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On the Fangs of Poisonous Serpents.

By Thos. Smith Esq.

Read June 4. 1818.

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ON THE STRUCTURE

OF

THE POISONOUS FANGS OF SERPENTS.

BY

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Read before the ROYAL SOCIETY, *June* 4, 1818.

WHEN the poisonous fangs of serpents are attentively examined, a slit or suture may be observed extending along the convex side, from the foramen at the base to the aperture near the point. (Plate XXII. A. B. C. D.) This is a consequence of an unusual, and hitherto, I believe, entirely unnoticed structure, resulting from the mode of formation of the tube through which the poison flows.

My attention was called to this structure, by having lately received from my friend Mr. HERBERT RYDER, the assay master to the mint at Madras, the bones of the skull of a cobra de capello. I had some years since noticed the slit running along the convex side of the fang, in making a preparation of the head of the common viper of this country, in which it is distinctly seen when magnified; nevertheless, it seems to have been overlooked by all the numerous authors who have written upon the subject of the venomous fangs of the viper, and who, as far as structure is concerned, do not appear to have advanced beyond PLINY, to whom, and even anterior to whose time, the circumstance of their being tubular was well known.

All teeth being formed from a pulp, which has the shape that the tooth itself is destined to retain, it has probably been imagined that the tube of the poisonous fangs of serpents

was produced by a perforation passing through the pulp; this is not, however, the case, the tube being completely external, and formed by a deep longitudinal depression on the surface of the pulp.

In order to render this more clear, I must here observe that a slight longitudinal furrow, or depression, is to be seen on all the teeth of the cobra de capello; on those which are nearest to the poisonous fangs it is most evident, and occupies the convex side of their curvature; it however is confined entirely to the parietes of the tooth, and does not at all affect the form of its cavity.

But in the poisonous fangs, this depression is sunk deep into the substance of the tooth, and occupies a portion of the space, which in the others is allotted to the cavity which contains that part of the pulp which remains when the tooth is completely formed; and the edges of the depression being brought together along the greater part of the tooth, form the slit or suture that I have before described, but, being kept at a distance at both extremities, there results a foramen at the base and at the apex.

That this is a correct view of the mode in which the poisonous tube is formed, receives additional support from what I have observed in a species of the genus hydrus, of SCHNEIDER. In this serpent, as in many others nearly allied to it (les hydres of M. CUVIER), there are simple teeth on the same bone which supports the poisonous fangs. These teeth so much resemble the fangs, that it requires a very close investigation to distinguish between them; and this arises from the simple tooth having not only a longitudinal furrow exactly resembling the edges of the slit of the poisonous

fang, but also a very visible cavity at the base, where the foramen occurs in the others; and I have even found a fine tube in a tooth of this sort; it was however confined to the parietes, and did not affect the cavity of the tooth.

To this gradation from a slight superficial furrow to a deep depression, may be added the fact, that no traces of either are observable in the teeth of those serpents which are not armed with venomous fangs: this I found to be the case in a large species of boa.

As a consequence of the structure that I have described, if a horizontal section be made of a poisonous fang, in which the edges of the longitudinal depression are rounded, we shall have a cylindrical cavity (the poison tube) nearly surrounded by a semilunar one (the cavity which contains the pulp). This is shown in the annexed drawings of the fangs of the cobra de capello. (Pl. XXII. E. F. G. H.)

If, however, the edges of the depression should be angular (as in the rattle snake), the horizontal section shows a figure somewhat different, the poison tube being more completely surrounded by the cavity which contains the pulp. This is shown in the drawing by the section of a fang of an unknown species of serpent, which has exactly the same form as that of the rattle snake, but is twice as large. (Pl. XXII. I. K.)

In sections taken at different parts of the fang, the proportions between the poison tube and the cavity which contains the pulp will be different; the latter greatly increasing towards the base of the tooth; and near the apex the poison tube only will be seen, the fang at that part being solid. In a section also of a completely formed fang, the poison tube, at its anterior part, will be closely invested by the thickened

parietes of the cavity which contains the pulp; this cavity however is never obliterated, but exists in all the teeth of serpents, even when they have arrived at their full growth.

In the fangs, when completely formed, the edges of the slit, or suture, are frequently soldered together; when they are angular, so large a surface comes in contact, that they appear to be united by bony matter; in the cobra de capello, where they are rounded, though in very close contact, they do not cohere. In the viper, the slit seems filled up by the enamel, which being nearly transparent, a bristle in the poison tube may be seen through it, and causes an appearance as if the slit was open.

In the first case, therefore, there is no channel observable on the exterior of the tooth; the line of junction, however, of the edges of the slit is very distinctly marked: in the cobra de capello there is an external furrow from the foramen of the base to that of the apex, owing to the edges of the slit being rounded; the same is the case in those species of hydrus that I have examined.

