3. PURPORTED FOSSIL "TERMITE NESTS" IN THE JURASSIC MORRISON FORMATION

NOTE: In the field guide prepared for the conference participants, this topic was presented as eight pages of text and illustrations. However, as a precaution, due to possible publication and copyright conflicts, distribution of that version is being temporarily restricted. A report that has already been published and that gives the salient results of the research on these intriguing structures is provided below. It is published in: Geological Society of America. 2006. Abstracts with Programs, Volume 38(6): p 7.

COMPLEX CONCRETIONS IN THE JURASSIC MORRISON FORMATION

(Ariel A. Roth, Tom Zoutewelle, and Dwight Hornbacher)

Complex concretions found in bedded sandstones of the Recapture Member of the Morrison Formation near Church Rock, NM are often large, resistant to erosion, and frequently display an abundance of 4-10 mm diameter branches. A common form is a vertical cylinder in the meter range, protruding and/or imbedded in the country rock, which consists of a hard core that often encloses an internal soft core. Frequently branches protrude from the hard core into the country rock and/or form irregular complexes. Cores or branches may be missing, and simple to compound bizarre shapes abound, including rare horizontal cylinders of core with small protruding branches.

On a microscopic scale the contact between concretions and country rock is dominantly irregular and gradational. Thin section point count comparisons of eight concretions with eight samples of country rock show significantly more cement ($P < 0.001$) and fewer primary pores ($P < 0.001$) in the concretions; also significantly fewer grains and more IGV ($P = 0.014$ for both) in the concretions. SEM of the concretions shows dominant pore-filling microcrystalline quartz, including intergrowth with illite/smectite. The country rock shows variable amounts of pore linings and local pore fillings composed of chlorite, kaolinite, illite/smectite, hematite, and microcrystalline quartz. Comparisons by XRF shows significantly more Si ($P < 0.001$) and less Al, Fe, Na, K, Mn, and Mg ($P = 0.003$) in the concretions. NA shows significantly less Na, Fe, Rb, Sb, and La ($P = 0.007$) in the concretions; Si and Al were not tested by NA. These data suggest that silica is added to the country rock to form the concretions.

Petrographic analysis seems to invalidate the suggestion of a fulgurite origin. Thus far, we have not found a convincing termite nest architecture or termites, and this brings into question the fossil termite nest interpretation. The rhizoconcretion interpretation also appears to be problematic due to general morphological factors and a paucity of ramifications. It may be that the concretionary process follows in part the pattern of the abundant "tubes," of organic or inorganic origin, that are already present in the country rock. It is hoped that the data presented above will help elucidate the origin of these intriguing structures.