

Revisiting the Huepac chert: Mineralization of a non-marine Late-Cretaceous microbial population deposit

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Late Cretaceous domical stromatolites are well-exposed in the Tarahumara Formation in Central Sonora, northwestern Mexico, within a volcano-sedimentary succession of continental origin. This succession includes not only stromatolites, but a well-preserved silicified microbiota, among which diatoms frustules record one of the first emergence of continental diatoms reported since almost two decades. Since then, silica mineralization has been an open question.

The results of this work present a diverse microfossil assemblage that includes rest of cyanobacterial, insects, invertebrates and plant tissues and pollen. Among cyanobacterial morphotypes well-preserved are filamentous remains from *Eomycetopsis*, *Calothrix*, *Sphaerophycus* and *Spirulina*, all of which have their fossil counterparts in Precambrian strata. In addition to their biological content, the mineralogical and geochemical features of the Huepac chert suggest a non-marine setting, and very similar to Rhynia chert.

In the vicinity of the limestone and chert deposits is possible to observe hydrothermal alteration halos in volcanic rocks, especially in the NW-SE trend of base metal mineralization and precious metals of the Ermitaño, Durazno and De Barrios ore deposits. These mineralizations consist of veins and stockworks associated with NW-SE fractures and faults. The mineralizations in these areas are representative of fissure and cavity-filling, and replacement hydrothermal processes. Authigenic minerals encountered in the sedimentary rocks of the Tarahumara Formation consist principally of pyrite, cinnabar, galena and barite. The authigenic minerals can be understood and interpreted successfully by hot spring activity with hydrothermal fluid interacting within a transitional continental environment. According to geochemical data, the results of this original work points to a biotic and abiotic silica sources for the mineralization of microbiota remains. The fossilization conditions bear a taphonomic resemblance to other Precambrian deposits.