

Taxonomic reassessment of *Cloudina*? from the Taylor Formation, Antarctica

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ABSTRACT

Fossils represented as *Cloudina*? were reported in the Antarctic Taylor Formation by Yochelson and Stump in 1977. Their assessment presented thin sections of specimens derived from an oolitic limestone breccia. Notably, one thin section contained a single presumed trilobite fragment, leading the authors to attribute the materials to the early Cambrian. The remaining fossil materials were characterized as tubes of varying preservational quality, likely overprinted by recrystallization. The structure of tubular fossils, as viewed in thin section, appeared bilayered, showing a thicker outer layer surrounding a thinner, darker, inner layer, enveloping the innermost lumen or cavity of the tube. While one specimen was reported to have two layers, it lacked other identifying features, such as the characteristic nested structure typical of *Cloudina*. The authors acknowledged the dissimilarity of their specimens to those reported from Namibia by G.J.B. Germs but noted similarities to *Cloudina borrelloii* from the San Juan Province, Argentina described by Yochelson and Herrera in 1974. This led the authors to cautiously identify their Antarctic specimens as *Cloudina*?, though subsequent reports expressed skepticism about placing the Argentinian materials within the *Cloudina* genus, suggesting a more plausible association with *Salterella* or *Acuticloudina*. Based on this single report, Ediacaran paleontologists have often, but tenuously, expanded the geographic distribution of *Cloudina* to include Antarctica. As the International Commission on Stratigraphy's Ediacaran Subcommission has defined the use of Ediacaran tubicolus organisms, including all plausible designations of *Cloudina*, as the leading index fossil group for placement of the terminal Ediacaran stage, this long-overdue reexamination is both timely and important for gaining a clearer picture of the cosmopolitan nature of this genus. Our initial analysis shows that these tubicolus taxa are single-walled, non-nested, and smooth-walled, gently tapering, conical tubes. Herein, we aim to reevaluate the taxonomy of these fossils using modern microanalysis and high-resolution photography to shed light on their potential phylogeny and evaluate their role in the broader context of late Ediacaran to early Cambrian tubular fossils.