Dinosaurian gastroliths.

Contributors

Wieland, G. R. 1865-1953.
Royal College of Surgeons of England

Publication/Creation

[Washington, D.C.] : [American Association for the Advancement of Science], 1906.

Persistent URL

https://wellcomecollection.org/works/gw2funqd

Provider

Royal College of Surgeons

License and attribution

This material has been provided by This material has been provided by The Royal College of Surgeons of England. The original may be consulted at The Royal College of Surgeons of England. where the originals may be consulted. The copyright of this item has not been evaluated. Please refer to the original publisher/creator of this item for more information. You are free to use this item in any way that is permitted by the copyright and related rights legislation that applies to your use.
See rightsstatements.org for more information.

wellcome collection

Wellcome Collection
183 Euston Road
London NW1 2BE UK
T +44 (0)20 7611 8722
E library@wellcomecollection.org
https://wellcomecollection.org

819

(19)

[*Reprinted from* SCIENCE, *N. S., Vol. XXIII., No. 595, Pages 819–821, May 25, 1906.*]

DINOSAURIAN GASTROLITHS.

THE occurrence of worn and polished quartz pebbles in such close association with plesiosaur skeletons of the Kansas chalk as to suggest that in life these reptiles were pebble swallowers was first noted by Professor Mudge and later by Williston.[1] More recently these observations of Mudge and Williston have been confirmed in the most conclusive manner by Mr. Barnum Brown,[2] who found siliceous pebbles almost invariably accompanying the plesiosaur skeletons, which occur in considerable number in the Niobrara shales of South Dakota. In some instances the pebbles were even found *en masse,* in one large specimen as many as a half bushel being present, ranging from the size of a walnut to four inches across.

From the regularity of appearance and association, Mr. Brown, as it seems to one familiar with the Dakotan Niobrara shales, is very correctly led to the conclusion that these pebbles served as 'stomach stones.' Such attrition stones, I was some years since informed, are habitually swallowed by the Florida alligators, and doubtless the habit of swallowing stomach stones, or *gastroliths,* as I shall conveniently call them, is and has been widespread amongst the reptilia, partly as in the birds.

[1] Field Columbian Museum Publication (Chicago), No. 73, p. 75.

[2] SCIENCE, N. S., Vol. XIX., No. 501, pp. 184, 185, August 5, 1904.

Furthermore, Williston in his most recent contribution on North American Plesiosaurs[3] adds the following remarks to his earlier statement: "It was with a specimen of an elasmosaur (*E. Snowii*) that Mudge first noticed the occurrence of the peculiar siliceous pebbles which he described; and it was also with another, a large species yet unnamed from the Benton Cretaceous, that the like specimens were found described by me in 1892. That this habit was not confined to this type of plesiosaur, however, is certain, since I have also observed it in different species of *Polycotylus* and *Trinacromerum,* both relatively short-necked and long-headed plesiosaurs. Much doubt and even ridicule have been thrown upon this supposed habit, and the use of pebbles by these reptiles. But the cumulative testimony of writers, both on this and the other side of the Atlantic, is quite conclusive. It has been assumed that the plesiosaurs could not have utilized the pebbles as a means of digestion in a muscular stomach. Dr. Eastman, who has vigorously opposed the idea of the possession of such a bird-like structure on the part of the plesiosaurs, seems to have been quite unaware that the modern crocodiles have a real bird-like and muscular gizzard, and are so described by Dr. Gadow. The crocodiles have a similar habit, or at least such a habit has been imputed to them, and it is not at all unreasonable that, strange as it may seem, the plesiosaurs had a real, muscular bird-like gizzard, which utilized the pebbles in whatever way the crocodiles may utilize them."

Certainly in connection with the foregoing facts it is of more than passing interest that at least some of the sauropodous Dinosauria were stone-swallowers. For one can not help eagerly scanning the record for every indica-

[3] *Am. Jour. Sci.*, Vol. XXI., March, 1906, p. 226.

tion of the true habits and structure of these extraordinary animals. The evidence for the use of gastroliths by the sauropods rests on at least one authentic instance—namely, that of a large sauropod observed at the northern end of the Big Horn Mountains by Mr. Charles Speer, of Billings, Montana. Mr. Speer found in immediate association with a considerable portion of the skeleton about two dozen quartz gastroliths, which, with various skeletal parts, he took back to Billings, where I saw all this material, September 19, 1902. These specimens were displayed in the window of the principal bank of Billings, of which Mr. Speer is cashier, and he has very courteously sent to the writer at the Yale Museum nine of these pebbles weighing a little over a kilogram in all, and varying from smaller forms to several inches in diameter. These flints vary from gray to brightly colored red and more or less mottled jasper, and include one very highly polished siliceous nodule quite filled with bryozoa and corals, and probably sponge spicules. This gastrolith shows the effects of secondary or *gastral wear,* its more depressed portions clearly displaying the original rougher true pebble surface. The finely, and even highly, polished and fresh surfaces of all the pebbles would, however, immediately arrest one's attention. In fact the entire surfaces are so surprisingly smooth and clear as to at first suggest a very recent origin, rather than ancient use. It is surmised, however, that immediately following the fossilization of the dinosaurian host, these gastroliths were incased in protecting calcite and clay, and that they were never subsequently disturbed till finally eroded out just previous to collection. Various rounded and notably smooth pebbles I observed when making the latter portion of the excavation from which I secured the type specimen of *Barosaurus,* in the summer of

1898, now appear to indicate that gastroliths accompanied that fossil, and it is very probable that many instances of true gastroliths have been overlooked.

The lizards, as I have been shown by Mr. A. Hermann, a most keenly observant lizard fancier, swallow pebbles when feeding on a pebbly cage floor; and he informs me that some of his species swallow very large pebbles for their size, these being soon passed. It can, of course, be that such pebble-swallowing is partly independent of stomach structure; but in view of the fact that the Dinosaurs retained and polished the pebbles, it is fair to assume that their gastrolithic habit establishes the presence of additional important structural analogies with the birds.

G. R. Wieland.