I should observe, that the poison tube is not coated with enamel; for the membrane or capsule in which the tooth is formed, and from the inner surface of which it is well known that the enamel is deposited, does not pass between the edges of the slit into the poison tube; as, however, it passes over the slit, it will cover it with enamel, and in some cases, by that means alone, the edges become soldered together.

As some excuse for the errors which may be found in this paper, I must observe, that many of my observations have been confined to small teeth of a species of hydrus, which I was therefore obliged to dissect under the microscope.

I have to thank Sir EVERARD HOME for the great interest that he has taken in the object of my enquiry, and for the assistance which he has afforded me; on the value of which it would be needless to enlarge before the Members of this Society.

The drawings annexed to the paper will sufficiently attest my obligations to Mr. CLIFT. I owe much to him, in addition, for the zeal with which he exhibited to me every thing in the Museum of which he has the custody, that was likely to promote my views, and for information upon several points, which was required in the progress of the investigation.

DESCRIPTION OF PLATE XXII.

a, *b*, *c*, *d*, are representations of the poisonous fangs of the cobra de capello, in four stages of their growth.

A, B, C, D, are magnified representations of the same.

A, is a full grown fang firmly fixed to the bone.

B, is not quite perfect, the lower part of the foramen at the base not being yet formed.

C, in this a very small part of the foramen is formed.

D, the part of the tooth above the foramen alone appears.

E, F, G, are end views of B, C, D, showing the poison tube nearly surrounded by the cavity which contains the pulp, and the proportions between them, at three different parts of the tooth.

H, a section made by sawing the full grown fang A, just above the lower foramen, showing the rounded edges of the slit, which consequently leave a slight channel along the tooth.

I, K, magnified representations of sections of the fangs of

an unknown species of serpent, which have exactly the same form as those of the rattle snake.

I, is a section of a young fang taken about the middle: in this stage of growth the cavity which contains the pulp almost entirely surrounds the poison tube, and the edges of the depression which form the suture are seen to be angular, and present so large a surface to each other, that the suture is completely filled up even in this early stage of growth.

K, is a section of a full grown fang of the same species of serpent at the same part as the preceding. Here the cavity of the pulp is seen greatly contracted from the more advanced stage of growth.

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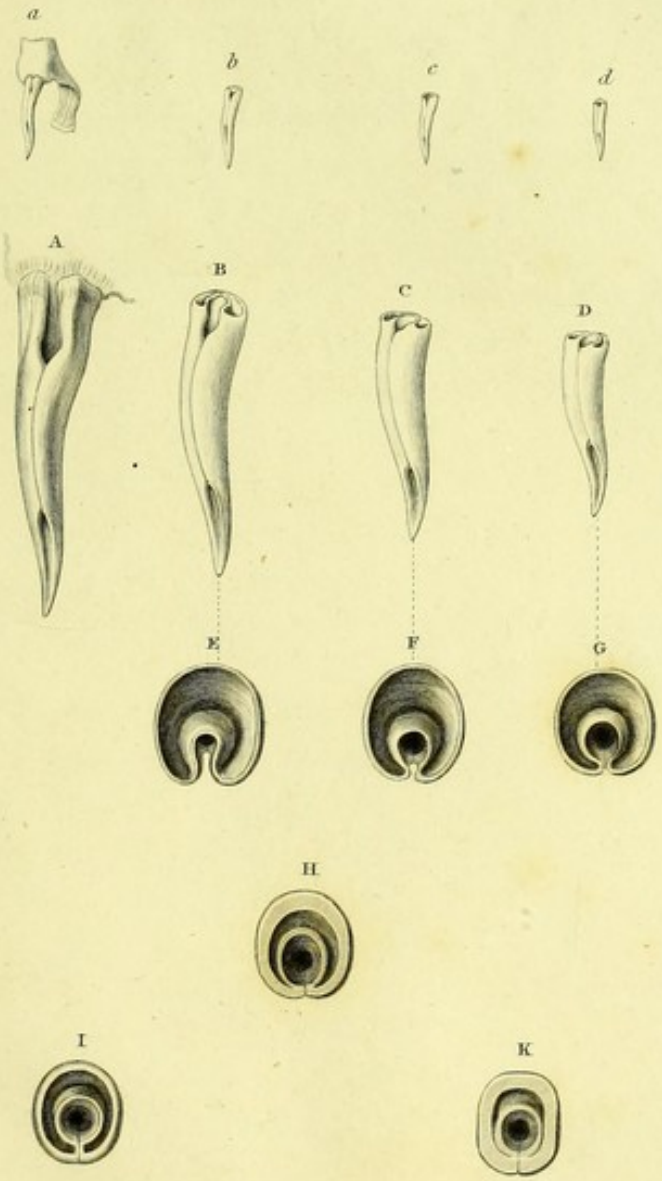

W. Clift. del.

F. Basire. sc.