

**Tuesday, March 15, 2005**  
**POSTER SESSION I: ASTROBIOLOGY**  
**7:00 p.m. Fitness Center**

Archer D. Jr. Smith P.

*Searching for the Missing Martian Organics with the Mars Phoenix Scout Mission* [#1598]

Recent theories have called into question the conclusion that there are no surface organics on Mars. It is now believed that simple organics could be formed during the oxidative decay of more complex organics. The Phoenix lander has the ability to detect these molecules, if present.

Mahaffy P. R. Brinckerhoff W. B. Buch A. Cabane M. Coll P. Demick J.  
Glavin D. P. Navarro-Gonzalez R.

*Measurement Protocols for In Situ Analysis of Organic Compounds at Mars and Comets* [#2224]

We explore *in situ* techniques for the determination of the abundance and chemical and isotopic composition of organic molecules in comets and those that might be found in protected environments at Mars as a first step toward understanding prebiotic chemistries on these solar system bodies.

Skellely A. M. Scherer J. R. Aubrey A. D. Grover W. H. Ivester R. H. C. Ehrenfreund P.  
Grunthaner F. J. Bada J. L. Mathies R. A.

*Sensitive Amino Acid Composition and Chirality Analysis with the Mars Organic Analyzer (MOA)* [#1109]

The Mars Organic Analyzer (MOA) is a portable system for amino acid analysis that consists of a compact instrument and a novel multi-layer CE microchip. The MOA has been successfully field tested on representative soil samples.

Glavin D. P. Aubrey A. Dworkin J. P. Botta O. Bada J. L.

*Amino Acids in the Antarctic Martian Meteorite MIL03346* [#1920]

Investigations of the Antarctic martian meteorite MIL03346 using high performance liquid chromatography and liquid chromatography time of flight mass spectrometry revealed that trace levels of amino acids are present.

Suzuki A. Kebukawa Y. Nakashima S. Keller L. P. Zolensky M. E. Nakamura T.

*Infrared Micro-Spectroscopy of Organic and Hydrous Components in Some Antarctic Micrometeorites* [#1176]

IR micro-spectroscopy of aliphatic and hydrous components of AMMs suggests that this type of study can be a possible classification method for micrometeorites. Some AMMs show distinct characteristics for these components.

Bonal L. Quirico E. Montagnac G. Reynard B.

*Laser-induced Fluorescence: Potential Interests for Immature Organic Matter Characterization* [#1858]

Preliminary results of Laser Induced Fluorescence on chondrites, kerogens and tholins show that the signal is sensitive to the composition and to the structure of the material.

Court R. W. Sephton M. A. Parnell J. Gilmour I.

*The Combustion Characteristics and Stable Carbon Isotopic Compositions of Irradiated Organic Matter: Implications for Terrestrial and Extraterrestrial Sample Analysis* [#1845]

Exposure to ionizing radiation causes the mean combustion temperature of naturally occurring, solid, terrestrial organic matter, derived from the radiation-induced polymerization of methane, to increase.

Kebukawa Y. Nakashima S. Zolensky M. E.

*In-Situ Heating Decrease Kinetics of Aliphatic Hydrocarbons in Tagish Lake Meteorite by Micro-FTIR* [#1146]

Kinetic heating experiments of organic material in the Tagish Lake chondrite were conducted *in situ* under a micro-FTIR. Two types of aliphatic C-H groups were revealed, one thermally fragile and the other being significantly more refractory.

Gerasimov M. V. Safonova E. N.

*Impacts of Large Meteorites as a Possible Source of Complex Organic Species on Titan* [#1066]

Experimental modeling proves that hypervelocity impacts of large meteorites on Titan's surface produce complex organic species (up to C<sub>30</sub>).

Brinckerhoff W. B. Managadze G. G. Chumikov A. E. Managadze N. G.

*Processing and Synthesis of Pre-Biotic Chemicals in Hypervelocity Impacts* [#1377]

We describe recent studies of the possible synthesis and processing of pre-biotic chemicals in hypervelocity dust impacts using pulsed laser based simulations of the impact plasma and reflectron time-of-flight mass spectrometry.

