

NOTES ON
SUDAN SNAKES

A GUIDE TO THE SPECIES
REPRESENTED IN THE
COLLECTION IN THE

NATURAL HISTORY MUSEUM
KHARTOUM

BY

N. L. CORKILL, M.D.
Sudan Medical Service.

SUDAN GOVERNMENT MUSEUM (NATURAL HISTORY)
PUBLICATION No. 3

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FOREWORD.

THE Sudan Government collection of snakes was first started in 1920, and by 1930 contained 220 specimens. In the latter year Mr. N. L. Corkill of the Sudan Medical Service, who had recently completed a survey of snakes and snake bite in Iraq, undertook to classify all specimens in the collection and subsequent additions thereto. Owing to his untiring zeal, which has stimulated enthusiasm in others, the number of specimens in the collection has increased in the short space of three years to more than 900.

There is no doubt that the subject of snakes and snake bite is not only of considerable interest from a zoological standpoint, but also of importance from the medical aspect.

The present work is the first of its kind on the subject of Sudan snakes and is admittedly of a preliminary nature, but the information should be of value to Medical Inspectors and others in enabling them to determine the commoner snakes of the Sudan and to recognise the venomous species. Further it is hoped that it will stimulate interest in the subject and encourage the collection of specimens and data.

H. W. BEDFORD,

Curator.

Sudan Government Museum (Nat. Hist.).

KHARTOUM,

April 11th, 1934.

PREFACE.

THE object of this guide is firstly to give some information concerning the snakes of the Anglo-Egyptian Sudan and thus to attach to the exhibition a certain amount of real value; it is hoped, secondly, to arouse interest of sufficient degree to induce readers to send in specimens of snakes and notes relating to their habits, vernacular names and folklore.

The collection, which comprises over 900 specimens, is still inadequate for the accurate delimitation of the distribution of all species and the recording, with certainty, of their colour variations and habits. The provinces of Darfur, Dongola, Berber, Bahr el Ghazal, Mongalla, the Upper Nile and the Fung (southern portion) have as yet practically no representatives in the collection, and more material is desirable from the Red Sea coast and the neighbouring hills. It is hoped to attempt a survey of the subject of snakes and snake bite in the Sudan when all provinces are well represented in the collection and when material has reached the figures of 2,000 snake specimens and 1,000 case records of snake bite; some 230 of the latter have already been collected.

The species exhibited number thirty-nine. It is probable that this number will be extended, ultimately, to the neighbourhood of sixty as there is yet to be revealed much from the border provinces. It is suspected, for example, that the rarity *Echis coloratus* exists in the Red Sea coastal area, and it is thought that the notorious Mambas of the genus *Dendraspis* are almost certain to be represented by one or more species in the extreme South. Ten of the thirty-nine snakes exhibited are dangerously poisonous to man; such snakes are known as thanatophidians. Of these one is a back-fanged colubrid, three are cobras and six are vipers.

Some of the specific names should not be regarded as finally valid as certain snake forms, so far, have only the scantiest representation in the collection. It is thought that the descriptions given as a guide to identification will usually be sufficiently diagnostic, but it may be necessary, ultimately, to widen the range of scale counts for several species. A minimum of information has been given on colouration as this is the least trustworthy factor in recognition of a species, and with the non-expert a too ready reliance on its use may bring disaster.

No acknowledgments have been made here for assistance received in the form of facilities, specimens or notes, although such have been forthcoming in large measure; it is intended that this shall be done later in a more formal treatment of Sudanese Ophiology. Again, having regard to the nature of this booklet, literary references are not given.

N. L. C.

KASSALA,
July, 1933.

INTRODUCTION.

SNAKES, together with the sphenodon, crocodiles, turtles and tortoises, and lizards belong to the Class Reptilia. As the Sub-order Ophidia or Serpentes they share the Order Squamata with their fellow Sub-order Lacertilia, the lizards.

Snakes are covered with scales, possess no ear-openings, have immovable eyelids, and with the exception of certain members of the Family Boidæ, such as the African Python (*Python sebæ*), have no suggestion externally of limbs or vestiges of limbs. A snake may be said to possess head, body and tail, and if the head is constricted off from the body, a neck also. The tail extends from the vent backwards. The tail, body, and most of the head may be covered with uniform small scales as in the Blind Snakes and Earth Snakes; it is more usual, however, for the scales on the belly, which are known as ventrals, to be much broader and bigger than those covering the back. In most families these ventral scales stretch completely across the belly, but in the Boas and Pythons they only extend across the central two quarters of the belly. The small scales on the back are known as dorsals and are arranged in regular rows. Individually, they may be plain, spotted, streaked, pitted or ridged with small keels. Scales immediately in front of the vent are called anals; in most snakes a pair of anals are present, but in many species a single scale only is found. On the undersurface of the tail are the subcaudal scales; these are most commonly arranged in a double series, but there are species characterised by the possession of unpaired subcaudals, the Black Burrowing Viper (*Atractaspis microlepidota*) for example. The tail may be terminated by a horny spike or scute as in the species just mentioned. The scales on the head may be small like the dorsals as in many vipers, the Puff Adder (*Bitis arietans*), for instance, or they may be large shields as in most snakes. The superficial layer of a snake's skin is cast off periodically and generally complete in one piece. It is transparent and like a piece of tissue paper and may bear the faintest suggestion of the markings. The individual scales are all shown by the cast and the species may, therefore, be identified from it.

The bones of a snake's jaws are very loosely attached to the skull and each other. In the process of swallowing they come apart to some extent and thus allow of prey being swallowed larger than the diameter of the resting mouth and throat. Snakes prey on other snakes, lizards, frogs, fish, birds and their eggs, the smaller mammals and insects. Some limit their diet to one or more of these items.

Many snakes have six rows of teeth, four in the upper jaw and two in the lower. Back-fanged colubrids, cobras and vipers have enlarged teeth in the upper jaw known as fangs; these are specialised for the inoculation of venom by being either grooved as with the two first-named or tubed as in the vipers. The venom glands are homologous with the salivary glands of man and the salivas of all snakes, fanged and otherwise, are in all probability poisonous. These

glands are situated laterally in the head behind the eyes ; in the Night Adders of the genus *Causus* they extend backwards into the forepart of the body. When a venomous snake strikes, the biting muscles compress the gland and thus cause venom to be forced along a duct to the canal commencement at the base of the fang, and thence into the bitten tissues in much the manner of a hypodermic injection. Characteristically, vipers strike and withdraw ; cobras may " worry " or " chew " on the bitten area. The bifid tongue of a snake is not a sting, it is a sense organ.

Most snakes lay eggs, but some viperine species are viviparous. In the Sudan snakes aestivate and become obviously numerous during and after the " rains " at which period also the young appear. The majority of snakes make a hissing noise by expelling air from their lungs when alarmed. Three Sudanese snakes—the Carpet Viper (*Echis carinatus*), the Horned Viper (*Cerastes cornutus*), and the Egg Eater (*Dasyveltis scabra*) make rasping noises by rubbing their scales together, and the writer has heard a Lined House Snake squeak like a mouse when pinched. The Egyptian Cobra (*Naja haje*) erects a pronounced hood when excited, as do also in lesser degrees the Black-necked Spitting Cobra (*Naja nigricollis*) and the Black-and-white Cobra (*Naja melanoleuca*). All three cobras may spit their venom in the eyes of those they encounter ; if the poison is immediately washed out, transient discomfort alone is experienced.

There are six families of snakes represented in the Sudan ; they include twenty-nine genera, and of the numerous species thirty-nine are described in the following pages. Of these species the Family Typhlopidae, the Blind Snakes takes one ; the Family Leptotyphlopidae, the Earth Snakes, one ; the Family Boidae, the Boas and Pythons, three ; the Family Colubridae, fifteen in its fangless division, the Aglypha and ten in its fanged division, the Opisthoglypha ; the Family Elapidae, the Cobras, three ; and the Family Viperidae, the Vipers, six.

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NOTES ON SUDAN SNAKES.

Family—*TYPHLOPIDÆ* (the Blind Snakes).

The members of this family are insignificant and subterranean; they are usually small and are insectivorous. Teeth are present in the top jaw only, and although these snakes possess a powerfully poisonous salivary secretion, it is infinitesimal in quantity and, therefore, the family is not considered dangerous. The distribution is world-wide within the Tropics.

No. 1. *Typhlops punctatus* (Leach), the Spotted Blind Snake.

The distribution is throughout Tropical Africa. In the Sudan specimens have been secured from the Upper Nile Province, Mongalla Province, and Kordofan Province (Nuba Mountains).

In Arabic it has been called DABIB EL AMIA and in the Madi language LOGUTI.

These snakes feed largely on insects and worms and are said to be found in association with ant colonies.

The similarity of the head and tail extremities, a characteristic these snakes share with the sand boas has given rise to a folk belief that these types of snakes have two heads or two mouths and travel backwards or forwards at will. As the eyes are imperceptible except to the informed, another folk belief has arisen which is, that the snake is blind, hence DABIB EL AMIA.

The species is characteristically subterranean. Owing to the minuteness of the mouth and the lack of fangs, the snake may be considered harmless in spite of its having a saliva possessing the properties of venom to a marked degree.

