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**Memoranda of Earthquakes in Upper
Assam from January 1839 to
September 1843**

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Notes

They adhere so strongly to the rock, that their precise external appearance has not been determined. In the inside of this mass small black grains may be seen resembling small seeds, the black matter of which is carbonaceous. When this is burnt off, the remainder of the fossil has been found on analysing it to consist of phosphate and carbonate of lime. It is supposed that the black grains are *seeds* which have passed undigested through the intestines, and have assumed in the passage such positions as these foreign bodies would and often do in the faeces.

A remarkable and beautiful result has been obtained by the application of the power of chemical analysis to these fragments. These are found to contain uric acid in the proportion of about one-half per cent., and from the circumstances under which it occurs it is concluded that the coprolite must have been dropped by a bird rather than any other animal. It also appears that the animal was in all probability omnivorous, a conclusion suggested by the analysis of the coprolite, and confirmed by the probable presence of seeds, as above alluded to.

II. *Memoranda of EARTHQUAKES IN UPPER ASSAM from January 1839 to September 1843.* By Capt. HANNAY, B. N. I.

[From the *Journal of the Asiatic Society of Bengal*, No. 58.]

1839. JANUARY 14th, 9 P. M. Shock of an earthquake felt at Suddeeah. Direction apparently from S. W. to N. E., preceded some days by rain and heavy snow in the mountains, air very cold.

June 3d, 8 P. M. At Suddeeah, apparently from S. to N., strong N. E. wind. Burrumpooter high, wet and disagreeable weather. Season unusually rainy from March up to this date. Small-pox prevalent.

1840. March 4th, 1 P. M. A total eclipse of the sun. When the sun was obscured the air was unusually cold and disagreeable to the feelings, even to nausea. About an hour after the eclipse (about 1 P. M.) a smart shock of an earthquake, and about ten minutes afterwards another; both shocks appeared to have come from the south. Sky cloudless, but atmosphere hazy.

1841. Feb. 9th or 11th. Felt at Gowhatty. This earthquake was different to those above mentioned; it was accompanied by a low rumbling noise; was sharp and stunning, as if a blow had been struck under the jaw; the others alluded to appeared, on the contrary, to have more of a trembling or rocking motion.

N.B. In February, 1841, at night, a splendid meteor was seen at Seesagur*, and in other stations in Upper Assam. It passed from

* Most of the shocks felt at Seesagur do not appear to be felt lower down the valley, but at Fezpoor earthquakes are said to be very frequent. There are no volcanoes in the neighbourhood, but the line of the Naga hills (nearer ranges) abound in iron and coal and numerous Petroleum springs, and in the Singpho country are springs of white mud.

east to west of the heavens, and burst with a loud report, the first like the firing of several large guns, and ending exactly like musketry file firing. Individuals on the frontier, who had not seen the meteor, imagined that some of the outposts had been attacked.

1842. January 4th, $7\frac{1}{2}$ P. M. A smart shock felt at Seesagur; the weather gloomy, cold, and threatening rain; cannot speak as to direction; shock similar in motion to those already noticed.

October 29th, 8 P. M. A smart shock, direction apparently from S. W. to N. E., trembling motion.

1843. April 6th, 8 P. M. After a very hot and close sultry evening, a severe shock of an earthquake at Dibrooghur lasted several minutes. The motion, however, was only trembling, affecting those houses which had posts built up by walls; direction appeared to be from W. or S. W.

1843. April 7th, Midnight. Slight shock felt at Dibrooghur. N. B. Both these earthquakes felt at Seesagur, Jeypoor, and all over Upper Assam.

June 15th, 11 A. M. Smart shock; motion vertical.

17th, 8 P. M. A very smart shock; at first slight, and followed by a severer one; motion undulating, and, from the position of a clock which was stopped, must have come from S. W. or W.; lasted altogether about a minute. Weather rainy, with occasional light squalls from S. W. These shocks felt at Dibroo, Jeypoor, and Sakenah; that of this date at a few minutes past eight reported by the officer to have thrown down a portion of the bank of the Burrumpooter. An earthquake on this day at Ceylon.

September 3d, $2\frac{1}{2}$ A. M. After as hot and sultry a day (the 2d) as I ever felt, the clouds gathered to S. W., indicating rain, but passed off without any; night very close and sultry; awoke by a smart shock of an earthquake; cannot speak as to duration.

$7\frac{1}{2}$ P. M. After a very hot day, clouds gathered at S. E., very close and sultry; squall came on a little before sun-set; vivid lightning all round the heavens previous to squall, making an extraordinary noise in the heavens over head, like the falling of heavy rain on distant jungle, or like the rushing of wind through a funnel; with this noise you heard an occasional growl like distant thunder.

When the rain fell, this noise, which had continued for some time, ceased; thunder very high in the heavens, but the lightning one blaze all round. While at dinner, smart shock from the S.

III. OSSEOUS CENTRES *of the* VERTEBRÆ *of* CARTILAGINOUS FISHES.

It is not generally known, although alluded to by M. Agassiz in the introduction to his great work on fossil fishes, that many if not all cartilaginous fishes (sharks, rays, &c.), have true bony nuclei