

GASTROLITH IDENTIFICATION AND REPLICATION BY MEANS OF ARTIFICIAL DIGESTION

Abstract

Gastroliths play an important role in digestion for many animals, both extinct and extant, including birds, non-avian dinosaurs, and crocodilians. The animal digestive system is primarily composed of soft tissues that do not preserve well, but because gastroliths readily preserve, we can use them as a tool to understand the feeding habits of extinct animals like dinosaurs. Identification of gastroliths is, however, an uncertain practice, owing to the fact that highly polished non-biological exoliths can often closely mimic their shape and size. Unless they are found *in situ*, there is no established method for confidently identifying gastroliths. This study is an attempt to circumvent this issue by establishing key textural features that can be used to distinguish non-biological exoliths from gastroliths, even when material is not associated with *in situ* remains, by replicating gastroliths in the laboratory and comparing their surface features to those of suspected dinosauria (sauropod) gastroliths. Owing to the fact that cobbles are exposed to very different chemical and physical processes in a digestive tract compared to in the external environment (a fluvial system, for instance), I hypothesize that patterns of surface micro-wear will be significantly different between replicated gastroliths and non-biological exoliths.

To test this hypothesis, we placed quartz-rich cobbles in a rock tumbler and added HCl acid and the digestive enzyme pepsin to replicate the chemical conditions of a stomach. In addition to these basic components, the main test group contains pine needles to simulate a potential Jurassic sauropod diet. Three more test groups were run to control for variables: horsetail reeds as a control food, no food to control for the effect of food, and water to control for the stomach environment. Samples were tumbled for approximately 900 hours, and digital macro-images were taken throughout the process. Additionally, SEM images were taken of the cobble surfaces both before and after tumbling. Results are pending, but I suspect, based on work by previous researchers that all samples will be similarly polished, but the pine needle group will best replicate known gastrolith surface features. If this is the case, then researchers can use surface features to more confidently identify gastroliths in the future.

Geological Society of America Abstracts with Programs.

Vol. 53, No. 3, 2021

doi: 10.1130/abs/2021NC-362874

© Copyright 2021 The Geological Society of America (GSA), all rights reserved.

Author

Quintin Powers

Augustana CollegeGeology Department

