

ing so placed, the diminution of gravitation is much smaller in the parts of the atmosphere turned toward the sun, than in those which are on the opposite side; the tail must, therefore, be much shorter in this region than in the other. And as the centre of gravity may be supposed extremely near the surface of the nucleus, as has been said above, it may be conceived that here the dilatation of the atmosphere no longer forms a tail, but only a nebulosity.

Lastly, the tail is ordinarily inflected, so as to turn its concavity toward the side from whence the comet comes, and to have the plane of its curvature coinciding with that of the orbit of the star. The reason is this,—the particles of the tail cannot follow the circulating motion round the sun, with the same rapidity as the nucleus, because to the same linear velocity correspond angular velocities, so much the smaller in proportion to the greatness of the distance from the sun. The radius will be tangent to the curve of the tail in the vicinity of the nucleus, because there the angular velocity of the particles of which it is composed does not differ from that of the nucleus. It is easy also to comprehend, that the tail will appear so much the more strongly inflected, the larger it is; a result of our hypothesis that agrees with observation.

According to what has been said above, the formation and change of the tails of comets may be considered as a sort of flux and reflux of the atmosphere of their bodies, perfectly similar to the tides which are caused by the moon in our ocean, and perhaps even in our atmosphere.

On the Snakes of Southern Africa. By ANDREW SMITH, M. D. M. W. S. Assistant-Surgeon 98th Regiment, and Superintendent of the South African Museum *. Communicated by the Author.

IN no branch of natural history is the want of accurate and perspicuous description more felt than in Ophiology. Such imperfections have unquestionably tended to retard the advancement of the science, to create diffidence and doubt in the mind of the inquirer, and to keep back communications on the sub-

* Read before the Wernerian Society, 22d April 1826.

ject, from a fear of unnecessary repetition or a chance of plagiarism.

As authors have hitherto, in general, been satisfied with having dead, distorted, and variously altered specimens for the description of species, in that way the confusion complained of most probably arose; and if so, the only method calculated to remove it, would be a series of accurate observations made upon living snakes. As considerable difficulties must necessarily be overcome before that can be generally effected, and as but few individuals, comparatively speaking, can enjoy the means of carrying on such inquiries, it therefore becomes the duty of all interested in the subject, to lose no opportunity of forwarding such a desirable object; and, under this impression, I have taken minute descriptions, from living examples, of the species actually contained in the South African Museum, of which the annexed are abridgments.

Such of them as have been ascertained, beyond doubt, to be already known, are designated by the established names; but where no descriptions have been found in Shaw or Lacepede (the only authors I have on the subject), answering exactly to the appearances which have been observed, I have given them names myself; and, in one of those instances, have selected, as a specific distinction, the name of the noble individual who procured it, and to whom natural history is indebted for the institution of the South African Museum, where the specimen is now deposited, viz. Lord Charles Somerset, governor of the Cape of Good Hope.

The descriptions, though concise, and by no means complete, have been proved to be sufficiently explicit to enable individuals to distinguish, with certainty and facility, the different species, which is all I aim at on the present occasion; reserving the more ample details, as well as the accurate representations which I actually possess, for a work expressly on the subject. With regard to number 5, I have considered it as a species of the genus *Naja*, more, however, from its manners than from its natural appearances. In relation to the former, they are exactly like those of number 4, or the *Naja capensis*, and so completely different from those of the vipers, that I have placed it, though devoid of the loose skin on the neck, with the former, at least till such time as an opportunity occurs of ascertaining, by ana-

tomical examination, its proper genus. If examples of all sorts of snakes could be procured alive, and kept so for some considerable time, many excellent specific characters, as well as valuable generic distinctions, would doubtless be obtained, and classifications, which have hitherto been formed upon insufficient data, might certainly be fixed upon clear and lasting principles. Indeed so convinced am I of that being practicable, that I have, for some time past, been forming a collection of live snakes; and, from experience, I find that the more their natural dispositions and appearances are remarked, the more perceptible is the insufficiency of our present divisions, and the want of reform.