IDENTIFICATION.

A black, worm-like form with superficially similar head and tail extremities. The body is covered with minute uniform scales each spotted white or bluish-white. The eyes are barely distinct. Note that the mouth is not hooked. There are 24 to 32 scales round the mid-body.

Family—*LEPTOTYPHLOPIDÆ* (the Earth Snakes).

The members of this family resemble those of the preceding family in being insignificant, small, insectivorous, subterranean, and of world-wide tropical distribution. They differ notably by having teeth only in the lower jaw.

No. 2. *Leptotyphlops cairi* (Dum. and Bibr.), the Cairene Earth Snake.

The distribution is throughout North Africa. In the Sudan specimens have been secured from Halfa Province, Khartoum Province and the Blue Nile Province.

No vernacular names for the species have so far been collected. It feeds on insects and may be found in rotting vegetation and wood débris.

IDENTIFICATION.

A small, thin, worm-like form of a pink or brown colour and with recognisable eyes. The body is covered with uniform small scales numbering 14 in the row at mid-body and its length is 65 to 90 times its circumference.

Family—*Boidæ* (the Boas and Pythons).

This family is represented all over the world and embraces the typically constricting snakes, that is the pythons, boa-constrictors and sand boas. None of these snakes has poison fangs, but it has been shown that the salivas of certain sand boas are powerfully poisonous.

No. 3. *Python sebæ* (Gmel.), the African Python.

The distribution is from South Africa northwards as far as Senegambia and Khartoum. In the Sudan specimens have been secured from Khartoum Province and the Blue Nile Province. Further, it is indisputable that the species is quite common in parts of Kassala Province, in Kordofan Province and elsewhere.

The usual Arabic name for the snake is ASSALA. To the Abyssinians of Gallabat it is known as ZANDU. To the Nuers it is apparently the snake called LAU. The Shilluks call it NYALO. The Nubas know it by the following names: at Shatt, BUCH; at Diloka, PAH; at Kilogi, RONGO; at Tindia, KULULA; at Kadugli, LISSINA; at Acheron, Jebel Moro, PAJI; at Koko Luman, Jebel Moro, PEEN; at Toitcho, Jebel Moro, JOANDI; and at Kinderma, Jebel Moro, WUTHIN.

The African Python preys on the smaller mammals such as rats, hyraces and dik-diks. In habits it is largely nocturnal and is fond of water. It can be aggressive if cornered. On each side of the vent is a claw-like structure which is actually a vestigial hind-limb; it is a belief in the Arab Sudan that these claws are thrust into nostrils of the prey to suffocate it. This species attain a length of over 20 feet. The specimen exhibited is a young one.

IDENTIFICATION.

If the snake is an adult, size alone will serve to identify it, for any snake over 10 feet in length in the Sudan will almost certainly prove to be this species. Smaller specimens may be identified by the narrow ventral scales, and the 2 pits in the scales bordering the upper lip; these scales lie on each side of the snout behind the central rostral scale. The ventrals number 269 to 286, the subcaudals number 63 to 77 pairs, and the dorsals number 81 to 93 in the row. A definite neck is present and the pupil is vertically elliptic.

No. 4. *Python regius* (Shaw), the Royal Python.

The distribution is from Senegambia and the Niger eastwards. In the Sudan the only records up to the present are from Dilling and Kadugli in the Nuba Mountains of Kordofan Province.

In the Nuba Mountains the name applied to the specimens secured was invariably the Arabic name NAWAMA, which is used more commonly in other parts of Kordofan, but always apparently in application to the Puff Adder (*Bitis arietans*).

The Royal Python is very passive and never bites. Its sluggishness and general torpidity account for the name NAWAMA, i.e., "the sleeper" being applied to it. It is small for a python, 6 feet being an exceptional length.

IDENTIFICATION.

A snake with narrow ventrals, a neck, a vertically elliptic pupil and 4 pitted scales on each side of the snout along the upper lips. The ventrals number 196 to 207, the subcaudals 30 to 37 pairs and the dorsals 53 to 63 in the row.

No. 5. *Eryx thebaicus* Reuss, the Theban Sand Boa.

The distribution is from Upper Egypt southwards to tropical East Africa. In the Sudan specimens have been secured from Khartoum Province, Berber Province, Blue Nile Province, Kassala Province and Port Sudan.

From its burrowing habits the snake is known by the Arabic name ABU DAFFAN, i.e., "the burrower." To the Hadendoa it is known as KWEKWAR OAFAS.

This is a burrowing snake, but is by no means restricted to a sandy habitat. It appears to be mainly nocturnal. Small birds, lizards and young rodents form its prey; they are killed by constriction before being swallowed. In the Sudan as in Egypt it is a snake much feared by the natives. Mr. H. H. King has a story of a death being ascribed to its bite in the Blue Nile Province. It has no fangs, but its genus has been shown to possess a poison-secreting gland, and its saliva as a result, must be considered poisonous. It is very doubtful whether it should be regarded as a dangerous snake.

IDENTIFICATION.

A yellow and brown fat-bodied snake, without a neck; with a very abrupt tail, with a vertically elliptic pupil and with narrow ventrals. The dorsals are keeled. The ventrals number 171 to 197, the subcaudals number 19 to 28 and are in a single series, and the dorsals number 47 to 53 in the row. The limit of recorded length is 620 mm.

Family—*COLUBRIDÆ* (the Colubrids).

The vast majority of snakes belong to the family Colubridæ. Such snakes have typically six rows of teeth, four of which are in the upper jaw and two in the lower. The head is covered with large shields, the ventrals stretch completely across the belly, the subcaudals are practically always in pairs, the anal is generally divided, the neck is generally defined and, as a rule, the tail is proportionately long and uniformly tapering. Certain of the species have been shown to possess poisonous salivas. The family is of world-wide distribution.

Series—*AGLYPHA* (the Fangless Colubrids).

Most colubrids belong to this series, the members of which possess no fangs and no venom glands.

No. 6. *Natrix olivaceus* (Ptrs.), the Olive Water Snake.

The distribution is Tropical Africa. In the Sudan specimens have been secured from the Upper Nile Province, the White Nile Province and the Bahr el Ghazal (Wau, recorded by Werner).

Naturally the species has a riverain distribution and its members are believed to be very common in the Sudd. Caterpillars, frogs and frogs eggs have been noted as food.

IDENTIFICATION.

A rather small olive snake with a broad dark stripe running down the back, the belly being yellowish. There are characteristic black vertical margins to the scales bordering the upper lips. The ventrals number 131 to 149, the subcaudals 55 to 58 pairs and the dorsals 19 to the row. The anal is paired. The recorded limit of size is 580 mm.

No. 7. *Boodon fuliginosus* (Boie), the Smoky House Snake.

The distribution is Northern Africa. In the Sudan specimens have been secured from Kassala Province, Kordofan Province (Nuba Mountains) and the Red Sea coastal area.

The habits and characteristics of the species may be taken to be those of *Boodon lineatus*, which is described immediately below.

IDENTIFICATION.

Expert determination alone can distinguish it from *Boodon lineatus* (see below).

No. 8. *Boodon lineatus* (Dum. and Bibr.), the Brown or Lined House Snake.

The distribution is South Arabia and Tropical and South Africa. In the Sudan specimens have been secured from Khartoum Province, Blue Nile Province, Kordofan Province (Nuba Mountains), Fung Province, White Nile Province, Kassala Province, the Red Sea coastal area and the Bahr el Ghazal (Wau, recorded by Werner).

It appears probable that this is one of the snakes known to the Arabs of the Central Sudan as BURUL. Werner has recorded the name JAGGER applied to a young specimen at Wau.

In the Central Sudan the species is reputed to be weakly poisonous. An adult woman was bitten by a quarter-grown specimen in Kadugli in 1932. She suffered from no general symptoms, but had a slight induration of the bitten area for three days. This snake is very common in cotton soil and is of frequent occurrence in and near houses. The usual diet is composed of small rodents, but it is said to also eat locusts and frogs. It has been noted that it constricts its prey. A young specimen in Wad Medani, in 1930, that had a damaged back, squeaked like a mouse when handled with forceps and then bit itself eight times at the site of injury.

IDENTIFICATION.

A dark-coloured snake with a flat, blunthead, an appreciable neck, a relatively short tail (i.e., for a colubrid form), a vertically elliptic pupil and a single anal. It may or may not have a pale line along each side. The ventrals number 192 to 237, the subcaudals 47 to 70 pairs, and the dorsals 25 to 31 in the row. Expert determination is required to distinguish between this species and *fuliginosus* (see immediately above). The limit of recorded length is 870 mm.

No. 9. *Lycophidium capense* (Smith), the Cape Wolf Snake.

The distribution is Tropical and South Africa. In the Sudan specimens have been secured from the Fung Province, Kordofan Province (Nuba Mountains) and the Red Sea coastal area (Erkowitz).

Loveridge has recorded that it preys on skinks and snakes.

IDENTIFICATION.

A rather small snake with the shields under the chin disproportionately small in comparison with those of other snakes. It is often dark in colour, spotted paler and with a white throat. The colour, however, varies considerably. The ventrals number 164 to 192, the subcaudals 30 to 45 pairs and the dorsals 17 to the row. The anal is single. The limit of recorded length is 450 mm.

