XII. *An Account of some fossil remains of the Rhinoceros, discovered by Mr.* Whitby, *in a cavern inclosed in the lime-stone rock, from which he is forming the Break-water at Plymouth. By Sir* Everard Home, *Bart. V. P. R. S.*

Read February 27, 1817.

When Mr. Whitby engaged to superintend this most arduous undertaking, Sir Joseph Banks requested him to examine narrowly any caverns he might meet with in the rock, and have the bones, or any other fossil remains that were met with, carefully preserved.

Mr. Whitby in compliance with this request, in November 1816, sent up to Sir Joseph Banks a box of fossil bones, which are the subject of the present Paper.

Mr. Whitby states the bones to have been found in a cavern, in the solid lime-stone rock, 15 feet wide, 45 feet long, taking the direction into the cliff, and 12 feet deep.

This cavern was filled with solid clay, in which the bones were imbedded, and lay about 3 feet above the bottom of the cavern. The lime-stone quarries of Oreston, in which this cavern was met with, are situated on the south side of Catwater, and about one mile from Plymouth.

When Mr. Whitby began to work this quarry, the rock was 74 feet perpendicular above high water; the bones were found 70 feet below the surface of the rock, and about 4 feet above high water mark. He quarried 60 feet horizontally into the cliff, before he came to the cavern. Before

Mr. WHITBY began to quarry here, 100 feet had been quarried into the cliff, so that 160 feet was the distance between the cavern and the original edge of the cliff; in all other directions the quarries consist of compact lime-stone to a great extent. The workmen came to this cavern by blasting through the solid rock, and at the depth in the rock at which it was met with, the surrounding lime-stone being every where equally strong, and requiring the same labour to quarry it; Mr. WHITBY saw no possibility of the cavern having had any external communication, through the rock in which it was enclosed.

The cavern was quarried within about a foot of its bottom, the lower clay was not all cleared out, but the bottom was sounded by an iron crow, and rock was every where met with.

Many such caverns, Mr. WHITBY says, have been met with in these quarries, and, in some instances, the rock on the inside was crusted with stalactite; but nothing of that kind was met with in the cavern in which the bones were found; so that there is no proof that any opening in the rock from above had been closed by infiltration.

The quarry in which this cavern was met with, is directly opposite the place where Mr. WHITBY lands, every time he visits the quarries, and therefore his attention was more naturally drawn to it than to any of the others; and as, in the contract of quarrying, there are two prices, one for rock, another for clay-earth and rubbish, and two officers attend, one, for the crown, and the other on the part of the contractors, who measure the contents of all caverns that contain clay, or other soft materials, it is only necessary to mention

that these officers state, that the rock surrounding the cavern, was equally hard with the other parts, requiring the same force to blast it, and that the quarrying was paid for accordingly.

The following is a list of the bones sent up by Mr. WHITBY to Sir JOSEPH BANKS; they all belonged to the Rhinoceros; but it will appear in the enumeration that they were parts of the skeletons of three different animals.

The third grinding tooth from behind, on the right side of the upper jaw.

The third grinder from the left side of the same jaw.

The second grinder from behind, on the right side of the lower jaw.

The second grinder from before, on the left side of the upper jaw.

The third or middle grinder on the left side of the lower jaw.

One of the smallest of the anterior grinders.

The upper portion of the radius of the right fore leg.

A portion of the fifth dorsal vertebra.

A portion of the cotyloid cavity of the scapula of the left shoulder.

The upper part of the atlas, with a portion of the articulating surface.

The olecranon of the right fore leg.

The first phalanx of one of the toes of the fore foot.

The lower extremity of the left os humeri.

Upper part of the right os humeri.

The head of the left os femoris.

The lower extremity of ditto.

One of the bones of the carpus of the left foot.

The lower extremity of the right ulna.

The lower extremity of the inside toe of the right foot.

The head of the os humeri.

The upper part of the right femor with the epiphysis separated.

The metacarpal bone of the middle toe of the right fore foot.

All these bones are in the most perfect state of preservation; almost every part of the surface entire, to a degree that I have never seen in specimens of fossil bones. The metacarpal bone is complete except a small injury on one side of it, which it received probably at the time it was dug out of the clay.

The teeth of the Rhinoceros differing in their form as well as structure, from those of every known animal, it was readily ascertained that these fossil teeth belonged to that animal; and it is a circumstance extremely satisfactory, that every one of the portions of bones dug up, possessed some distinguishing character, so as not only to enable me to ascertain the particular bone to which each broken portion belonged, but that character was also sufficiently well marked, to make it clear that the bones belonged to the Rhinoceros.

It was very much in our favour, that the elephant is the only animal whose equality of size could lead us into any mistake on this subject.

The metatarsal bone, the only one which was sent up entire, was immediately recognized to belong to the Rhinoceros, since these bones in that animal are nearly double the length of the same bones in the elephant.

Mr. BROOKS, Surgeon, and Teacher of Anatomy in Blenheim Street, has in his collection the skeleton of a Rhinoceros, which is considered to have been the largest ever seen in this country.

I took advantage of Mr. BROOKS's kindness, not only to compare all the fragments of these bones, with the entire ones in the skeleton, but also to measure with some accuracy the length and breadth of the metacarpal bone in the fossil state and that in the skeleton, so that we might form some comparative idea of the size of the two animals, to which they belonged.

The skeleton stands 5 feet 8 inches high, the metacarpal bone is $7\frac{1}{8}$ inches long, $2\frac{1}{8}$ inches broad. The metacarpal bone, in a fossil state, is $8\frac{1}{8}$ inches long, and $2\frac{1}{4}$ inches broad.

All the bones appear to have belonged to Rhinoceroses of nearly the same size, except the cotyloid cavity of the left scapula, which evidently was part of the skeleton of a smaller animal, and the olecranon of the right fore leg of one still smaller.

It is deserving of remark, that all the bones found in this cavern belonged to the same species of animal. Great pains were taken to ascertain whether there were any other bones than those sent up to London, but no others were discovered.

Professor BRANDE, Secretary to the Society, analysed a portion of one of the bones and a portion of one of the teeth. He remarked, that he had never met with fossil bones so purely earthy, and free of extraneous matters.

When the bone was heated, it exhaled scarcely any smell of animal matter, nor had it lost any of its natural whiteness.

It consisted of

60 Phosphate of lime.
28 Carbonate of lime.
2 Animal matter.
10 Water.

The tooth consisted of

78 Phosphate of lime.
8 Carbonate of lime.
8 Extraneous earthy matter.
6 Animal matter, water and loss.

At my request he made at the same time an analysis of a Rhinoceros's tooth found at Brentford, and of the tibia of an Hippopotamus found at the same place, as well as of the rib of the fossil remains of an animal of the fish tribe found at Lyme; an account of the Brentford bones, as well as of the bones at Lyme, has a place in the Philosophical Transactions.

The Rhinoceros's tooth from Brentford contained

70 Phosphate of lime.
6 Carbonate of lime.
20 Extraneous earthy matter.
4 Animal matter and water.

The tibia of the Hippopotamus contained

50 Phosphate of lime.
5 Carbonate of lime.
24 Siliceous earth.
10 Aluminous earth.
4 Oxide of iron.
2 Water.
5 Animal matter.

The fish's rib contained

50 Phosphate of lime.
19 Carbonate of lime.
15 Aluminous earth.
5 Siliceous earth.
8 Water.
3 Animal matter.

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