INTERCOSTAL BLOOD-VESSELS IN MESOZOIC CROCODILES.

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PLATE 21.

ABOUT the year 1916 five consecutive vertebræ of *Steneosaurus* were found in the Kimmeridge Clay on the north side of Shotover Hill near Oxford. When cleaned, four were found to be most distinctly marked with conspicuous, whitish, Y-shaped markings on the side of the bodies of the vertebræ. The markings were metamerically repeated and therefore cannot be considered to be artifact. Although no colour-mark is noticeable on the fifth vertebra, the stem of the Y is just indicated by a minute, hardly noticeable depression upon one side of the bone only. These markings we attributed to former blood-vessels. At my request Mr. R. H. Burne, of the Royal College of Surgeons, has been good enough to dissect a small recent crocodile, and has obtained confirmatory results. He found that the intercostal arteries lie more or less towards the centre of each vertebral body, nearer to the hinder than to the forward end, and on receiving his preparation I was able to corroborate his observation. We were not, however, able to perceive any branching of the artery in the position so clearly marked out upon the fossil bones, but then the example dissected was a far smaller animal (Plate 21, Fig. 2).

Through the courtesy of Dr. A. Smith Woodward and Dr. C. W. Andrews I was able to look through a long series of fossil crocodilian vertebræ in the National Collection. In no case did any vertebra show colour-markings like those on the Shotover bones, but there were some three or four specimens that were slightly grooved on the sides, possibly through the former existence of intercostal arteries closely pressed against the growing bone.

In the Phillips collection in the Museum at Oxford I was more fortunate. In a series of some eight or nine nicely preserved vertebræ of *Teleosaurus subulidens* Phillips from the Great Oolite at Enslow Bridge two vertebræ show the grooves on both sides, and one vertebra shows a groove on one side only. The branching of the vessel is, however, not shown in any of these vertebræ (Plate 21, Fig. 3).

The fact that a growing bone will give way to and mould itself round a blood vessel is of course well-known. But lateral groovings on vertebræ, such as those now figured, do not appear

to have been recorded before, and their existence would probably have passed unnoticed but for the colour-markings exhibited by the Shotover specimens.

Two explanations have occurred to me to account for the colour-prints of the vessels ; but both make certain demands on the imagination. In the first case I imagine a recently defunct healthy crocodile, partly eviscerated by some predatory beast, and then sun-dried, so that the intercostal blood-vessels dried on the bodies of the vertebræ which were elsewhere bared. If such a prepared bone were exposed to the staining action of a ferruginous soil, the bare bone might get browned while the part under the vessel might remain white.

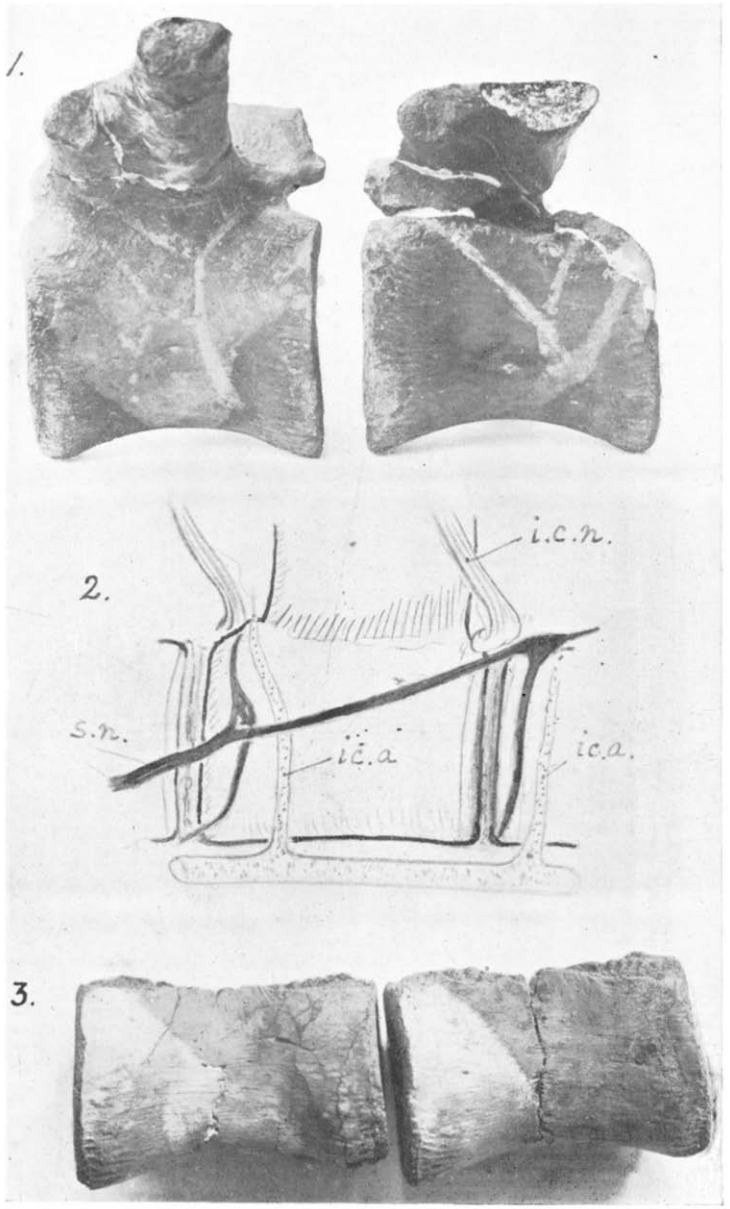
A colour-print thus produced might then have become " fixed " by fossilisation.

The second explanation is that the crocodile was old, and suffered from calcified arteries. On this assumption, during the process of decay and of embedding in the clay, linear deposits of calcium phosphate would have lain upon the sides of the vertebræ. It will be for chemists to think out some chemical process by which such calcified tissues may have hindered the formation of brown hydrated oxide of iron along the course of the arteries. It is certain that reptiles suffered severely during the Mesozoic period from various complaints resulting in very varied exostoses, some cases of which have been recently described by Baron Nopcsa.

The specimens described were referred to in letters to the *Times* for November 7, December 7 and 12, 1923.

EXPLANATION OF PLATE 21.

1. Thoracic vertebræ of *Steneosaurus* showing marking of blood-vessels.
2. Dissection of recent Crocodile. *ic.a.* intercostal artery, *i.c.n.* intercostal nerve, *s.n.* sympathetic nerve. (After Burne).
3. Vertebræ of *Teleosaurus subulidens* Phillips showing lateral grooves.



CROCODILIAN VERTEBRÆ SHOWING MARKINGS OF INTERCOSTAL BLOOD VESSELS.

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