralaphis tristis, 94-5 (see Tree-snake, Indian Bronze-backed)
Dendrophis pictus, 95, 148 (see Bronze-back, Eas'ern)
 Desert Snakes, 147
 Desert Snake, Gunther's, 147
 " " Maynard's, 147
 " " Ridgeway's, 147
 Dhamans, 27, 84 (see Rat Snakes)

- Dhaman, Banded, 86-7 (see Rat Snake, Shaw's)
 Dhaman, Graceful, 88
 Dinodon, 147
 Dipsadinna, 143
 Dipsadomorphous trigonatus, 93-4 (see Tree-snake, Common Brown)
 Disabling a Snake, Best method of, 6
 Distribution of Indian Snakes, 141-9
 Doliophis bivirgatus, 55 (see Coral Snake, White Striped)
 Doliophis intestinalis, 55 (see Coral Snake, Belted)
 Do-moo-samp, 26, 71 (see Double-headed Snake)
 Dorsals, 18 (see Costals)
 Double-headed Snake, 26, 137
 Dryocalamus nympha, 112, 145 (see Bridle Snake)
 Dryophis inveterizans, 91 (see Whip-snake, Common Green)
 Dryophis pulverulentus, 93 (see Whip-snake, Brown-Speckled)
 Dumeril's Snake, 149
 Du-toudya, 137 (see Double-headed Snake)
 Dwarf Snake, Gunther's, 145
 " " Perrotet's, 145
- E**
- Earth Boa, Black, 71 (see Earth-snake, John's)
 " " Linna's, 142
 " " Red, 69 (see Earth-snake, Russell's)
 " " Schneider's, 142
 Earth Snakes, 6, 69-72, 76, 78, 142
 Earth-snake, Iridescent, 78, 142
 " " John's, 69, 71-2, 77, 142
 " " Laurenti's, 142
 " " Linna's, 142
 " " Rough-tailed, 68, 142
 " " Russell's (or Common), 33, 69, 142
- Earth-worms, 9
 Echis, 17, 34 (see Saw-scaled Viper)
 Echis colorata, 36, 153
 Egg-eating Snake, 115
 Elachistodontirae, 145
 Elaphechis, 57
 Elapinae, 143
 Enemies of Snakes, 128-9, 157-9
 Eristocophis memahoni, 36-7 (see McMahon's Viper)
 Eryx, 69 (see Earth-snakes)
 Eryx conicus, 69 (see Earth-snake, Russell's)
 Eryx johnii, 71 (see Earth-snake, John's)

F

- Fangs of a Poisonous Snake, 11-13
 Foa's Viper, 38
 Fossil Snake, 155
 Flying Snake, 150 (see Tree-snake, Ornate)
 Food of Snakes, 4, 27, 35, 41, 51, 54, 60, 73, 75-6, 80-81, 83, 89, 92, 94-6, 98-99, 104, 106-110
 Fresh-water Snakes, 26, 104, 144-5
 Frontal Shield, 21

G

- Gaboon Viper, 153
 Gamma Snake, 93-91 (see Tree-snake, Common Brown)
 Garter Snakes, 57, 115
 Gerardia prevostiana, 82 (see Water-snake, Gerard's)
 Giant Brown Snake, 152 (see Taipan)
 Glauconia, 142
 Glaconiidae, 66
 Goobra, 95 (see Tree-Snake, Indian Bronze-backed)
 Goom Phitti, 111 (see Rat-Snake, Copper-headed)
 Gordus Worm, 9 (see Hair-worm)
 Gray's Viper, 42
 Green Cobra, 105 (see Keel-back, Green)
 Green Pit-Viper, Common, 41
 Green Tic, 143
 Ground Snakes, 26-7
 Ground-snakes Filleted, 108 (see Kukri Snakes)