No. 10. *Mehelya chanleri* STEJNEGER, the File Snake.

The distribution is from Tropical East Africa northwards to Somaliland, Abyssinia and the Sudan. In the Sudan a single specimen only has been taken. The place of capture was Dilling in Kordofan Province.

The snake may be regarded as a distinct rarity. The peculiar appearance of the vertebral line of dorsals is noteworthy; they are enlarged and bicarinate.

IDENTIFICATION.

The vertebral line of bicarinate scales may be considered generally diagnostic. The ventrals number some 240, the subcaudals 60 or so pairs and the dorsals 15 to the row. The anal is single.

No. 11. *Coluber florulentus* GEOFFR., the Flowered Snake.

The distribution is North-east Africa from Egypt to Somaliland. In the Sudan specimens have been secured from Halfa Province, Dongola Province, Berber Province, the Blue Nile Province, Khartoum Province, Kordofan Province and the Red Sea coastal area.

It is commonly encountered in the neighbourhood of buildings. In the Sudan mice and small birds have been noted as prey.

IDENTIFICATION.

A snake of variable colouration, generally with darker crossbands in front and square spots along the rest of the back. The tail is one-fifth of the total length. The ventrals number 201 to 228, the subcaudals 82 to 100 pairs and the dorsals 21 or 23 in the row. The anal is paired. The limit of recorded length is 1090 mm.

No. 12. *Spalerosophis diadema* (SCHL.), the Clifford's Diademed Whip Snake.

The distribution is from North Africa to North-western India. In the Sudan specimens have been secured from Khartoum Province, the Blue Nile Province, Kassala Province and Kordofan.

In the Central Sudan, the Arabic names ABU RISWA and RISEIWA have been applied to specimens. The names are said to be inspired by the heavy dorsal markings which suggest a wristlet of large beads.

Rodents and birds are the usual prey. The species may be found in almost any type of habitat and is fairly commonly encountered in and around dwellings and in cultivation.

IDENTIFICATION.

A snake with three dark longitudinal bars on its nape and a series of large dark spots down its back. The dorsals are keeled, particularly posteriorly and the anal is single. The ventrals number 210 to 278, the subcaudals 65 to 110 pairs and the dorsals are 25 to 33 in the row. The limit of recorded length is 1800 mm.

No. 13. *Chlorophis emini* (GNTHR.), the Emin's Green Snake.

The distribution is Uganda and the South-eastern Sudan. In the Sudan specimens have been secured from Mongalla Province, the Upper Nile Province, and the Bahr el Ghazal.

Loveridge records that frogs and skinks have been noted as prey and that an examination of stomach contents has revealed a buprestid beetle and the leg of a grasshopper.

IDENTIFICATION.

A slender green snake, the belly of which is not white or pale. The tail is a third of the body length. The anal is paired. The ventrals have no lateral keel. The ventrals number 155 to 190, the subcaudals 111 to 122 pairs and the dorsals 15 to the row. The limit of recorded length is 720 mm.

No. 14. *Chlorophis irregularis* (LEACH), the Irregular Green Snake.

The distribution is Tropical Africa. In the Sudan specimens have been secured from Talodi and the nearby Jebel Moro, in Kordofan Province.

Vernacular names applied to these specimens were SEMSARI by the Baggara Arabs and RUNGU by the Moro Nubas of Tirun.

The Talodi specimen was taken in an outhouse and the Moro specimens were secured from beneath a rock in a khor on top of the mountain.

IDENTIFICATION.

A slender green snake, the belly of which is not white or pale. The tail is a third of the body length. The anal is paired. The ventrals exhibit a lateral keel which is not continued in the subcaudals. There may be darker spots on the back. The ventrals number 150 to 182, the subcaudals 94 to 133 pairs and the dorsals 15 to the row. The limit of recorded length is 820 mm.

No. 15. *Philothamnus semivariatus* (SMITH), the Spotted Wood Snake.

The distribution is Tropical and South Africa. In the Sudan specimens have been secured from Kordofan Province and the Upper Nile Province.

Loveridge says this snake can inflate its neck. The same observer gives its food as lizards and frogs.

IDENTIFICATION.

A slender green snake which may be barred or spotted darker; the belly is greenish yellow. The tail is more than a third of the body length. The anal is paired. The ventrals are keeled laterally as are also the subcaudals. The ventrals number 169 to 207, the subcaudals 112 to 115 pairs and the dorsals 13 to 15 in the row. The limit of recorded length is 1210 mm.

No. 16. *Coronella semiornata* PTRS., the East African Smooth Snake.

The distribution is East Africa. In the Sudan specimens have been secured from the Blue Nile Province and Mongalla Province.

IDENTIFICATION.

A darkish snake with markings anteriorly. The tail is a quarter of the total length. There is no keeling of the ventrals. The anal is paired. The ventrals number 176 to 204, the subcaudals 63 to 88 pairs and the dorsals 21 in the row. The limit of recorded length is 610 mm.

No. 17. *Scaphiophis albopunctatus* PTRS., the Spotted Beaked Snake.

The distribution is Tropical Africa. In the Sudan specimens have been secured from the Fung, Kassala Province and Kordofan Province.

IDENTIFICATION.

A pale heavy snake with small darker spots on the back and a bird-like beak terminating the upper jaw. A row of scales between the eye and the scales rimming the upper lip will clinch the identity. The anal is paired. The ventrals number 210 to 240, the subcaudals 51 to 65 pairs and the dorsals at midbody 21 to 25 in the row. The limit of recorded length is 960 mm.

No. 18. *Contia africana* BLGR., the African Dwarf Snake.

The distribution is the Sudan and Eritrea. In the Sudan a specimen has been secured from Erkowit in the Red Sea coastal area (the type specimen, a description of the taking of which is given in Abel Chapman's "Savage Sudan").

IDENTIFICATION.

A small insignificant snake with a single anal. It is easily identified by its simple scale counts. The ventrals number 162, the subcaudals 69 pairs, and the dorsals 15 in the row.

No. 19. *Grayia tholloni* MOCQ., Gray's Snake.

The distribution is Uganda, the French Congo and the Sudan. In the Sudan specimens have been secured from the Upper Nile Province and the Bahr el Ghazal.

IDENTIFICATION.

An average sized snake with typical cross bands on the back, light in colour and widening at the sides. A dark line along the middle of the underside of the tail is typical. The ventrals number 130 to 145, the subcaudals are in 100 to 128 pairs and the dorsals are 15 to the row.

No. 20. *Dasyveltis scabra* (LINN.), the Egg Eater.

The distribution is Africa and Southern Arabia. In the Sudan it has been taken in the Blue Nile Province only.

This snake is nocturnal. It is without the normal armament of teeth, its mode of feeding being such that teeth would be valueless. It swallows eggs which are broken in the gullet against enamel capped projections of the vertebral bodies; the egg contents are swallowed and the broken shells are ejected through the mouth. It varies greatly in colouration. Like the two dangerous vipers, *Cerastes cornutus*, the Horned Viper, and *Echis carinatus*, the Carpet or Saw-scaled Viper, when excited, it makes a rasping noise by rubbing its coils together.

IDENTIFICATION.

The absence of teeth is diagnostic. The anal is single. The scales are keeled. There may be several inverted V-shaped marks on the back of the head and neck. The ventrals number 185 to 236, the subcaudals 41 to 94 pairs and the dorsals 23 to 27 in the row.

Series OPISTHOGLYPHA (the Back-fanged Colubrids).

As a rule these snakes have the tail proportionately shorter than the Aglyph colubrids. Many have angular heads and vertical pupils. They have venom glands yielding a venom that in most species is not very poisonous to humans, and also have grooved enlarged teeth, that is, poison fangs. In most species these are situated below the eye at the back of the mouth.

No. 21. *Tarbophis obtusus* REUSS, the Blunt-nosed Cat Snake.

The distribution is North and East Africa, and Arabia. In the Sudan specimens have been obtained from Khartoum Province, Blue Nile Province, White Nile Province and Kassala Province.

This is the snake most frequently encountered in houses and gardens in Khartoum. One day a specimen was seen climbing a wall some 30 feet above the ground with a number of sparrows mobbing it. Ultimately it fell to the ground and was secured. In its belly were found two sparrow nestlings. The young of this species are much more strikingly marked than are the adults and, moreover, show in a greater degree that prominence of the eye-balls which in Egypt has secured for the species the name of ABU EYUN, the "father of eyes." A note sent with a specimen from Dueim states that local opinion has it that the species chirps like a bird.

IDENTIFICATION.

A snake with a flat head well constricted off from the neck, with vertically elliptic pupils margined by a golden or orange iris and with paired anals. The ventrals number 213 to 272, the subcaudals 65 to 82 pairs and the dorsals 21 to 23 in the row. The limit of recorded length is 1870 mm.

No. 22. *Crotophopeltis hotamboeia* (LAUR.), the Herald Snake.

The distribution is Tropical and South Africa. In the Sudan specimens have been secured from the White Nile Province, Blue Nile Province, Kordofan Province and Mongalla Province.

