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A review of gastrolith function with implications for fossil vertebrates and a revised classification

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Misleading interpretations of "gastroliths" in fossil taxa have complicated the use of this term in palaeontology. This paper reviews the definitions and ascribed functions of gastroliths. According to the suggested definition, gastroliths are hard objects within the digestive tract of animals—without specification of the mechanisms that are responsible for their accumulation. To further improve definitions, the origin–based terms "bio–gastrolith", "patho–gastrolith", and "geo–gastrolith" are introduced. The term "exolith" is introduced for isolated clasts with a possible history as geo–gastroliths. Hypotheses about the function of stomach stones in fossil and extant taxa are reviewed, discussed and supplemented with new research. Trituration and mixing of foodstuff are the generally accepted functions of gastroliths in many vertebrates, including birds. In contrast, ballast provided by swallowed stones is considered to be of limited importance for buoyancy in aquatic animals. Other functional hypotheses include mineral supply and storage, stomach cleaning, maintenance of a beneficial microbial gut flora, destruction of parasites and alleviation of hunger. Accidental ingestion of sediment, either by being mistaken for prey, by being attached to it, during playing or due to pathological behaviour, is considered to be common. Different functions may overlap in various taxa.

Key words: Gastroliths, stomach stones, gastrolith function, palaeobiology, ingesta, vertebrates, digestion, digestive tract

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