To attempt the latter, however, with any prospect of success, would require, previously, great observation and extensive experience, both of which must be the work of time; and therefore, by waiting for them, other persons might notice what we ought to do at least in relation to our own colonies. Therefore, to prevent that happening to the Cape of Good Hope, I propose, in successive papers, to give short sketches of the different species of the serpent tribe which are actually contained in our infant museum, dividing them, for the time being, according to the most popular classification at present in use.

VIPERA.

a. With orbiculo-cordate Head, and Fangs.

1. *VIPERA inflata*. Burchell.

Puff-Adder of the Inhabitants.

Ground colour above, varying from brown to brownish-yellow or dirty yellow, and variegated throughout by transverse curved or ziz-zag bands of black, and bright yellow or cream-colour. The bright yellow or cream-colour, which ever of them it happens to be, is generally found immediately behind the black ones, and the same colour is invariably observed marking more or less of other scales in various situations. The lateral portions of the black bands are mostly somewhat semicircular with their curvatures backwards; the central parts again acutely angular or arrow-shaped, with their points nearly in the middle of the back, and directed towards the tail. The bands on the anterior and middle parts of the body are for the most part continuous, though marked by such a serpentine course, but near the tail they become much less distinct, and are often either completely interrupted or lost. Towards the middle as well as more forwards, they have three distinct curvatures or angles, one on each side, being generally semicircular, and the third on the middle of the back mostly acute and angular. Besides those three portions, some of the bands have at their extremities also a black blotch on each side, which in some instances are connected to them, but in the majority are separate. The

ground colour of the tail is generally darker than that of the body, and more distinctly intersected by several narrow regular and continuous yellow bands, which extend round the greater part of its circumference. Colour below, as well as on the inferior parts of the sides, bright yellow, some of the scuta and squamæ, however, variously marked towards their extremities by black spots. Head much depressed and mottled above by black, yellow, and brown. Generally posterior to each eye, just over the place where the jaws dilate behind, there is a large blackish blotch, with a yellow centre, and also before and between the eyes is usually observed a transverse black band, dotted more or less with yellow. The eyes are situated well forward and high up on the head, the nostrils are large, and placed close to the edges of the upper lip. The scales with which the head is covered, as well as those on the body, are ovate, imbricate and carinated: The nose and lateral parts before the eyes are covered with irregular flattened, granular-like bodies. Body diminishes suddenly and considerably in size at the commencement of the tail, which is slender for the size of the snake, and measures about $\frac{1}{4}$ th of the whole length, which is usually from three feet to three and a half. The neck is considerably narrower than either the body or the head. Its motion is moderately quick, its disposition fiery, and its bite frequently, though not invariably, fatal. Scuta somewhere about 139, squamæ generally about 22.

The colouring of this snake is very peculiar, and Burchell's * remark, that it is not easy to convey an idea of it by mere description, is very just.

2. VIPERA armata.

Horned Snake of the Inhabitants.

Ground colour above, ash-grey, bluish-grey, or greyish-green, with irregular rows of irregular brown spots, that have their edges considerably darker in general than their centres. In most specimens, two distinct rows are observed along the middle of the back, but in some there is only one, and then the spots are considerably larger, and extend right across the imaginary dorsal line. Along each side again, is another row of spots, but of a much smaller size than those just described, and between them and the scuta is a slight mottling of blackish-blue dots, ziz-zag streaks, or waving lines. Colour below a shining pearly white, with in many instances a slight tinge of red. Head depressed, and like the body covered with carinated scales. Eyes prominent, placed well forward; and each guarded above by three or more short, erect and prickly pointed bodies, which have obtained for it the name it bears amongst the colonists. Neck considerably smaller than the head or body, and the latter diminishes much in thickness at the vent. The tail is slender, pointed, and about $\frac{1}{4}$ th of the length, which is seldom more than fourteen or fifteen inches. Greatest thickness rarely more than that of a man's thumb, unless when enraged, at which time, it can, in common with most vipers, increase its dimensions very considerably. Scuta generally about 120, and squamæ about 26.

