

# **PRELIMINARY ANALYSIS OF MICROBIAL HABITATS AND GEOCHEMICAL ENVIRONMENTS OF SISTEMA ZACATÓN, MEXICO**

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The deep phreatic caves of Sistema Zacatón have unique microbial communities that appear to interact directly with observed aqueous geochemical conditions. The water-filled sinkholes that extend into the deeper regions of the aquifer—El Zacatón, Poza Caracol, and La Pilita—have the most diverse habitats of microorganisms and are characterized by purple, red, and green biomats that entirely cover the calcium carbonate walls. These biomats are typically thin films of organic matter that likely host sulfur-oxidizing and reducing bacteria capable of utilizing volcanically originated sulfur to facilitate reduction-oxidation reactions. Diurnal fluctuations of colloidal sulfur in the water column coupled with measurable shifts in redox conditions indicate that phototrophic microbes are involved in the complicated geochemistry found in these aquatic environments, and conditions are extremely reducing with typical dissolved oxygen concentrations less than 0.10 mg/l throughout the water columns, even at the surface. The function of microbial communities in the cave-forming processes at Sistema Zacatón is presently unknown; however, significant geochemical reactions that occur in this karst system are hypothesized to be influenced by microbiological activity.