H

- Habitats of Snakes, 6
 Habits and Characteristics of Snakes, 4-7
 Haffkine Institute, Bombay, 125
 Hair-worm, 9-10
 Hamadryad, 53 (see King Cobra)
 Haploercus, 146
 Helicops schistosus, 107 (see Keel-back, Olivaceous)
 Hemibungarus nigrescens, 56 (see Coral Snake, Gunther's)
 Hiss of a Snake, 5, 32, 153
 Homalopsinae, 144
 Homorelapa, 57
 Horned Adder, 30, 39, 153
 " Asp, 39, 153
 " Puff Adder, 39, 153
 Horned Viper, Perso-Baluch, 37
 Horseshoe Viper, 42
 Hump-nosed Viper, 43

- Hydrophiinae, 63 (see Sea-snakes)
 Hypsyrhina enhydridis, 82 (see Water-
 snake, Schneider's)
 Hypsyrhina sieboldi, 82 (see Water-
 snake, Siebold's)

I

- Identification of Snakes, 18, 130-6
 Ilysiidae, 67, 142
 Infralabial Shields, 22
 Internasal Shields, 22

J

- Jararaca, 155
 Jerdon's Viper, 42

K

- Kakria, Kander or Kandor, 70 (see
 Earth-snake, Russell's)
 Kawdya or Kawriwala, 100 (see Wolf-
 Snake, Common)
 Keel-backs, 103-7, 145-6
 Keel-back, Anderson's, 145-6
 " Assam, 145
 " Beddome's, 146
 " Black-Banded, 146
 " Blyth's, 146
 " Bois's, 146
 " Buff-Striped, 106
 " Chequered, 83, 104
 " Firth's, 146
 " Green, 105-6
 " Gunther's, 145
 " Jerdon's, 146
 " Leonard's, 146
 " Olivaceous, 83, 107
 " Orange-collared, 146
 " Painted, 146
 " Peal's, 146
 " Schlegel's, 146
 " Selater's, 146
 " Venning's, 146
 " Vermilion-necked, 146
 " Wall's, 146
 King Cobra, 14, 28, 53-4, 150
 rait, 1, 17, 27-8, 58-62
 rait, Banded, 59, 61-2
 " Common, 28, 59-61
 " Greater Black, 62
 " Lesser Black, 62
 " Many-banded, 62
 " Wall'sy, 62
 K., Yellow-headed, 62
 Kukri Snakes, 108-9, 148-49
 Kukri Snake, Beddome's, 148
 K., " Boulenger's, 148
 " " Common, 108

- Kukri Snake, Crimson-tailed, 148
 " " Elliot's, 148
 " " Fea's, 148
 " " Gray's, 148
 " " Gunther's, 148
 " " Hampton's, 148
 " " Jerdon's, 148
 " " Large-Spotted, 149
 " " Light-Barred, 109
 " " Macdougall's, 148
 " " Ornate, 148
 " " Pigmented, 148
 " " Red-bellied, 148
 " " Red-spined, 148
 " " Schlegel's, 149
 " " Short-tailed, 148
 " " Theobald's, 148
 " " Variegated, 109
 " " Violaceus, 148
 " " Wall's, 148
 " " Woodmason's, 148

L

- Labu, 154
 Lachesis gramineus, 41 (see Green Pit
 Viper, Common)
 " macrolepis, 43 (see Viper,
 " Large-scaled)
 " monticola, 41 (see Viper,
 " Large-spotted)
 Levantine Viper, 37
 Lipopeltis, 149
 Lore or Loreum, 23, 29
 Loreal Shields, 23
 Lycodon, 98 (see Wolf-snakes)
 Lycodon anamallensis, 102 (see Wolf-
 snake, Gunther's)
 " aulicus, 98 (see Wolf-snake,
 " Common)
 " atropurpureus, 102 (see Wolf-
 snake, Cantor's)
 " flavomaculatus, 101 (see Wolf-
 Snake, Yellow-spotted)
 " fasciatus, 102 (see Wolf-
 snake, Anderson's)
 " jara, 102 (see Wolf-snake,
 " Twin-spotted)
 " mackinnoni, 102 (see Wolf-
 snake, Mackinnon's)
 " striatus, 101 (see Wolf snake,
 " Shaw's)
 Lycodon travancoricus, 102 (see
 Wolf-snake, Beddome's)
 Lytorhynchus, 147

