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# IX Congreso Latinoamericano Paleontología

Organizan:

20 - 24 de Setiembre 2016, Lima - Perú

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# ENIGMATIC PRESERVATION OF NEOPROTEROZOIC VASE-SHAPED MICROFOSSIL (VSMS) IN DOLOSTONE CLAST FROM DIAMICTITE OF URUCUM FORMATION, MATO GROSSO DO SUL, BRAZIL

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South and east of the city of Corumbá (Mato Grosso do Sul, Brazil), in the southern Paraguay Belt, the Neoproterozoic Jacadigo Group, remarkable for the more than 300 m of banded iron-formation in its upper portion (Santa Cruz Formation), is exposed in natural outcrops and mining operations. Conformably beneath this succession, the Urucum Formation, a siliciclastic succession with subordinate carbonate, comprises the basal part of the group. In a thick diamictite within alluvial fan deposits near the base of this formation, gravel- to cobble-sized dolomitic clasts exhibit well-preserved Vase-Shaped Microfossils (VSMs), typically entombed within carbonate cement, as well as small amounts of ghost ooids, detrital grains, and authigenic quartz. Fibrous to bladed dolomite forms a thin rim (<10-µm-thick) around most of the VSMs and partially coats the inside wall or, more rarely, fills some tests. More commonly, mosaic dolospar fills the VSMs and also comprises most of the rock. Although little of the original primary rock fabric is observable in thin section due to post-depositional recrystallization and dolomitization, the VSMs retain both their original shape and evidence of original organic, siliceous, and organo-siliceous wall compositions, as established by petrographic microscopy and Raman spectroscopy. This enigmatic preservation appears to be related to very early overgrowth of carbonate cement that encased the VSMs during early marine diagenesis in the phreatic zone. This diagenetic environment favors precipitation of acicular aragonite or bladed high-Mg calcite cement. The current fibrous and bladed aspect of the carbonate surrounding the VSMs is interpreted as largely a palimpsestic (mimic replacement) habit that survived later recrystallization and replacement by dolomite of the original cement. This probably occurred under the influence of meteoric or mixed waters during the final stages of early diagenesis. Continuous recrystallization during burial diagenesis produced the dolospar mosaic. Despite post-depositional alteration, the rim cement shielded the VSMs, thereby preserving their shape and limiting the degradation of their walls, which has important implications for inferring biological affinities and understanding early siliceous biomineralization. These observations point to a marine origin for the Urucum VSMs, as interpreted for practically all other Neoproterozoic VSMs, which differs markedly from the continental depositional setting attributed to the Urucum diamictite containing clasts bearing these microfossils.