In Dilling the pale local form is spoken of as DABIB EL ABIAD, the "white snake." The Nubas of Gulfan Moron call it KOMOLORRI and the Kadugli Nubas, TIRI.

It is common round houses, in gardens and trees, on rocky ground and near wells. Loveridge has recorded that it feeds on mice and toads.

IDENTIFICATION.

A snake with three pairs of shields under the chin. The anal is single. The ventrals number 144 to 180, the subcaudals 32 to 54 pairs and the dorsals 17 to 19 in the row.

The limit of recorded length is 610 mm.

No. 23. *Malpolon moilensis* (REUSS), the Moila Snake.

The distribution is Northern and Eastern Africa and South-west Asia. In the Sudan specimens have been secured from Dongola Province, Darfur Province and Khartoum Province.

This is a desert species. It has been noted in Iraq that a specimen inflated its neck.

IDENTIFICATION.

The shape of the head is characteristic. A pale snake spotted darker with a convex angular head. The anal is paired. The ventrals number 159 to 176, the subcaudals 48 to 73 pairs and the dorsals 17 to the row. The limit of recorded length is 430 mm.

No. 24. *Rhamphiophis rostratus* PTRS., the Eastern Sharp-nosed Snake.

The distribution is Tropical East Africa. In the Sudan specimens have been secured from Kordofan Province.

It appears probable that this is the snake known in Western Kordofan to the Baggara as ABU HANAIG, that is, the "father of jaw." To the Nubas of Jebel Moro it is known as BINGIL at Tira Luman and PENNAIR at Acheron.

Specimens have been taken in houses, in a native market and under rocks in khor beds on top of Jebel Moro. A note on a specimen from Delami records that it moved slowly, and hissed and spat. The beak-like snout is characteristic of this species and *S. albopunctatus* only, in the Sudan.

IDENTIFICATION.

A snake with a beak-like snout and with the eyes in contact with the scales that border the upper lip. The anal is paired. The ventrals number 148 to 192, the subcaudals 90 to 110 pairs and the dorsals 17 in the row at midbody. The limit of recorded length is 1380 mm.

No. 25. *Psammophis sibilans* (LINN.), the Hissing Sand Snake.

The distribution is Western, Central, Eastern and North-eastern Africa. In the Sudan specimens have been secured from Berber Province, Khartoum Province, the Blue Nile Province, Dongola Province, Kordofan Province, Kassala Province, the Fung, the Upper Nile Province, the Bahr el Ghazal and the Red Sea coastal area.

In the Central Sudan the striped forms are known to the Arabs as ABU SA-AIFA, because their marking suggests the commonly used fibre strips of the Dom Palm. The non-striped forms are known as ABU FAR or ABU FEIRAN in allusion to the usual rodent diet of the species. Other Arabic names used are UM SOT inspired by its whip-like form and ZERRAG suggested by the fact that its movements are like those of something shot or lanced like an arrow or spear. This last name is commonly used throughout the Arab world for any swift, thin, whippy snake. To the Hadendoa the striped form of *P. sibilans* is known as TOMAI and the unstriped as MA'YITT. The Nubas of TINDIA call the striped form BURUSAM.

These snakes are often encountered in the day-time. They are common in cultivation, in gardens, round houses and in the cracks of cotton soil. They have been noted swimming in irrigation canals in the Damer area. They feed usually on small rodents, but they

are said also to eat young birds and locusts. In size they are comparatively large and this combined with a show of fierceness procures them great respect. They cannot, however, be considered dangerous.

IDENTIFICATION.

A snake attaining a relatively large size, that may or may not be striped and that has a long, thin, angular head with large eyes. The tail is a third of the total length. There are one or two very large teeth in the upper jaw below the eyes. There is often a faint brown line along each side of the belly. The scale that terminates the snout is as deep as it is broad. The head may be longitudinally and transversely streaked. The anal is paired. The ventrals number 155 to 198, the subcaudals 90 to 116 pairs and the dorsals 17 in the row. The limit of recorded length is 1210 mm.

No. 26. *Psammophis schokari* (FORSK.), the Variable Sand Snake.

The distribution is from Northern Africa to Afghanistan and Sind. In the Sudan specimens have been secured from Halfa Province, Dongola Province, the Libyan Desert (Bagnold Expedition, 1932), the Fung, Kordofan Province and the Red Sea coastal area.

By the Arabs of the Central Sudan the species is confused with its congeners and, therefore, is known as ABU SA-AIFA, ABU FAR, UM SOT or ZERRAG. The Nubas of Karko, near Dilling, call it KUNG.

Unlike *sibilans* it is of placid disposition. Both of the Bagnold Expedition snakes were very pale desert forms; one had an unidentified bird in its mouth.

IDENTIFICATION.

Superficially this species resembles the preceding one, but the lateral lines on the belly, if present, are discontinuous, the lips are spotted and the scale terminating the snout is broader than deep. The anal is paired. The ventrals number 162 to 195, the subcaudals 93 to 149 pairs and the dorsals 17 to 19 in the row. The limit of recorded length is 1210 mm.

No. 27. *Psammophis punctulatus* DUM. and BIBR., the Speckled Sand Snake.

The distribution is East Africa from Mozambique to the Sudan, and Arabia. In the Sudan specimens have been secured from the Blue Nile Province and from Kassala Province (the Butana).

IDENTIFICATION.

In its main features it is a typical Sand Snake like *sibilans* described above. The belly is olive, grey, brown or pink speckled darker; this speckling is general over the whole body. There are three stripes down the back. The anal is paired. The ventrals number 177 to 190, the subcaudals 130 to 158 pairs and the dorsals 17 in the row. The limit of recorded length is 1660 mm.

No. 28. *Psammophis biseriatus* PTRS., the Link-marked Sand Snake.

The distribution is Central and Eastern Africa. In the Sudan specimens have been secured from Kordofan Province (Nahud area) and from the Red Sea coastal area (Erkowitz).

This snake is a rarity and in life is rather beautifully coloured, the head being a vivid emerald green and certain of the dorsal markings being a delicate shade of amethyst. In preservation these colours fade. The Nahud specimen was picked out of a tree on a *goz* slope covered with grasses. Its tail was strongly and actively prehensile twining instantly round the fingers and wrist of its captor; at the time it was noteworthy that no attempt was made to bite.

IDENTIFICATION.

A typical sand snake with a rather slenderer tail than its congeners. The anal may be single or paired. The ventrals number 142 to 164, the subcaudals 100 to 131 pairs and the dorsals 15 in the row. The limit of recorded length is 1050 mm.

No. 29. *Psammophis subtæniatus* PTRS., the Striped Sand Snake.

The distribution is East Africa from Zanzibar to the Southern Sudan. In the Sudan specimens have been secured from the Bahr el Ghazal (recorded by Werner from Wau) and Kordofan Province.

To the Arabs it is known as ABU SA-AIFA like all striped Sand Snakes. By the Nubas of Jebel Moro it is called, at Kinderma, RUNGU; at Turun, KALINGI; at Tira Luman, NARANGI; at Koko Luman, INIMARO; at Toitcho, TURIK; at Acheron, PERITORO; and at Um Gabrallah, DOWA.

In January, 1933, young specimens were obtained from *khors* in the vicinity of all the Moro villages. Before this the species had been considered something of a rarity. It is probably the commonest snake of the larger rocky outcrops.

IDENTIFICATION.

It is a typical sand snake like the foregoing species. There may be a dark line running down the middle of the back and a thin one each side of the belly. The scale terminating the snout is broader than deep. The anal is paired. The ventrals number 151 to 168, the subcaudals 100 to 108 pairs and the dorsals 17 in the row. The limit of recorded length is 1030 mm.

No. 30. *Dispholidus typus* (SMITH), the Boomslang or Tree Snake.

The distribution is Tropic and South Africa. In the Sudan specimens have been secured from the Fung and the Gallabat area of Kassala Province.

This snake is of very variable colouration. It lives mainly in trees, preying on birds and chameleons. It is said to be of placid disposition, but none the less has achieved an evil reputation by reason of the very serious results following a bite in a negro attendant at Port Elizabeth snake park some years ago. This man strangely enough exhibited the hæmorrhagic symptoms and signs which are usually associated with the viperine type of poisoning.

IDENTIFICATION.

A slender snake with relatively enormous eyes, the appearance of which is quite diagnostic. The head is markedly convex. The dorsal scales are strongly keeled. There are two very large fangs below each eye. The anal is paired. The ventrals number 162 to 201, the subcaudals 91 to 131 pairs and the dorsals 19 to 21 in the row. The limit of recorded length is 1500 mm.

Family ELAPIDÆ (the Cobras).

This family has representatives in all continents but Europe and embraces all land snakes furnished with comparatively immovable fangs in the front part of the upper jaw. This includes the true cobras, the tree-cobras or mambas, the coral snakes and all the poisonous snakes of Australia, where there are no vipers. The family represents a stage further than the Opisthoglypha in the development of the poison fang as an inoculatory mechanism. The groove in the fang has now deepened and the edges of the groove are showing the tendency to close in as a roof over the canal to form a tube, a stage which is actually reached in the Family Viperidæ.

No. 31. *Naja haje* (LINN.), the Egyptian Cobra.

