

## **Fossilized nanobacteriaforms from the Green River Formation: Ancient life forms or just a product of calcium carbonate precipitation?**

Glenn Mason

*Indiana University Southeast, USA*

Controversy surrounding the existence of minute bacteriaforms called "nanobacteria, nannobacteria, or ultrabacteria" has existed since their discovery in 1988. These tiny bacteria-like forms, recognized in the 0.05 to 0.5 micrometer range have been disputed as living entities by some researchers because it is believed that they are too small to facilitate DNA replication. Samples of Green River oil shale from Wyoming, long valued for its **exquisite fossilization, revealed possible "nanobacteria" from the Tipton Shale Member** associated with a fossilized bacterial mat. Mineral precipitates are generally observed as angular forms, with their shape reflecting the crystalline structure. These **"nanobacteriaforms" clearly have a rounded or filamentous appearance, strongly suggestive** of living forms, but with none of the telltale angularity normally observed with minerals. Associated with carbonate-rich sediments and other larger fossilized bacteria-like forms, these tiny particles may represent an important step in furthering our understanding of how a complex geochemical system, like the Eocene Lake Gosiute or Lake Uinta produced such a wide diversity of mineral forms. Climate induced evaporation, contributions by volcaniclastic sources, as well as detrital material played a dominate role in the mineralogy of the Green River Formation. However, the biological contribution to mineral genesis should not be overlooked. Not that long ago, mineral precipitation was considered to be the exclusive product of inorganic reactions; now, the common association of fossil bacteria (and nanobacteria) may further demonstrate the complex intertwined and possibly inseparable relationship that exists between the living and geochemical worlds.