The motion of this snake is but slow, its disposition is fierce, and its bite I have found invariably occasion death, when inflicted on young animals, though not always when practised on old ones of the same species.

* Travels in Southern Africa, vol. i.

b. With ovato-cordate Head and Fangs.

VIPERA montana.

Berg-Adder of the Inhabitants.

Ground colour, a dirty brownish black, the intensity of which varies in different specimens. Along the back there are two rows of large, black semilunar spots, having their convexities directed towards each other, and their margins surrounded by a narrow edging of dirty white. Below those, on each side, is another row of similarly shaped and coloured spots, but of a smaller size, and having their convexities pointing downwards. These are separated from the centre rows by two white longitudinal lines, which are, for the most part, continuous, though here and there occasionally interrupted. The two lateral rows are not well seen on the sides of the neck, but the two central ones extend distinctly forwards, along the upper surface of the head, as far as the eyes; though, in the latter situation, the spots are of an oblong, instead of a semilunar shape. Between the side rows and the abdomen the colour is variegated, black, and dirty white; the scuta themselves are of the latter hue, and mottled with black or blackish blue; indeed, in many examples, the latter is the prevailing colour. Head somewhat quadrangular, with its posterior extremity a good deal broader than the neck, and, like the body, covered above by ovate and carinated scales. Eyes moderately large, and placed well forward. Nostrils close to the tip of the nose. Thickness, as in the two preceding species, diminishes rapidly about the anus. Tail slender, pointed, and about $\frac{1}{2}$ th of the whole length of the snake, which is generally between sixteen and twenty inches. Greatest circumference seldom more than that of a man's thumb. Scuta generally about 132. Squamæ about 20. Motion rather slow; disposition ferocious, and bite poisonous; though not invariably fatal.

The above approaches so close in its characters to the Coluber Atropos of Shaw*, L'Atropos of Lacepede†, that I feel disposed to view it as the same snake.

It is commonly found amongst short grass, in dry mountainous situations, all over Southern Africa.

Variety.

Ground-colour cinereous, with four rows of spots, similarly arranged and shaped as in the sort just described, but their colour, instead of being black, is reddish-brown, with lighter centres.

NAIA.

a. With loose Skin on the sides of the Neck, and Fangs.

NAIA capensis.

Ringhals Slang of the Inhabitants.

Above, black and dirty white, the colours disposed in alternate waving transverse bands. The black is the prevailing or sole colour towards the head,

* General Zoology, vol. iii. part 2. p. 404.

† Histoire Naturelle des Serpens, tom. ii. fol. 134. 4to. Paris, 1759.

and it is not till nearly two inches from that part that the white is distinctly seen. Towards the tail, as well as on it, the regular disposition of the two colours is most clearly marked, and the bands are most directly transverse. Below, the general colour is black, with the scuta, that are more than a few inches behind the chin, white at their extremities. Between those that are thus marked and the head, the space is a deep shining jet black, except at two points, where some plates throughout are nearly white, and thereby give rise to two broad transverse light-coloured bands. Tail slender, tapering, terminated by a shining horny point, and not quite $\frac{1}{4}$ th of the whole length of the reptile, which is generally from two feet six to three feet. Head depressed, narrow before, a little dilated behind, and somewhat broader than the neck; covered above by plates, of which the nasal or most anterior one is triangular, its apex extending upwards and backwards, whilst its base is directed downwards, to form the anterior portion of the upper lip. Eyes prominent, nostrils large, and opening backwards. Body broad and flattish, with a loose fold of skin on each side of the neck, which it can extend at pleasure, and form into small wing-like or thin membranous processes, like what is done by the Coluber Naia of Linnæus. Scales carinated, with those of the two lowermost rows larger than any of the others. Greatest circumference about the middle of the body, and that is seldom more than three or three inches and a-half. Scuta usually about 130. Squamæ about 43.