The distribution is from North-east Africa southwards to the Transvaal and Zululand and eastwards to Arabia and Palestine. In the Sudan specimens have been secured from Khartoum Province, the Blue Nile Province, the Fung, Kassala Province, the Bahr el Ghazal and Kordofan Province.

The usual name in Arabic for this snake is ABU DARAGA, that is, the "father of the shield." This name is not applied merely because the spread hood is of the form of a hide shield, but rather because the cobra when excited and threatened or threatening moves its hooded head from side to side much as a combatant feints and parries with a shield. In Kordofan ABU KURUKURU, that is, the "father of the cave," is used of the melanotic form that frequents the rocky cover of the *jebels*.

An unusual colour variety, lemon yellow barred heavily with russet and black, occurs in the Khatmia area of Kassala and is known locally as ABU ZENOU, that is, the "father of arms," because "it has in its coils the strength of many arms." It is sometimes referred to by Arabs of the Central Sudan as HAM. The Hadendoa speak of the species as HAM-HAM and ABU DARAGAB, both derived from the Arab names. The Abyssinians of Gallabat know the snake as GASHA. To the Shilluk the melanotic form is known as DETANG. Nuba names are legion; at Karko, KALURU; at Diloka, DHAIRA; at Tindia, KELLO; at Kadugli, KILFO; at Gulfan Moron, WA; at Shatt, YOKIUT; at Turun, Jebel Moro, KABURI; at Koko Luman, Jebel Moro, KOLOR; at Um Gabrallah, Jebel Moro, DORAR; at Toitcho, Jebel Moro, TUMO; at Tira Luman, Jebel Moro, TURLI and the melanotic form SHINGIL; and at Acheron, Jebel Moro, JANDIL.

The snake is common all over the country and while it seems to prefer the neighbourhood of houses or old ruins it may be encountered in practically any form of habitat. It is largely nocturnal like most snakes. It feeds mainly on frogs and toads, birds and birds eggs. Its fondness for eggs probably accounts for its being so often found near villages where fowls abound. It makes an aggressive show if cornered and may spit its venom three or four times from a range of anything up to six feet into the eyes of those whom it encounters. Arab belief has it that it spits in the eyes of sitting hens to blind them and induce them to leave their eggs at its mercy. If

a person has received a charge of venom in the eyes and these are in a healthy condition, nothing serious or even very uncomfortable should happen providing the eyes are immediately washed out. If they are not, pain and inflammation will supervene and probably run a course to recovery in three or four days. If the eyes are injured or diseased when spat into it is possible that absorbed venom will give rise to systemic symptoms of mild cobra poisoning.

There is no authentic record of death in a human following a bite from the Egyptian Cobra despite its commonness in such places as Egypt and Palestine, to say nothing of the Sudan. It is, however, dreaded by natives wherever it occurs. In the Sudan it is said to kill instantly, that is, presumably in a matter of minutes. This may be so, and if it is, will account for the absence of such cases from hospital experience, that is, cases die before they can be brought to hospital. At the same time it is strange that one can never obtain even a good account at second hand with name, date, place, etc., in authentication. Perhaps the species for all its display of fierceness is not so ready to bite as is its Indian congener the Cobra-di-Capello (*Naja naja naja*) which has a most substantial death-roll lavishly illustrated by the published word.

Assuming its poison to exert effects like those of the venoms of other cobras which have been studied, a bitten person may be expected to become weak and wish to sit or lie down; he may initially suffer slight pain at the site of injury and, perhaps, may vomit. Later he will appear to be drowsy as paralysis will cause his eyelids to droop and his lower jaw to fall away from the upper, simulating yawning. He will shortly be unable to swallow or speak and saliva will dribble from his mouth. In severe cases coma will supervene and merge into death, which may be heralded by convulsions. It may be said that a person who is going to die from cobra poisoning will do so as a rule in twelve hours or less. Survival for longer than this will generally be followed by rapid recovery of health.

At Atet on 11th May, 1932, Dr. J. Bryant shot an Egyptian Cobra measuring 7 feet 5 inches in length and with a maximum girth of 9 inches. For the species this is enormous and probably constitutes the published record. The species is the one presented in the royal Uræus of Ancient Egypt, and is generally considered to be the inspiration of the "brazen serpent" of Moses. In parts of Kordofan the head is incorporated in a charm to secure success in hunting.

IDENTIFICATION.

A snake of variable colouration, with no appreciable neck, but with a hood recognisable when not erected by the redundancy of loose skin below the head. There is a pair of stout fangs projecting down from the front part of the upper jaw on each side. The anal is single. Between the eye and the scales lining the margin of the upper lip there intervene two smaller scales (suboculars). The ventrals number 191 to 214, the subcaudals 53 to 64 pairs and the dorsals 21 to 23 in the row on the neck and 19 to 21 in the row at mid-body. The 6th or 7th scale lining the upper lip margin is the largest and deepest of its series. The limit of recorded length is now (*vide supra*) 2260 mm.

No. 32. *Naja melanoleuca* HALLOW., the Black-and-White Cobra.

The distribution is Tropical Africa. No Sudanese specimens are in the collection, but one is exhibited from Gambia trading post in Abyssinia which is not far from the Sudan boundary. Evidence for the existence of the species in the Sudan is provided by the published statement of Major Stanley S. Flower that he has seen the snake in Mongalla (Ann. and Mag. Nat. Hist., ser. 10, 7, p. 499, May, 1931).

Aylmer writing of the species in West Africa records that it spits and that it is found near water.

IDENTIFICATION.

A snake similar to the preceding, but with no subocular scales intervening between the eye and the scales forming the upper lip. As with *Naja haje* the 6th or 7th of these scales is the largest and deepest. The hood is not so developed as in *Naja haje* however, and a notable difference is that *melanoleuca* has the scales bordering its lips rimmed heavily with black along their vertical margins. The ventrals number 204 to 219, the subcaudals 60 to 70 pairs and the dorsals 23 to 29 on the neck and 19 to 21 at midbody. The limit of recorded length is 2400 mm.

No. 33. *Naja nigricollis* REINH., the Black-necked Spitting Cobra.

The distribution is Tropical Africa and southwards as far as Natal in the East of the continent. In the Sudan specimens have been secured from Halfa Province, Khartoum Province, Kassala Province, the Blue Nile Province, Kordofan Province, the Fung and the Bahr el Ghazal.

The common black form with the heavy white bands across the throat is called ABU SOMEET, the "father of agate," the association being with the necklace of beads made of black agate veined white which adorns the necks of most Sudanese women of Arab stock. Another name of similar inspiration is ABU SUK-SUK, that is, the "father of beads." Other colour forms of the snake share the names ABU DARAGA and ABU KURUKURU with *haje*. The Shilluk would presumably call the black form DETANG. The Nubas of Dilling called a specimen KONGOLI and the Nubas of Shatt use the name DULDUSUL.

The species appears to frequent mainly riverain cultivation and the roots of trees and seems to be very definitely a rarity far from water. They are largely nocturnal in habit and prey on mammals, birds, lizards, snakes and birds' eggs. They produce expanded hoods when excited, but not to the pronounced degree shown by *haje*. They prefer to spit rather than to bite and do so in the same manner as *haje*, the spitting being preceded for a few moments by a chewing action. Colour forms of the species are numerous, the throat bands for example may be white, black, grey, yellow or red; this last colour has been described in West Coast forms by Aylmer. This writer has stated that it is *nigricollis* that forms the stock in trade of the average West Coast charmer.

IDENTIFICATION.

It has the cobra characteristics of the two preceding species but differs in that the 3rd of the scales lining the upper lip is the

deepest and the last one is the longest. It has no suboculars intervening between the eye and the lip scales. The hood is not so well developed as in *haje*. The ventrals number 183 to 228, the subcaudals 55 to 68 pairs and the dorsals 21 to 29 in the row on the neck and 17 to 25 in the row at midbody. The limit of recorded length is 2000 mm.

Family VIPERIDÆ (the Vipers).

This family has representatives in all snake-infested parts of the world except Australia. Its members represent a stage further in fang specialisation than do the Cobras. These viperine fangs are hollow and may be likened to hypodermic needles. They are much enlarged and when not in action are folded down along the upper jaw on each side in a fold of sheathing membrane which, in the resting stage, will generally hide them from view. For striking they are rotated into freedom through an angle of 90° by means of a rotating bone. When a viper strikes and misses its bite the fangs are cleared from piercing the lower mouth parts by these being drawn into each other by an elastic ligament which connects the two halves of the lower jaw at the chin. To examine the fangs of a viper it is usually necessary to press them down by a pin or needle passed above between them and the upper jaw. The venoms of vipers in their poisonous effects are predominantly hæmorrhagic.

No. 34. *Causus rhombeatus* (LICHT.), the Common, African or Demon Night Adder.

The distribution is Tropical and South Africa. In the Sudan specimens have been secured from Dongola Province, the Upper Nile Province, Mongalla Province and Kordofan Province.

A specimen in Kadugli was referred to as UM SHEDIGAT, that is, the "mother of cheeks," this, however, is a name more usually applied to the much commoner Carpet Viper (*Echis carinatus*) to whom it would more appositely apply.

