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POST-GLACIAL (VARANGER) MICROBIALITES AND ASSOCIATED STRUCTURES IN THE ARARAS AND BASAL ALTO PARAGUAI GROUPS, SOUTHEASTERN AMAZON CRATON, BRAZIL (LATE NEOPROTEROZOIC-CAMBRIAN?)

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That the Earth's Proterozoic benthos was dominated by mostly nearshore marine and intertidal prokaryotes is evident from the robust record of stromatolites and other microbial laminites in carbonate rocks (e.g. Walter, 1976, 1992; Awramik & Sprinkle, 1999; Grotzinger & Knoll, 1999). Moreover, a broad range of formerly problematic sedimentary structures in siliciclastic rocks of this age have recently been interpreted as the result of desiccation, partial erosion, and soft-deformation of unusually cohesive, microbially or organically bound mud, silt, and sand also in shallow-marine and peritidal settings (e.g. Hagadorn & Bottjer,1997; Gehling, 1999; Seilacher, 1999; Bouougri & Porada, 2002).

Neoproterozoic successions on the southeastern margin of the Amazon Craton, central-western Brazil, include post-glacial (Varanger) carbonate rocks of the Araras Group and siliciclastics of the basal Alto Paraguai Group containing a wide variety of microbialites and mat-related sedimentary structures. These sediments were evidently deposited under well-lit conditions that permitted widespread colonization of the late Neoproterozoic seafloor in this region.

Outcrop-based facies analysis allows reconstruction of the depositional paleoenvironments of these successions. The basal carbonates of the Araras Group comprise a stromatolitic cap carbonate sequence deposited below storm-wave base on a moderately deep to deep platform immediately following the low-latitude Puga (Varanger) glaciation (Nogueira *et al.,* this volume; Trindade *et al.*, this volume). Upsection, deep-water limestones and shales were laid down and succeeded by deep-water dolomudstone and lower shoreface sandy dolostone storm deposits. Installation of a peritidal platform characterized by meter-thick tidal flat/sabkha cycles with abundant small stromatolites was accompanied by increased siliciclastic influx, a prelude to subsequent exposure and erosion marking a sequence boundary. The carbonate platform deposits were supplanted by storm- and tidal-generated siliciclastic shoreline deposits with microbially bounded sedimentary structures.

The successive paleoenvironmental changes registered stratigraphically were accompanied by modifications in the sedimentological manifestations of the changing microbial communities. In a considerable part of the rapidly deposited dolomudstones of the basal 10-m of the Puga cap carbonate stromatolites comprise fenestrate, irregularly stratiform microbial laminites with isolated irregular highs. Associated sedimentary structures indicate deposition below storm wave base. In the upper part of the Araras Group, stromatolites, oncoids, and microbial laminites, initially described by Zaine (1991) and Boggiani (1997), are present in chert and dolostone of the shallowing- and brining-upward cycles associated with arid tidal flats. The stromatolites exhibit stratiform, unbranched to simply branched columnar and knobby "cerebral" morphologies, generally less than 15 cm in greatest dimension, and generally occur in medium to thick beds. Stromatolite morphologies vary in accordance with the degree of "environmental stress" (desiccation, salinity, exposure) at the site of deposition. The fact that each stromatolitic portion of the Araras Group presents characteristic stromatolite morphologies related to a known succession of paleoenvironmental settings may be used to mark stratigraphic position within the group even in isolated outcrops.

Within the basal portion of the Alto Paraguai Group occur abundant variants of *petee* structures and other features attributed to the desiccation, soft-deformation, and eventual erosion of relatively cohesive siliciclastic sediments. The unexpected cohesiveness of these sediments is interpreted as deriving from microbial binding and associated physical-biological processes (Paterson & Black, 2000; Noffke *et al.*, 2001; Bouougri & Porada, 2002). The structures include, among others, fillings of spindle-shaped, subcircular, and other forms of shrinkage/"syneresis" cracks, as well as compacted post-storm stacks of argillaceous, microbial mats in shoreface-foreshore settings.

Evidently, the depositional settings immediately following the Puga glaciation at least till initial deposition of the Alto Paraguai Group were sufficiently well-lit to permit abundant, widespread colonization of the seafloor by varied benthic microbial communities adapted to relatively deep, supratidal and coastal, carbonate to siliciclastic environments.

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UNLOCKING PARASEQUENCES AND HIGH FREQUENCY CYCLES THROUGH STROMATOLITE PATTERNS FROM THE VILLA MÓNICA FORMATION, PRECAMBRIAN, TANDILIA SYSTEM, ARGENTINA

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The Tandilia System is an orographic belt located in the Buenos Aires Province, which maximum length is 350 km in NW-SE direction. Their hills are composed of an igneous metamorphic basement and a Precambrian and Lower Palaeozoic sedimentary cover, which show a sub horizontal disposition. Precambrian sedimentary successions are conformed by Villa Mónica, Cerro Largo and Loma Negro formations (Sierras Bayas Group), and Cerro Negro Formation. The Lower Palaeozoic succession is known as the Balcarce Formation. These lithostratigraphic units were grouped into five depositional sequences: Tofoletti, Malegni and Villa Fortabat sequences (Riphean), La Providencia sequence (Riphean-Vendian) and Batán sequence (Cambrian-Ordovician).

The oldest depositional sequence (Tofoletti, 52 m thick) shows two sedimentary facies associations: a) quartz-arkosic arenites to the base and b) dolostones and shales to the top. The former is composed of shallow marine siliciclastic rocks (conglomerates, quartz and arkosic sandstones, diamictites and shales), and the latter is characterised by shallow marine stromatolitic dolostones and shales. This sequence has been dated by stromatolites and Rb/Sr ages in 800-900 Ma. The dolostones of the Villa Mónica Formation support a very good assemblage of stromatolites, which is composed of *Colonella* fm., *Conophyton ?ressotti, Conophyton* fm., *Cryptozoon* fm., *Gongylina* fm., *Gymnosolem* fm., *Inzeria* fm., *Jacutophyton* fm., *Jurusonia nisvensis, Katavia* fm., *Kotuikania* fm., *Kussiella* fm., *Minjaria* fm., *Parmites* fm., *Parmites* cf. *cocrescens* and *Stratifera* fm.

Along the dolomitic unit of the Villa Mónica Formation, these stromatolites are strongly ordered. In mesoscale studies, two kind of patterns have been distinguished dependent of the vertical and lateral arrangement of the stromatolites inside the biostromes: i) when the stromatolites do not present any variation along the bed, these bioconstructions have been named "monostromatolite layers", and ii) by the other side, "stromatolites cycles" (Serebryakov, 1976) are defined when there are changes in stromatolite morphology The focus of this contribution is to analyse the sedimentological significance of the stromatolite arrangement and their use in a sequence stratigraphy framework. The methodology applied in this study includes the follows steps: logging, field photography and drawing, sampling, serial slabbing, line drawings, three-dimensional graphical reconstructions, thin sections, stromatolite identification and stromatolite pattern arrangement outlining.

In this sense, three monostromatolite layers and six stromatolite cycles have been identified in the Villa Mónica Formation. The former ones consist of a) flat laminated stratiform stromatolite, b) globoidal laminated bulbous stromatolite, and c) gently folded laminated stratiform stromatolites. By the other hand, "stromatolite cycles" consist of d) planar laminated stratiform stromatolites passing upwards to convex laminated columnar stromatolites,