The motion of this snake is very rapid, its disposition is very fierce, often almost apparently courting opposition, and its bite, in all the instances in which I have tried it, has soon occasioned death.

It delights in warm sandy situations, and is found pretty generally diffused over the whole of Southern Africa.

b. Without any loose Skin on the Neck, but with Fangs.

5. NAIA Somersetta.

Nacht Slang or Night Snake of the Inhabitants.

Ground colour above, a brick red or orange colour, and intersected by twenty-four or twenty-five black rings, which are generally of greatest breadth about the centre of the back, or under the belly. The one next to the head is by much the largest, and above has a pointed extension in front, which runs a short way along the crown of the head. At some distance before this ring, on the hinder part of the head, an irregular black spot is observed on each side; and from the upper lip of one side, to the same place on the opposite, directly cutting the eyes, extends a narrow transverse black band. Many of the black rings on the body have above an interrupted edging of yellowish white. Colour below a dirty reddish-white, more or less deeply tinged here and there with yellow. Head depressed, inclined to ovate, and its sides slightly dilated behind, thereby giving to it a little superiority in point of breadth over the neck. Above it is covered by large plates, the foremost of which, or the nasal one, is considerably elevated above the others, and triangular, with its apex extending upwards and backwards, whilst its base, which is slightly arched, is downwards, and forms the anterior part of the upper lip. The thickness of the body is pretty nearly the same throughout, and does not exceed that of a man's thumb. It increases but little behind the neck, yet it diminishes considerably and rather abruptly about the vent. Tail thickish along its whole length, terminated by a horny point, and measuring about $\frac{1}{3}$ of the whole

length of the snake, which is usually about two feet two or three inches. Scales smooth and slightly imbricate, towards neck and tail inclined to ovate, but, about the middle of the body, a little disposed to an orbicular shape. Scuta about 159, squamæ 20. Motion rather quick; disposition extremely fierce; and bite often mortal.

This sort of snake is but rarely met with here; indeed the present is the first I have seen, though for the last four years I have been endeavouring to procure one. The inhabitants assert that it only moves about during the night, and thereby account for its being so seldom found.

ELAPS.

a. With Fangs.

6. *ELAPS punctatus.*

Kousseband or Garter-Snake of the Inhabitants.

Ground colour, a deep jet-black, variously marked by minute white dots and blotches. Along the centre of the back the spots are largest, and of irregular forms, some being roundish, and others triangular, oblong or waved. On each side of this central row is a zig-zag line of white dots, which forms more or less frequent connections with the spots of the central row just mentioned. Immediately under this second row, is a third also of white dots, nearly straight, and extending distinctly from the head to the tail. Colour below black and white, disposed in alternate transverse narrow lines, which, under the tail, appear in a double series. Head small, somewhat ovate, roundish in front, and covered above by plates, the colour of which are black, with an interrupted whitish line running along the middle of the crown, and the sides slightly spotted with yellowish-white. Mouth small. Neck not less than the head; nor is any part of the body larger than the neck; so that the whole is therefore nearly of the same thickness, except the tail, which tapers gently to a fine slender point, and measures about one-eighth of the length of the whole, which, in the specimen described (the only one I have seen), was about nine inches, and nowhere thicker than a common quill. Scales smooth, slightly ovate, and scarcely, if at all, imbricate. Scuta 183, squamæ 38.

This is a rare species of snake at the Cape; its motion is quick; its appearance beautiful; and its bite highly venomous; having in several instances occasioned death while it continued alive in my possession. Other snakes besides this, which are either remarkable for their beauty, or the variety of their colours, when of a small size, are generally considered by the inhabitants as a *Kousseband*.

(*To be continued.*)