A large number of these snakes appeared in Kadugli in the late "rains" of 1932 in gardens and cotton soil cultivation. A boy of five years of age was bitten by an adult snake of this species in Dilling on 2nd June, 1931. He recovered after 11 days' illness characterised by swelling of the bitten toe, hæmorrhage from it, slight fever and mild hæmaturia. The genus is remarkable for the possession of a poison gland which reaches back into the body cavity. Prey is provided by frogs and toads.

IDENTIFICATION.

A fat-bodied, short-tailed snake with erectile fangs, large shields on the head and an inverted V-marking with its apex resting on the large scale (the frontal) that lies between the eyes. There may be a series of dark, rhomboidal markings running down the back. The snout is blunt and is not turned up. The anal is single. The ventrals number 120 to 155, the subcaudals 15 to 29 pairs and the dorsals 17 to 21 in the row. The limit of recorded length is 700 mm.

No. 35. *Causus resimus* (PTRS.), the Green Night Adder.

The distribution is Tropical Africa. In the Sudan specimens have been secured from Darfur Province, Kordofan Province, the Upper Nile Province and Mongalla Province.

Its characteristics are much the same as those of *rhombeatus*.

IDENTIFICATION.

The species superficially resembles the preceding one, but differs in the colouration, in having the snout definitely turned up and in that the V-marking on the head barely touches the frontal scale. Further the tail of *resimus* is one *eleventh* of its body length, while that of *rhombeatus* is one *ninth*. The ventrals number 134 to 152, the subcaudals 17 to 25 and the dorsals 19 to 21. The limit of recorded length is 470 mm.

No. 36. *Bitis arietans* (MERR.), the Puff Adder.

The distribution is Tropical and South Africa and Arabia. In the Sudan specimens have been secured from the Blue Nile Province, the White Nile Province, the Upper Nile Province, Kassala Province (Bahr es Salaam) and the Bahr el Ghazal.

Arabic names used of the species are DAGAR and more usually NAWAMA, that is, the "sleeper," this latter name being obviously inspired by the Puff Adder's torpidity. The species appears to be restricted to a riverain distribution. It feeds on frogs, toads, small mammals and, possibly, orthopterans. Placid and sluggish in disposition it probably only bites if trodden on. It has been claimed by a writer to the *Times* (7th September, 1932) that the Puff Adder emits a bell-like note at the breeding season. This is the largest of the Sudanese vipers. Its fangs are impressive weapons and its venom is comparatively large in quantity. Fortunately, a certain amount of venom is locked up at the site of a bite by the clotting of blood in the neighbourhood and probably does not gain access to the blood stream. Deaths from bites by this species are rarely heard of, possibly because of its torpidity and the fact that it is not aggressive.

IDENTIFICATION.

A very fat-bodied snake with large, erectile fangs, a thin neck, a short stumpy tail, a broad, flat head covered with small-keeled scales like the dorsals, and a vertically elliptic pupil. Between the eyes there are 8 to 11 scales. The ventrals number 131 to 145, the subcaudals 16 to 34 pairs and the dorsals 29 to 41 in the row. The limit of recorded length is 1350 mm.

No. 37. *Cerastes cornutus* (LINN.), the Horned Viper.

The distribution is North and North-east Africa as far south as Omdurman, eastwards through Arabia and Palestine to Iraq. In the Sudan specimens have been secured from Dongola Province, Berber Province, the Red Sea coastal area and Khartoum Province (Kerreri Hills, Omdurman).

Flight-Lieut. A. P. Ritchie, D.F.C., R.A.F., told the writer that at Bir Natrun in November, 1931, he saw three horned snakes not bigger than 28 inches long and of a pale colour with darker markings; these must have been *Cerastes cornutus*.

If a specimen is horned it will usually be called by Arabs QARNA or ABU QARUN in allusion to its horns. Without horns it so much resembles certain colour forms of the Carpet Viper, *Echis carinatus*, that it shares with it several vernacular names. These are, ABU or UM GENAIB, that is, "the sideways one," in allusion to the habit possessed by both these snakes of coiling rapidly to a flank with the head poised threateningly to the front, and WASHASHA and its variants, mimetic names suggested by the rustling noise these snakes make when excited, by rubbing their coils together, a behaviour, incidentally, which is shared in the Sudan with *Dasyveltis scabra*, the Egg Eater. Hillelson gives as an Arabic name for the Horned Viper IMEYANA, that is, "the blind one." To the Hadendoa the species is known as KWEKWAR MALA'DAIYAB.

The species is usually considered to feed on birds, but it is probably by no means so limited in its tastes. Flower has recently quoted an observation showing a jerboa to have been swallowed and Dr. J. Bryant told me that in Dongola, in 1931, he found in the stomach of a specimen the remains of beetles and a lizard.

In about half the specimens recorded from Arabia, Iraq and the Sudan, horns have not been present and their absence seems to be unrelated to sex, maturity, habitat or geographical distribution. The writer was informed by Dr. Farag at the Giza Zoological Gardens, in 1932, that females in captivity there laid from 12 to 13 eggs in the clutch and that the young when hatched were always horned. It rather seems, therefore, that the absence of horns is due to accidental injury; do birds peck them off? The function of the horns has never been explained, but it is known that the snake which is a great bird eater lies immediately beneath the surface of the sand with the tips of its horns alone showing, like small seeds.

As with the Egyptian Cobra, *Naja haje*, this species is of wide distribution, frequent occurrence, evil reputation and fierce behaviour, yet not a single thoroughly authenticated fatal case of poisoning resulting from its bite has been published. The writer has published two probable cases from Iraq and Dr. J. Bryant states that the natives of Dongola say the bite is only occasionally fatal. From the data available it appears that the main results following its bite are marked swelling and necrosis, followed by indolent sepsis in the neighbourhood of the bite. Hæmorrhagic symptoms so typical of most viperine poisonings seem to be absent.

IDENTIFICATION.

A small pale snake of variable colour with or without markings. It is fat-bodied, has a short, stumpy tail, a defined neck and an "ace of spades" flat head covered with small keeled scales like the dorsals. If horns are present, the species is, of course, immediately recognisable. The scales between the eyes number 15 to 21, thus readily distinguishing it from *Bitis arietans*, the Puff Adder. A specimen without horns again may be readily distinguished from *Echis carinatus*, the

Carpet Viper, by noting that the subcaudals are paired and not in a single series. The ventrals number 130 to 165, the subcaudals 25 to 42 pairs and the dorsals 27 to 35 in the row. The limit of recorded length is 720 mm.

No. 38. *Echis carinatus* (SCHN.), the Carpet or Saw-scaled Viper.

The distribution is Africa north of the Equator, and Southern Asia from Arabia and Transcaspia to India. In the Sudan specimens have been secured from the Blue Nile Province, Kassala Province, the White Nile Province, Kordofan Province, Darfur Province and the Red Sea coastal area.

In the Central Sudan, the snake is known to the Arabs most often as WASHASHA, KHASHASHA or RASHASHA, mimetic variants suggested by the rustling noise made by the excited snake as it rubs its coils together. ABU or UM GENAIB, that is, the "sideways one," is also used in allusion to its habit of coiling to a flank with the head threatening to the front (see under *C. cornutus* above). To the Baggara of Southern Kordofan it is UM SHEDIGAT, that is, the "mother of cheeks"; this is in allusion to the lateral salience so typical of the viperine head and well exemplified in this species. In Western Kordofan, the commonest name for it is UM DESHEINA; this is apparently mimetic. To the Hadendoa it is KWEKWAR, a Bergo applied to a specimen the name DUL and the Abyssinians of Gallabat known it as OOFEYT. Among the Nubas it is called KUBAH in Kadugli, SHWADJA in Karko, SHIGARI in Diloka, and OWISS in Shatt.

This is the commonest poisonous snake in the Sudan and in some localities it is the commonest of all snakes. It is undoubtedly the cause of most snake bite accidents and is apparently responsible for the majority of these accidents which end fatally. The writer has notes of ten cases of snake bite in which the snake was secured and identified as *Echis carinatus*; none ended fatally and in none did permanent disability result. The writer also has notes of twelve cases in which the snake was not taken, but in which the description of the snake by the victim, and his symptoms admit of no doubt that the same species was involved. In this second series, one old man died, a young girl suffered a complete necrosis of a foot, an adult man was left with a paralysis of the limbs, and two adults were left with impaired vision, one of them ten years after the accident. An old man was met in El Odaiya who claimed to have been bitten by WASHASHAS eleven times and another man was seen in Abu Deleig who said he had been bitten by these snakes seven times. In the Sudan the species cannot be considered as terribly lethal. Deaths are tragic when they do occur and generally will be found to be in the very young or very old or possibly in the invalid.

Typical symptoms are pain and swelling at the site of injury, swelling of scars and in odd skin areas, abdominal and lumbar pain, headache and bleeding from the gums, nose, bowels, bladder and old or recent scars. Later may supervene necrosis of tissue and bone, apoplexy, paralysis, and impairment of vision and hearing. The average case seen in hospital recovers sufficiently for discharge in ten days.