M

- Macropisthodon plumbicolor, 105 (see
 Keel-back, Green)

Mamba, 151
 Mamushi, 154
 Many-toothed Spot-bellied Snake, 113
 (see Polyodont, Jerdon's)
 McMahon's Viper, 36-7
 Mental Groove, 23
 Mental Shield, 22
 Millard's Viper, 43
 Mock Cobra, 146
 Mock Viper, 43-44, 144
 Mud Snake, 82

N

Naja bungarus, 53 (see King Cobra)
 Naja tripudians, 45 (see Cobra,
 Indian)
 Naja, 115
 Nasal Shields, 22
 Night Adder, 30, 38, 153
 Night Adder, Snouted, 38

O

Ocellital Shields, 23
 Oligodon melanogaster, 145 (see
 Kukri Snake, Pigmented)
 Oligodon subgriseus, 100 (see Kukri
 Snake, Variegated)
 Organs of a Snake, 3

P

Palate Teeth, 11
 Paniwala, 104 (see Keel-back,
 Chequered)
 Parietal Shield, 21, 23
 Phayre's Snake, 146
 Phoorsa, 34 (see Saw-scaled Viper)
 Pit Vipers, 6, 28-9, 40-44, 143, 154-5
 Pitless Vipers, 6, 28-39, 152-3
 Plagiopholis, 146
 Plates, 19
 Pohur, 42 (see Arcistrodon hima-
 layanus)
 Poison Apparatus of a Snake, 12
 Polyodonts, 145
 Polyodont, Cantor's, 145
 " Gray's, 145
 " Gunther's, 145
 " Jerdon's, 114, 145
 Polyodontophis subpunctatus, 114 (see
 Polyodont, Jerdon's)
 Pond-snake, Common, 104 (see Keel-
 back, Chequered)
 Postocular Shields, 23
 Prefrontal Shields, 21-2
 Preocular Shields, 23
 Protection against Snakes, 127-9

Psammodynastes pulverulentus, 43
 (see Mock Viper)
 Psammophis, 97 (see Sand-snakes)
 Psammophis condaranus, 97 (see
 Sand-snake, Indo-Burmese)
 Psammophis leithel, 97
 " longifrons, 97
 " schokari, 97
 Pseudocerastes bicornis, 37 (see
 Smith's Viper)
 Pseudocerastes persicus, 37 (see
 Horned Viper, Perso-Baluch)
 Pseudoxenodon angusticeps, 146 (see
 Mock Cobra)
 Puff Adder, 5, 30, 38-9, 153
 Pythons, 6, 27, 73, 74, 142, 156
 Python molurus, 74-5, 142 (Indian
 Python)
 Python reticulatus, 76, 142, 156
 " West African, 156

R

Rat Snakes, 84-9, 147
 Rat-snake, Blyth's, 147
 " Cantor's, 147
 " Common, 84-6
 " Copper-headed, 111-2
 " Fasciolated, 86 (see Shaw's
 below)
 " Geoffroy's, 89
 " Gray's, 87
 " Karlin's, 89
 " Murray's, 89
 " Ravergier's, 89
 " Scoulegier's, 89
 " Slater's, 147
 " Shaw's, 86
 Rattle Snakes, 14, 40, 44, 154-5
 Rattle-snake, Banded Timber, 154
 " Diamond-backed, 154
 " Prairie, 154
 " Striped, 154
 Red Viper, 155 (see Copperhead)
 Reed Snake, Gunther's, 112 (see
 Smooth Snake, Gunther's)
 Rhabdops, 146
 Ring or Grass Snake, 114
 Ringhal, 115 (see Cobra, Spitting)
 Rock Python, 156
 Rock Snakes, 74 (see Pythons)
 Rooka, 95 (see Tree Snake, Indian
 Bronze-backed)
 Rostral Shield, 22
 Rough-sides, 146
 Rough-side, Black-bellied, 146
 " Cantor's, 146
 " Rose-bellied, 146
 " Wall's, 146
 " Yellow-bellied, 146

