3.2 Billion-year-old Organic-walled Microfossils

Life on earth during the Archaean eon has received increasing support based on geochemical, sedimentological and palaeontological evidence. Ambiguities and controversies exist regarding the biogenicity and syngeneity of the record older than late Archaean. Very recently, Javaux et al. (*Nature*, v.463, pp.934-938, 2009) reported large (about 300 µm in diameter), well preserved carbonaceous spheroidal microstructures in Mesoarchaean shales and siltstones of the Moodies Group of South Africa, the earth's oldest siliciclastic alluvial to tidal estuarine deposits. These microstructures are interpreted as organic-walled microfossils on the basis of petrographic and geochemical evidence for their endogenicity and syngencity, their carbonaceous composition, cellular morphology and ultra structure, occurrence in populations, taphonomic features of soft wall deformation, and the geological context plausible for life, as well as a lack of abiotic explanation falsifying a biological origin. These are the oldest and largest Archaean organic-walled spheroidal microfossils reported so far. Their observations suggest that relatively large microorganisms cohabited with earlier reported benthic microbial mats (Noffke et al. *Geology*, v.34, pp.253-256, 2006) in the photic zone of marginal marine siliciclastic environments 3.2 billion years ago.

While analyzing this report, Roger Buick (*Nature*, v.463, pp.885-886, 2010) views that Javaux and colleagues, Archaean acritarchs are rather larger, lacking in any of the diagnostic features of eukaryotes, excluding biomarker geochemistry, which was not examined. This does not mean that they are not eukaryotes. The biological relationships of these large Archaean microfossils are not resolved as yet, and the intriguing possibility that they are indeed eukaryotes remains to be refuted. He opined that a hydrocarbon biomarker study of shale in the Moodies Group from where these oldest microfossils are extracted, may resolve the issue. But until then, acritarchs must remain tantalizingly ambiguous but nonetheless significantly old and surprisingly large –

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