The species is found in sand, rock, cotton soil, mountain, desert, cultivation, open country, wooded country, near water and away from it. There are several colour forms varying with the type of the habitat. The species may positively infest a locality as it does, for example, at Semma and Kadugli in the Nuba Mountains; it may even infest a house. Although it makes a fierce show it probably never bites unless actually trodden on or touched. Most of its victims are males bitten in the early morning or at evening dusk. Its venom, though a very potent one, is fortunately small in quantity.

It is largely a feeder on insects and centipedes. The young are produced free-living and active.

IDENTIFICATION.

A fat-bodied snake with erectile fangs, a single series of subcaudals under the tail, and the head covered with small keeled scales like the dorsals. The head is flat, the neck is constricted and the tail is stumpy. The colour is a pale shade on the back of grey, yellow, red or brown, marked or unmarked. A pale mark as of a bird's foot on the head and nape is diagnostic, as also is a white wavy line running down the flank. The belly is pale and may be marked with brown or black specks, spots or blotches. It is the only non-black snake in the Sudan with the subcaudals in a single row and the ventrals the width of the belly. The ventrals number 132 to 192, the subcaudals 21 to 48 unpaired, and the dorsals 27 to 37 in the row. The limit of recorded length is 720 mm.

No. 39. *Atractaspis microlepidota* GNTHR., the Black Burrowing Viper.

The distribution is East and Central Africa including the Sudan. In the Sudan specimens have been obtained from the Blue Nile Province, Kassala Province, the Fung, the Upper Nile Province, Kordofan Province and the Bahr el Ghazal.

In the Central Sudan it is generally spoken of as SILL and ABU LAQQAZ, that is, the "father of prodding or jabbing." It is apparently this snake which in the Fung and in parts of Kordofan is known as ABU ASHARA DAQIQA,* that is, the "father of ten minutes," presumably in allusion to the supposed duration of life in a person who has been bitten by it. Another name sometimes applied to the snake is ABU SHATTAR. To the Hadendoa it is TAGDAI and GED'IT. Among the Nubas it is called, at Tindia, SONGKOFAN; at Kadugli, TOMOGALI; at Koko Luman, Jebel Moro, MARNGIL BEENI; at Acheron, Jebel Moro, TUMMO; at Kilogi, EDORUR; at Diloka, KARSII; and at Karko, KONGTUNDU.

It appears to occur mostly in cotton-soil areas and has been noted in diverse habitats such as houses, gardens, walls, rocky hillsides, cultivation, in trees, in building debris, and in *sagias*. It is said to eat butterflies. It is oviparous.

* In this connection it is of interest to note that there is a small black snake in Eritrea which is very much feared and is said to have an Abyssinian name meaning "the snake of seven steps," because, after being bitten, a person only takes seven steps before falling to the ground and dying. This rather suggests *A. microlepidota* or a kindred species. The writer is indebted to Dr. and Frau Jacobsen for this piece of information.

The Black Burrowing Viper is the second commonest poisonous snake in the Sudan and the second most frequent cause of accidents and deaths from snake bite. The symptoms of poisoning from its bite resemble those in *Echis* cases. The writer has notes of three cases of bite in which the snake was secured and identified as *A. microlepidota*. One of them, a healthy adult, was bitten in a *sagia* at Kassala in 1927, he died in six hours. The other two cases, also adult men, were bitten by immature snakes; one was very seriously affected for over a fortnight. This snake wherever it occurs with *Echis* is very much the more feared of the two.

IDENTIFICATION.

This is the only uniform black snake in the Sudan. Like *Echis* it has single subcaudals. It has large shields on its head unlike most vipers. It has no neck, a short stumpy tail, a spike on the end of the tail, minute eyes and, of course, the usual erectile fangs. The ventrals number 212 to 245, the subcaudals 26 to 37 unpaired and the dorsals 29 to 37 in the row. The limit of recorded length is 540 mm.

KEY TO THE IDENTIFICATION OF THANATOPHIDIANS
IN THE SUDAN.

To identify a snake in the Sudan with certainty as one of the ten dangerous species it is advisable to work through this key systematically from A until the determination is effected; there is no safe short cut with the exceptions of the Horned Viper (*C. cornutus*) when horned, the Carpet Viper (*E. carinatus*) when typically coloured, and the Black Burrowing Viper (*A. microlepidota*) which is the only all-black snake with undivided subcaudals.

A—Lay the snake on its back and ascertain whether the scales on the belly stretch completely from one side to the other. If they do not, reject the snake from consideration; it is non-dangerous. If they do stretch completely across the belly, pass to examination B, as the species may be one of the following:—

- | | | | |
|-------------------------------|-------|----------------------------------|-------|
| (1) <i>D. typus</i> | p. 22 | (6) <i>C. resimus</i> | p. 27 |
| (2) <i>N. haje</i> | p. 23 | (7) <i>B. arietans</i> | p. 27 |
| (3) <i>N. melanoleuca</i> ... | p. 25 | (8) <i>C. cornutus</i> | p. 27 |
| (4) <i>N. nigricollis</i> ... | p. 25 | (9) <i>E. carinatus</i> | p. 29 |
| (5) <i>C. rhombeatus</i> ... | p. 26 | (10) <i>A. microlepidota</i> ... | p. 30 |

B—Examine the anal scale in front of the vent. If it is double, the snake, a long and whippy one, and if, also, there are present two large fangs situated in the upper jaw below relatively enormous eyes, and strong keeling of the dorsal scales, then the snake is the Boomslang or Tree Snake (*D. typus*). Reject all other snakes with double anals as being non-poisonous and pass to examination C.

C—Examine the upper surface of the head. A head covered with small keeled scales more or less uniform with the dorsals will be one of the three following vipers which may be easily distinguished one from another:—

B. arietans (the Puff Adder), subcaudals paired, scales between eyes 8 to 11.

C. cornutus (the Horned Viper), subcaudals paired, scales between eyes 15 to 21, horns may be present.

E. carinatus (the Carpet Viper), subcaudals *single*.

A snake not yet determined will have its head covered with large plates. Pass to examination D.

D—Prise open the mouth and examine the teeth of the upper jaw. If enlarged, prominent teeth project down from the front of the jaw in a fleshy sheath and have no appreciable line of smaller teeth running back from them, the snake is one of the three cobras. Note that the teeth are not moveable, i.e., not erectile. The three cobras are distinguished one from another as follows:—

N. haje (the Egyptian Cobra), suboculars two, deepest supralabial 6th or 7th.

N. melanoleuca (the Black-and-White Cobra), suboculars nil, deepest supralabial 6th or 7th.

N. nigricollis (the Black-necked Spitting Cobra), suboculars nil, deepest supralabial 3rd.

If the snake has enlarged teeth in the fore part of the upper jaw as mentioned above, but has them folded along the jaw line backwards and possibly requiring leverage from a needle to depress them into view, then it is one of the three remaining vipers which may be differentiated as follows:—

C. rhombeatus (the Demon Night Adder), subcaudals paired, snout not turned up, inverted V-mark well on to frontal.

C. resimus (the Green Night Adder), subcaudals paired, snout turned up, inverted V-mark barely touching frontal.

A. microlepidota (the Black Burrowing Viper), subcaudals *single*.

Any snake still undetermined will be harmless or a harmful species not yet established as occurring in the Sudan. If one of the latter it will have the teeth characteristics described above under D as diagnostic of the cobras and vipers.

SNAKE BITE IN THE SUDAN.

To assess the exact damage done by poisonous snakes in the Sudan is difficult as hospital statistics are transparently deceptive. Probably most persons who die from snake bite do so shortly after the bite and thus are not admitted to hospital. This is known to be true for the Nuba Mountains and also for parts of Kassala Province. Other places of sinister reputation in respect of snake bite fatalities are the Butana, the Gezira irrigated area, Makwar and Erkowit.

In a series of 231 cases of snake bite of which the writer has notes, there were 13 deaths, a case mortality of 5.6 per cent. These cases are almost entirely taken from the hospital records of Wad Medani, Khartoum, Kassala, Kadugli, Dilling, Dueim, Gedaref and Sennar. In the same series permanent disability resulted in 11 cases, i.e., 4.5 per cent. This took such forms as necrosis and loss of bones and limbs or portions of limbs, chronic ulceration, paralysis, and impairment of vision and hearing. In only 15 out of these 231 were the offending snakes secured and identified. The Carpet Viper (*Echis carinatus*) came first with 10 cases; next the Black Burrowing Viper (*Atractaspis microlepidota*) with 3 cases, and the Demon Night Adder (*Causus rhombeatus*) and the Lined House Snake (*Boodon lineatus*) were responsible for a case each; the last named is a non-poisonous species. Three snakes which had spat in the eyes of natives were also secured; one was an Egyptian Cobra (*Naja haje*) and the other two were Black-necked Spitting Cobras (*Naja nigricollis*).