Royal Snake, 32, 88
 Russell's Viper, 5, 15, 17, 21, 31-34, 150

S

Safest Way of holding a Snake, 1
 Sand Snakes, 97, 143-4
 Sand-snake, Brandl's, 144
 " Indo-Burmese, 97
 Saw-scaled Viper, 17, 34-6
 Scales on Snakes, 18-23
 Schaapsteker, 151
 Scrub Python, 156
 Sea-snakes, 1, 4, 9, 14, 24-6, 28, 63-4,
 143, 152
 Serpent, Derivation of the term, 3
 Shields, 21
 Sidewinder, 154
 Simotes albocinctus, 109 (see Kukri
 Snake, Light-Barred)
 Simotes arnensis, 103 (see Kukri
 Snake, Common)
 Sisutrus, 154
 Sloughing in Snakes, 4
 Slow-worm, 8
 Slug Snakes, 79, 143
 Smith's Viper, 37-8
 Smooth Snakes, 115, 146, 149
 Smeoth Snake, Beddome's, 146
 " " Blyth's, 146
 " " Doria's, 149
 " " Gunther's, 112, 149
 " " Hampton's, 149
 " " Jerdon's, 149
 " " Leith's, 148
 " " Rapp's, 149
 " " Stoliczka's, 149
 " " Theobald's, 149
 Snake, Derivation of the term, 3

SNAKES IN:

Andaman and Nicobar Islands, 40,
 42, 62, 76, 95, 100, 141, 143-9
 Assam, 42, 54-6, 62, 79, 82, 89, 101-2,
 109, 111, 141-9
 Bengal, 34, 41-2, 46, 53-4, 56, 60, 62,
 65, 82, 89, 96, 102, 106, 109, 111,
 141-9
 Bihar, 103, 145
 Bombay Presidency, 32, 34, 36, 43,
 46-8, 56, 60, 66, 68, 70, 85-7, 94, 97,
 100-2, 111-3, 141-4, 146, 148
 Burma, 32, 34, 40-42, 54-6, 61-2, 67,
 75, 78-9, 82, 84, 89, 92, 95-6, 98,
 102, 116-12, 141, 9
 Central India, 46, 48, 97, 148
 C. P., 97, 101-2, 113, 145
 Kashmir State, 37, 42
 Madras Presidency, 32, 34-5, 42-3,
 53-4, 56, 60, 67, 70, 82, 92-3, 96,
 97, 102, 112-2, 141-4, 146-8

North-West Frontier Province, 53,
 66, 88-9, 141-2, 144, 149
 Orissa, 82, 113, 144, 147
 Punjab, 32, 35-6, 60, 66, 88, 97, 142,
 144, 147
 Rajputana, 46, 88, 97
 Sind, 33-6, 47, 60, 66, 87-9, 97, 142,
 144-5, 147, 149
 United Provinces, 83, 88, 97, 102,
 112, 141
 Snake-bite, Mortality from, 1-2
 " " Treatment for, 122-6
 Snake Poison, Effects of, 14-7, 33, 35,
 40, 51-3, 60, 121-2
 Snake-stones, 125
 Spinals, 18 (see Vertebrals)
 Stoliczka's Snake, 145
 Subcaudals (Scales), 20
 Sublingual Shields, 22-3
 Subocular Shields, 23
 Sacuruja, 156 (see Anaconda)
 Superb Snake, 152 (see Copperhead)
 Supralabial Shields, 22
 Supraocular Shields, 23

