

# Geological and Planetary Sciences/ Humanities and Social Sciences

Session **H**

Room: 128 Baxter  
Session Chair: John Magyar

---

2:00 - 2:20 PM	<b>Kevin A. Waite</b> Williams College	Southern Culture and the Warrior Ethic	William F. Deverell <i>Director, Huntington-USC Institute on California and the West</i> Alan Jutzi <i>Avery Chief Curator, Rare Books, Huntington Library, Art Collections, and Botanical Gardens</i>
2:20 - 2:40 PM	<b>Michelle Jiang</b>	Categorizing Moral Judgments and the Corresponding Associations Between Judgmental Tendencies and Emotional Moral Memories	James F. Woodward <i>J.O. and Juliette Koepfli Professor of the Humanities</i> Jessica Edwards <i>Graduate Student in Biology</i>
2:40 - 2:50 PM	<b>BREAK</b>		
2:50 - 3:10 PM	<b>Darren Pais</b> Saint Louis University	The Effects of Trough Topography on Stratigraphy in the Martian North Polar Layered Deposits	Bruce C. Murray <i>Professor of Planetary Science and Geology, Emeritus</i> Asmin Pathare <i>Postdoctoral Scholar in Planetary Science</i> Sarah M. Milkovich <i>Member of the Technical Staff, JPL</i>
3:10 - 3:30 PM	<b>Tomasz M. Tyranowski</b> Jagiellonian University	Global Climate Modeling, Analysis, and Prediction	Yuk L. Yung <i>Professor of Planetary Science</i> Duane Waliser <i>Visiting Associate in Geological and Planetary Sciences</i>
3:30 - 3:50 PM	<b>Cristal L. Lindell</b> University of Texas at San Antonio <i>Howard Hughes Medical Institute MURF Fellow</i>	Purification and Crystallization of the Arsenate Reductase Complex ArrAB	Dianne K. Newman <i>Professor of Geobiology and Biology; Investigator, Howard Hughes Medical Institute</i> Davin Malasarn <i>Graduate Student in Biology</i>

*continued*

In addition, co-immunoprecipitation experiments were done in order to determine whether the truncated proteins interact with themselves *in vitro*, as the full-length proteins do. Results from these experiments will also be presented.

### **The Effects of Trough Topography on Stratigraphy in the Martian North Polar Layered Deposits**

Darren Pais

Mentors: Bruce C. Murray, Asmin V. Pathare, and Sarah M. Milkovich

Deciphering the stratigraphy of the Martian North Polar Layered Deposits (NPLD) may provide critical insight into climatic processes on Mars. Detailed layering is exposed within NPLD troughs, the stratigraphy of which is manifest in high resolution Mars Orbiter Camera (MOC) and Thermal Emission Imaging System (THEMIS) visual images. Further, elevation data available from the Mars Orbiter Laser Altimeter (MOLA) measurements provides us with a detailed topographic map of the NPLD. Previously, we demonstrated that so-called "wrinkled" offset roughs are potential sites of localized deformation in the NPLD. The core motivation for work this year is to understand the relationships between stratigraphical observations and topography. Milkovich et al. have demonstrated a useful procedure for obtaining layer geometry from High Resolution Stereo Camera (HRSC) observations and elevation data. We intend to employ these techniques using our altimetrically co-registered THEMIS and MOC observations, in order to ascertain the link between trough topography and stratigraphy. This extended analysis will then be incorporated into a three-dimensional model of trough evolution, which will allow us to determine the relative importance of the various mechanisms governing trough modification. Specifically, we will attempt to simulate whether surficial processes (deposition and erosion) can reproduce present-day trough stratigraphy, or alternatively, whether subsurface deformation is the predominant modification mechanism within the NPLD.

### **The Study of *C. elegans* EGF Pathway Through the Use of RNA-Mediated Interference**

Chun-Che Peng

Mentors: Paul W. Sternberg and Cheryl Van Buskirk

The EGF signaling pathway is important in the propagation of signals that regulate cell proliferation, differentiation, motility, and apoptosis. In the nematode *C. elegans*, the *lin-3* gene encodes the EGF-like ligand and *let-23* encodes the EGF receptor homolog. Recently, it has been found that ectopic expression LIN-3 at any stage induces a reversible cessation of feeding and locomotion. This has been interpreted as the induction of inappropriate lethargus behavior which otherwise would normally occur before larval molting. It is known that heat-shock expression of LIN-3 leads to cessation of pumping and movement. Critical players in the pathway include LET-23, PLC- $\gamma$ /IP3, DAG, and unc-13. But the roles of numerous neurotransmission factors remain unknown. Mutant analysis of these factors is too tedious and time consuming for the method to be practical. The use of RNAi is more preferable. Bacteria engineered to produce mass amounts of double stranded RNA transcribed from the gene encoding the interested neurotransmission factors are to be fed to the hs:LIN-3 *C. elegans*. If such worms exhibit pharyngeal pumping and locomotion, then it can be concluded that the interested factor is involved in the signaling pathway.

### **Reductive and Oxidative DNA Damage by a Photoactive Iridium Complex**

Daniel W. Rowlands

Mentors: Jacqueline K. Barton and Fangwei Shao

An iridium complex,  $[\text{Ir}(\text{ppy})_2(\text{dppz}')](\text{NO}_3)$ , ( $\text{ppy}$  = 2-phenylpyridine;  $\text{dppz}'$  = ethyl-(dipyridophenazine-11-yl)-hex-5-ynoate) was developed in hope of using it as a covalently tethered intercalating probe of long-range oxidative and reductive DNA damage. Specifically, it was designed to have the proper redox potentials to only oxidize  $\text{N}_2$ -cyclopropylamine-guanosine ( $^{\text{Cp}}\text{G}$ ) and only reduce  $\text{N}_4$ -cyclopropylcytosine ( $^{\text{Cp}}\text{C}$ ), modified nucleosides which rapidly and irreversibly decompose when oxidized or reduced. To study its usefulness for this purpose, fluorescence spectra were taken of it in MeCN, aqueous sodium phosphate buffer, and DNA. The complex was irradiated at 380 and 405 nm in the presence of  $^{\text{Cp}}\text{C}$  nucleotides and duplexes containing  $^{\text{Cp}}\text{G}$  and  $^{\text{Cp}}\text{C}$ . Fluorescence experiments demonstrated that the complex is not stable in aqueous buffer with or without DNA present in solution, however hypochromism was observed suggesting that the complex does interact with DNA in aqueous buffer. The complex was found to promote the photooxidation of  $^{\text{Cp}}\text{G}$  nucleotides contained in DNA duplexes in the absence of oxygen but was not shown to promote photoreduction of  $^{\text{Cp}}\text{C}$  nucleotides in the absence of oxygen.