# MARS ROVER SAMPLE RETURN: A SAMPLE COLLECTION AND ANALYSIS STRATEGY FOR EXOBIOLOGY

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NASA is currently considering a Mars Rover/Sample Return mission for the late 1990's. We have been conducting an interdisciplinary effort to consider how such a Mars mission can be realistically structured to maximize the planetary science return. Our focus has been to concentrate on a particular set of scientific objectives (exobiology), to clarify and prioritize the scientific goals, and to evaluate the instrumentation and analyses required to attain those goals. For reasons described elsewhere it is reasonable to search for biological signatures, both chemical and morphological, of extinct life on Mars. Life as we know it on Earth requires the presence of liquid water, therefore, it is important to explore sites on Mars where standing bodies of water may have once existed. Outcrops of layered deposits within the Valles Marineris appear to be ancient lake beds. Because they are well exposed, relatively shallow core samples would be very informative. The most important biological signatures to detect would be organics, microfossils or larger stromatolite-like structures, although the presence of cherts, carbonates, clays and shales would be significant. In spite of the limitations of current robotics and pattern recognition, and the limitations of rover power, computation, Earth communication bandwidth and time delays, we have developed a partial scenario to implement such a scientific investigation. In our poster, we describe in detail the rover instrumentation and the procedures and decisions and IR spectrometer. We will also describe preliminary results from a collaborative effort with SRI's vision group, which indicate the rover will be able to autonomously detect stratification, and hence will ease the interpretation burden on the scientists and lead to greater scientific productivity during the rover's lifetime.