T

Taipan, 152
 Teeth of Snakes, 11-13
 Temporal Shields, 23
 Tiger Snake, 115, 152
 Total Number of Species among
 Snakes, 24
 Treatment for Snake-bite, 122-6
 Tree Cobra, 151 (see Mamba)
 Tree Snakes, 26, 90-96, 143
 Tree Snake, 151 (see Boomslang)
 Tree Snake, Broad-headed, 90, 93
 " " Common Brown, 26, 93-4,
 143-4
 Tree Snake, Indian Bronze-backed,
 91-5
 " " Long-nosed, 90-91
 " " Ornate or Golden or
 Gold and Black, 90, 96, 150
 Trinket Snake, 110-1
 Trimeresurus, 154
 Trimeresurus anamallensis, 42 (see
 Anamalai Viper)
 " cantoris, 42 (see Cantor's
 Viper)
 " jerdoni, 42 (see Jerdon's Viper)
 " purpureomaculatus, 42 (see
 Gray's Viper)
 " strigatus, 42 (see Horse-
 shoe Viper)
 Trirhinopholis, 146
 Tropidonotus natrix, 114 (see Ring
 Snake)

- Tropidonotus piscator*, 104 (see Keel-back, Chequered)
 " *stolatus*, 106 (see Keel-back, Buff-striped)
Typhlopidae, 65 (see Blind Snakes)
- U**
- Uropeltidae*, 67, 142
- V**
- Ventrals (Scales), 19
 Vertebrae (Scales), 18
Viper, Large-scaled, 43
 " Large-spotted, 41
Viperabarus, 114 (see Common Viper)
 " *lebetina*, 37 (see Levantine Viper)
 " *russelli* 31 (see Russell's Viper)
Viperidae, 29 (see Vipers)
Viperinae, 29 (see Pitless Vipers)
Vipers, 6, 24, 27-44, 143, 152-5
- W**
- Water Moccasin, 155
 Water Snakes, 80-83, 144-5
Water-snake, Blandford's, 145
 " Boie's, 145
 " Cantor's, 145
 " Chequered, 83, 104 (see Keel-back, Chequered)
 " Dog-faced, 80-81, 145
 " Ferdon's, 145
 " Gerard's, 82, 145
 " Gray's, 145
 " Linne's, 145
 " Rasp-skinned, 80, 145
 " Schneider's, 82, 145
 " Siebold's, 82-3, 145
Water Viper, 155 (see Water Moccasin)
Westermann's Snake, 145
Whip Snake, 90-91, (see Tree-snake, Long-nosed)
Whip-snake, Beddome's, 144
 " Boie's, 144
 " Brown-Speckled, 91, 93, 144
Whip-snake, Common Green, 91-2, 144
 " Gunther's, 144
 " Perrotet's, 144
Wolf Snakes, 98-102, 146-7
Wolf-snake, Anderson's, 102
 " Beddome's, 102
 " Cantor's, 102
 " Common, 60-61, 98-101
 " Gammie's, 147
 " Gunther's, 102
 " Jerdon's, 147
 " Mackinnon's, 102
 " Shaw's or Striped, 101
 " Twin-spotted, 102
 " Yellow-spotted, 101
- X**
- Xenopeltidae*, 78, 142
Xenopeltis unicolor, 78 (see Earth-snake, Iridescent)
Xylophis, 146 (see Dwarf Snake)
- Z**
- Zamenis arenarius*, 89 (see Rat-snake, Murray's)
 " *ciadema*, 88 (see Royal Snake)
 " *fasciolatus*, 86 (see Rat-snake, Shaw's)
 " *florulentus*, 89 (see Rat-snake, Geoffroy's)
 " *gracilis*, 88 (see Dhaman, Gracel)
 " *karelini*, 89 (see Rat-snake, Karelin's)
 " *korros*, 89 (see Rat-snake, Schlegel's)
 " *nucosus*, 84 (see Rat-snake, Common)
 " *ravergieri*, 89 (see Rat-snake, Ravergier's)
 " *ventrimaculatus*, 87 (see Ratsnake, Gray's)



ZOOLOGICAL GARDEN

B
1