There are many modes of treatment practised by natives of the Sudan; they are mostly of psychological value only, while some are positively harmful. Of the more rationally inspired may be mentioned ligature, incision, excision and cupping. Bitten persons in the Central Sudan are not allowed to sleep and drums are beaten to prevent their doing so; this is an argument for the lethality of the cobras as the obvious inspiration is the course taken by the poisoning in a person bitten fatally by one of these snakes; apparent drowsiness, yawning and sleep (i.e., paralysis and coma) from which there is no waking gives rise to the argument "prevent this sleep and death cannot take place." As internal remedies are used eggs, milk, a folk antidote of world-wide use, lemons, roots, and portions of rhinoceros horn; from cups of this last material other remedies may be drunk and thereby acquire added virtue. Most of the internal remedies are taken with the avowed purpose of causing emesis and the incidental expulsion of the venom. In frank magic *Fikkis* spit and mutter and *Kajurs* conduct their *sibrs*. A common magical form is for a bitten digit or limb to be immured in the freshly opened body of a bird or domestic animal; the mechanism here is the transference of evil by contact.

To outline a scheme of action for the lay-person faced with a snake bite accident away from medical aid is not an easy thing to do nor is it likely to be very satisfactory when done. As, however, the results may be so serious and as certain simple measures may make all the difference in the case which has been inoculated with a dose on the border-line between the sub-lethal and the supra-lethal, a simple scheme for lay action is given here.

FIRST AID.

A—IF THE PATIENT IS SEEN WITHIN TEN MINUTES OF THE BITE.

(1) Secure absolute recumbency and rest. Activity means more rapid absorption of the venom. Avoid the use of alcohol in acute snake poisoning ; its stimulant effect also accelerates absorption.

(2) If the situation of the bite permits, apply a ligature round the thigh or upper arm and then if it is a finger or toe that has been bitten another ligature round the base of the affected digit. A ligature is best of rubber or other elastic material. It is useless placed round the lower leg or forearm as the blood vessels running between the pairs of bones are not compressed. The ligature should cause congestion but should not obliterate the arterial pulse. As ligatures cause damage themselves if left on too long, they should be relaxed periodically. They may be left on for the first 20 minutes and thereafter loosened for 3 minutes, this being repeated for, say, 3 hours, after which time a ligature cannot be conceived as achieving any good. Should it be decided that the snake in kind or size is not dangerous, the ligature should be at once removed.

(3) Obtain the snake or a description of it and decide whether it was a Boomslang, Cobra, Carpet Viper, Horned Viper, Puff Adder or Black Burrowing Viper. If other than these remove the ligature, keep the patient at rest and reassure him that he is not dangerously poisoned. Wash the wound with any mild antiseptic and dress it with a pad and bandage. If the snake is one of the thanatophidians just mentioned, proceed to (4) below. The Night Adders are not considered dangerous.

(4) Swab the bitten part with iodine or potassium permanganate solution to clean off any venom left on the surface of the wound. With a razor or razor-blade sterilised in spirit or a match flame, make three or four incisions of about one inch in length, a third of an inch apart and one quarter of an inch deep ; these should embrace the area of the wound. Over these incisions apply continuous suction by means of a breast pump or the mouth for, say, one hour. Avoid a blunt or heavy knife for such will drive venom into the circulation. If mouth-suction is used, care should be taken that the person sucking is not suffering from cracked lips, sore gums or, in fact, any disease or injury of the lips or mouth, as for such a person there would be danger of venom gaining entrance to his system. In any case it would be as well for any person applying suction by the mouth to use frequent mouth washes of potassium permanganate. This treatment is only likely to be of help in Puff Adder bites.

(5) Reassure the patient that most people recover who are bitten by even very dangerous snakes.

(6) Remove the patient as speedily as is consistent with a lack of physical and mental agitation to a place where medical treatment and observation can be continuously given.

B—IF THE PATIENT IS SEEN MORE THAN TEN MINUTES AFTER THE BITE.

Proceed as above, except that ligation and incision are useless and needlessly add to the patient's suffering, most certainly if more than half an hour has elapsed since the bite. In any case it is only in Puff Adder poisoning that they can be considered of possible benefit.

C—LATER TREATMENT IF NO MEDICAL AID IS AVAILABLE.

The important things are rest, warmth, fluids and liquid foods. No drugs should be given except an initial dose of Epsom salts. When possible, a simple enema should also be administered to reduce one source of self-poisoning and discomfort. If necessary, the patient must be bullied into drinking water *ad nauseam*.

Cases of Cobra poisoning will either die within, say, 12 hours or make a quick recovery. Nothing can be done for them.

In Viperine poisoning there will have to be fought the initial shock shown by coldness, sweating, weakness, collapse and rapid thin pulse. Treatment is by warm wraps, hot water bottles, water by the mouth, warm salt solution (one teaspoonful to the quart) by the rectum in pint administrations hourly and if the patient can take such things, four-ounce feeds half-hourly of hot coffee, tea, cocoa or soup, and milk and egg. This is the ideal mode of feeding cases of viperine poisoning throughout the whole time that they are obviously acutely ill.

Hæmorrhage from the wound can only be dealt with by a firm, mildly antiseptic pad and bandage. For bleeding from the mouth and other parts nothing can be done; an occasional saline mouth wash, however, may be comforting. When the acute stage has passed, septic wounds may be treated with hot fomentations (those that are merely warm facilitate the septic process), and definite gangrene is ideally dealt with by cutting away the diseased portions or even amputation of, for example, an affected toe or finger. Needless to say, operative interference by a layman could only be justified in extreme circumstances for it introduces new dangers in the shape of hæmorrhage from cut or exposed vessels and a possible extension of sepsis by the exposure of new raw areas. Should tetanus supervene, all that can be done is to secure for the patient undisturbed rest. He should be given as much fluid as possible by means of a tube through the mouth and also by the bowel.

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APPENDIX I.

A list of species unrepresented in the exhibition, that have either been recorded from the Sudan in the past or have recently been found.

Family TYPHLOPIDÆ.

- (1) *Typhlops schlegelii* BIANC.. Mongalla Province.
- (2) *Typhlops sudanensis* SCHMIDT. Southern Sudan.

Family LEPTOTYPHLOPIDÆ.

- (3) *Leptotyphlops macrorhynchus* (JAN). Blue Nile Province ?
- (4) *Leptotyphlops dissimilis* (BOCAGE). White Nile Province.

Family BOIDÆ.

- (5) *Eryx muelleri* BLGR.. Kordofan and Blue Nile Province ?

Family COLUBRIDÆ (AGLYPHA).

- (6) *Prosymna meleagris* (RHDT.). Blue Nile Province.
- (7) *Chlorophis beguaerti* SCHMIDT. Southern Sudan.

Family COLUBRIDÆ. (OPISTHOGLYPHA.)

- (8) *Crotophopeltis degeni* (BLGR.). White Nile Province.
- (9) *Amphorhinus nototania* (GTHR.). Bahr el Ghazal.
- (10) *Dromophis lineatus* (DUM. & BIBR.). Mongalla Province.
- (11) *Aparallactus concolor* (FISCH.). Mongalla Province.
- (12) *Aparallactus lunulatus* (PTRS.). Kassala Province.
- (13) *Chilorhinophis butleri* WERNER. Mongalla Province.

Family ELAPIDÆ.

- (14) *Elapechis laticinctus* WERNER. Kordofan Province.

Family VIPERIDÆ.

- (15) *Atractaspis phillipsi* BARB.. Sudan.

APPENDIX II.

INSTRUCTIONS FOR COLLECTING SNAKES AND DATA CONCERNING SNAKE BITE.

Snakes may be captured and killed by various methods, but it is important that as little damage as possible be inflicted, particularly to the head. Nevertheless, all snakes no matter how mutilated or insignificant and all information, however meagre, relating to any aspect of snake study are of value.

Specimens intended for preservation should have the belly slit open longitudinally, but should not have the contents cleaned out as these are wanted for examination. They may then be bottled or tinned in spirit or in a mixture of one part S.M.S. formalin to two of water. If neither of these preservatives is available, the snake should be packed in salt, some of which should be inserted into the body cavity. A piece of stout white paper should be tied round the mid-body and should bear in blacklead (not copying lead) the name of the collector, date, time and place of collection, and whenever possible brief information respecting the nature of the locality, vernacular names of the snake, notes on its behaviour when encountered, and any native beliefs about its food, habits, poisonous properties, or significance in myth and magic.

Details of deaths from snake-bite are most particularly wanted as it is known that hospital statistics convey a false impression as to the mortality rate in this affection. There is no doubt that most people who die from snake poisoning do so remote from medical aid and unknown to medical intelligence. Details of such cases should contain in authentication, the name, age and race of the victim, the date and time of the occurrence, the vernacular name of the snake if it was seen, together with a brief description of it as regards colour, size, behaviour, and shape of head, neck, body and tail. Any information on the victim's condition is most conveniently recorded in brief notes summarising the situation at intervals of time that have elapsed since the bite; for example, "Two hours after bite: started bleeding from mouth and complained of pain in loins" and "eight days after bite: became paralysed, incoherent, later unconscious and cold, and then died."

Needless to say, if the snake is secured and sent in associated with the notes of the case, these have a much greater value. Specimens and notes should be sent to the following address:—

**"Curator,
Natural History Museum,
Gordon College,
Khartoum.**

25° 30° 35°

GENERAL MAP OF ANGLO EGYPTIAN SUDAN

Scale 1:15,000,000

Milimetres 0 50 100 200 300 Kilometres

REFERENCE

Boundary International	-----
Boundary Provincial	-----
Railways	-----
Railways Projected or Proposed	-----

