METHODOLOGICAL DEVELOPMENT FOR EXTRACTING THREE-DIMENSIONAL SPECIMENS OF CLOUDINA LUCIANOI (BEURLEN E SOMMER, 1957)

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Abstract

This study presents a new 3D method for calcareous skeleton Cloudina lucianoi (Beurlen & Sommer, 1957) extraction. These skeletons occur in limestone matrix of Nama Group, Namibia and Corumbá Group, Brazil, Ediacaran sections. This work improves morphological analysis and provides insights into phylogenetic affinities. New protocols for samples preparation and 3D calcareous skeletons extraction from limestones matrix is presented. Cloudina lucianoi is an Ediacaran fossil attributed to the phylum Cnidaria or Annelida. The studied material came from outcrops of the Tamengo Formation in Mato Grosso do Sul of Brazil and from the Nama Group in southern Namibia, both sections are attributed to the uppermost Ediacaran. The extraction of Cloudina lucianoi specimens from limestones consisted of a series of physical and chemical procedures aiming at separating skeletons from the rock matrix. The samples were submitted to a chemical treatment comprising two methods: Solution Drip System (SD) and Immersion System (SI). Different concentrations of acetic acid (1.8% and 4%) were used in both systems in order to evaluate the effectiveness of different acid concentrations in disaggregating the studied samples. The attacks under both SD and Si modalities took place simultaneously in order to observe the reactions and evaluate the effectiveness of the disaggregation process. The results of this treatment of the samples are promising, with the recovery of three-dimensional Cloudina lucianoi specimens, internal molds and external surface of the skeletons. These specimens allow the observation of important morphological features, such as the funnel-in-funnel construction, lamellar structure of funnel walls, and annular striations on outer funnel walls. In a preliminary analysis, the drip system with a 4% diluted acid solution has proven to be more effective. A geochemical analysis (EDS) of samples from the Tamengo Formation and the Nama Group revealed a lower magnesium carbonate (<2%), although the skeletons have a significantly higher amount of magnesium (>15%Mg), which appears to provide greater resistance to acid attack when compared to the calcium carbonate matrix. This different Mg concentration appears to be related to the differential disaggregation of the matrix allowing the separation of the skeletons in 3D. In conclusion, the integration of thin section observations and morphological characterization of chemically extracted three-dimensional skeletons can provide key morphological information about some of the earliest known animal skeletons.

Keyword

Paleontology, Ediacaran, Cloudina lucianoi, 3D Fossil extraction