Nuth J. A. III Johnson N. M.

*Protostars are Nature's Chemical Factories* [#1849]

Many grain types act to promote the surface mediated conversion of molecular hydrogen, nitrogen and CO into organic molecules. Recent work demonstrating that inner nebular materials can flow back into the outer nebula ensure that some fraction of this product is incorporated into planetesimals.

Saha C. P. Bryson C. E. Sarrazin P. Blake D. F.

*PoDS: A Powder Delivery System for Mars In-Situ Organic, Mineralogic and Isotopic Analysis Instruments* [#1575]

PoDS is a Powder Delivery System intended to satisfy the collection, processing and distribution requirements of powder samples for Mars *in situ* mineralogic, organic and isotopic measurement instruments.

Martín-Gago J. A. Mateo-Martí E. Prieto-Ballesteros O. Atienza C. Sobrado J. M. Gómez-Elvira J.

*A New Simulation Chamber for Studying Planetary Environments* [#1625]

We present a versatile planetary simulation chamber able to reproduce atmosphere and sample temperature for most of the planets. It has been especially developed to make feasible *in situ* irradiation and characterization of the sample.

Mateo-Martí E. Martín-Gago J. A. Prieto-Ballesteros O. Atienza C. Sobrado J. M. Gómez-Elvira J.

*An Experimental Set-Up for Studying the Chemical Effect of Irradiation on Different Planets* [#1624]

We present an overview of the technical capabilities of a recently build experimental system for simulating the environment of different planetary bodies and the chemical effect of irradiation from different sources.

Hurowitz J. A. Tosca N. J. McLennan S. M. Schoonen M. A. A.

*Mechanically Produced Radical Species at Silicate Surfaces and the Oxidant in Martian Soils* [#1991]

The silicate minerals present in basalt are shown to produce oxidizing species in solution after crushing. These results may provide an explanation for the reactive, oxidizing nature of the Martian soils as observed by the Viking Labeled Release and Gas Exchange experiments.

Duong T. A. Kanik I.

*Classification of Ion Mobility Data Using the Neural Network Approach* [#2231]

In this work, the ion mobility spectral data, obtained from electrospray ionization ion mobility spectrometer system, are used as input data for CEP neural network code to learn and validate.

Weinstein S. Pane D. Warren-Rhodes K. Cockell C. Ernst L. A. Minkley E. Fisher G. Emani S.

Wettergreen D. S. Wagner M. Cabrol N. A. Waggoner A. S.

*Use of a Novel Rover-mounted Fluorescence Imager and Fluorescent Probes to Detect Biological Material in the Atacama Desert in Daylight* [#1494]

We deployed our fluorescence imaging system which detects fluorescence signals from sparse microorganisms and biofilms on Carnegie Mellon University's autonomous rover Zoë. The results of the 2004 Atacama Desert field season, in Chile, are discussed.



Parnell J. Baron M. Cockell C. S.

*Endolithic Colonization of Fluid Inclusion Trails in Mineral Grains* [#1285]

Many scenarios for the colonization of planetary surfaces by microbial life involve endoliths. This study records microbial mass along fluid inclusion trails (healed microfractures) in quartz grains.

Brown I. I. Mummey D. Cooksey K. E. McKay D. S.

*Iron-tolerant Cyanobacteria as a Tool to Study Terrestrial and Extraterrestrial Iron Deposition* [#1159]

A new genus of cyanobacteria exhibiting elevated dissolved iron tolerance and the ability to precipitate hematite on its exopolymeric sheath is described in this study as a tool to study terrestrial and extraterrestrial iron deposition.

Blackhurst R. L. Roberts D. Jadbubansa P. Genge M. J. Grady M. M.

*Cryptoendolith Colonization of Diverse Substrates (1): Cultivation and Characterization* [#1067]

We are investigating whether cryptoendolithic microorganisms are able to colonize diverse substrates through biogenic weathering. This first part of the study involves the cultivation and characterization of microbial consortia from Antarctic sandstone habitats.

Mendez C. Garza E. Gulati P. Morris P. A. Allen C. C.

*Isolation and Identification of Microorganisms in JSC Mars-1 Simulant Soil* [#2360]

JSC Mars-1 was assayed for the presence of bacteria. Molecular analysis of the soil revealed several species of bacteria.

Schulze-Makuch D. Irwin L. N. Lipps J. H. LeMone D. Dohm J. M.

*Scenarios for the Evolution of Life on Mars* [#1728]

Here, we relate the possible evolution of life on Mars to the Martian environmental history; and conclude on strategies for survival ranging from psychrophilic life to lifestyles that may use alternating cycles between dormant and active life forms.

Fairén A. G. Amils R.

*Martian Acidic Environments Through Time: Opportunities for Life* [#1085]

Hemispheric acidic oceans on Mars represent a localized stage in the Noachian. Shallow surface acidic water have also been flowing recurrently on several martian locations during the Hesperian and the Amazonian. Life may have gained a foothold in these environments.

Fisk M. R. Storrie-Lombardi M. C. Joseph J.

*Elemental Abundance Distributions in Basalt Clays and Meteorites: Is It a Biosignature?* [#2275]

Bayesian classification algorithms distinguishes biotic and abiotic alteration in sub-oceanic basalts using elemental abundance data. The data address the more general question of utilizing elemental abundance distribution in clays as a valid biosignature for analysis of meteorites.

Brunner B. Coleman M. L.

*$\Delta^{17}O$  of Martian Sulfate: Assessment as a Tool to Recognize the Impact of Biological Sulfur*

*Cycling on Mars* [#1932]

Martian sulfate deposits are an archive of past or present biotic processes even in the absence of traces of extraterrestrial life. We assess the analysis of mass independent isotope fractionation of oxygen in sulfate as a biosignature.

Lauer H. V. Jr. Ming D. W. Golden D. C.

*Thermal Characterization of  $Fe_3O_4$  Nanoparticles Formed from Poorly Crystalline Siderite* [#2153]

In this study, we describe the synthesis of a suite of sub micron (<200 nm) magnetite particles. We then analyze them thermally using scanning differential calorimetry and crystal phase-wise by X-ray diffraction.

Bjornes E. E. Lindsay J. F.

*The Depositional Setting of the Earth's Earliest Sedimentary Rocks* [#1821]

Some of the oldest sedimentary rocks come from the Australian Coucal Formation. We investigate the composition and texture of the basalt and chert layers within this formation and discuss their implications for their depositional setting.

Trail D. Mojzsis S. J. Harrison T. M.

*Hadean Crustal Processes Revealed from Oxygen Isotopes and U-Th-Pb Depth Profiling of Pre-4.0 Ga Detrital Zircons from Western Australia* [#2223]

Identification of zircons up to 4.37 Ga, U-Th-Pb zircon depth profiling, and oxygen isotopes on >3.8 Ga zircons.

Lerman L.

*Could Martian Strawberries Be? — Prebiotic Chemical Evolution on an Early Wet Mars* [#2317]

The universality of chemical physics dictates the ubiquity of bubbles, aerosols, and droplets on planets with water and simple amphiphiles. Their ability to functionally support prebiotic chemical evolution seems critical: on the early Earth and Mars, and quite likely for Titan and Europa.

Lerman L.

*Do Martian Blueberries Have Pits? — Artifacts of an Early Wet Mars* [#2210]

Early Martian weather cycles would have supported organic chemical self-organization, the assumed predecessor to an independent “origin” of Martian life. Artifacts of these processes are discussed, including the possibility that Martian blueberries nucleated around organic cores.

Smythe W. D. Lopes R. M. Pieri D. C. Hall J. L.

*An Approach to In-Situ Observations of Volcanic Plumes* [#2296]

Aerobots enable *in situ* measurement of volcanic plumes — which play a profound role in the evolution of life. Plume measurements are vital for understanding how volcanos work and mitigating volcanic hazards. Plume aerobots can prototype platforms for Titan exploration.