Report: Gordon Research Conference on the Origin of Life
and associated
Gordon-Keenan Graduate Research Seminar

January 19-24, 2008
Ventura, California

Thanks to generous funding by the Director's Discretionary Fund of the NASA Astrobiology institute and the Alfred P. Sloan Foundation, the 2008 GRC on Origins of Life and associate Graduate Research Seminar were the best attended, youngest and most diverse such meeting in many years. Expenses were covered in full for 32 speakers, and in part or in full for 35 graduate students and 62 poster presenters (see budget below).

At the beginning of the meeting the GRC on origins was on probation status because of relatively low attendance at the previous meeting. This meeting was fully subscribed, thanks in large measure to the high level of external support. We are now off probation and the next meeting is scheduled for January, 2010, in Galveston, Texas. Prof. George Fox of the University of Houston will be the Chair.

The support of NAI was critical to the success of this meeting, particularly in the support of young scientists. Continued support of future meetings is strongly encouraged. Almost half of the people attending, including most of the younger scientists, responded that this was the best scientific meeting they had attended in the previous 12-month period. A major reason for that response was the broadly interdisciplinary nature of the meeting and its close ties to astrobiology.

The final schedule of the 2008 meeting appears below.

FINAL SCHEDULE
GORDON RESEARCH CONFERENCE, ORIGIN OF LIFE, January 20-24, 2008
Crowne Plaza, Ventura, California
Robert Hazen (Carnegie Institution), Chair; George Fox (Univ. Houston), Co-Chair

With thanks for the generous support provided by:

The Alfred P. Sloan Foundation

NASA Astrobiology Institute

SUNDAY

2:00 pm - 11:00 pm	Arrival and check-in
6:00 pm	Dinner
7:30 pm –7:50 pm	Welcome / Introductory Comments/GRC Site staff/ Chair Remarks
7:50 pm – 9:30 pm	**From Scenarios to Schemas: Robust Models for Life's Origins** **Robert Hazen** (Carnegie Institution) Discussion Leader
7:50 pm – 8:25 pm	**Shelley Copley** (Univ. of Colorado) "False Dichotomies and the Origin of Life"
8:25 pm – 8:45 pm	Discussion
8:45 pm –9:15 pm	**John Baross** (Univ. of Washington) "History of the Major Ideas for the Origin of Life on Earth"
9:15 pm – 9:30 pm	Discussion
9:30 pm	Wine reception

MONDAY

7:30 am - 8:30 am	Breakfast
9:00 am - 12:30 pm	**Real World Geochemical Complexity: Interfaces, Gradients and Cycles** **John Baross** (University of Washington, Seattle) Discussion Leader
9:00 am – 9:20 am	**Ariel Anbar** (Arizona State Univ.) "The Role of P and As: Geochemical Aspects"
9:20 am – 9:40 am	**Felicia Wolfe-Simon** (Harvard Univ.) "The Role of P and As: Biochemical Aspects"
9:40 am – 10:00 am	Discussion
10:00 am – 10:30 am	Coffee Break/GRC Photo
10:30 am – 11:00 am	**Victoria Orphan** (Caltech) "Microscale Biosignatures:Carbon and Sulfur Cycling in Extreme Environments"

11:00 am – 11:10 am	Discussion
11:10 am – 11:40 am	**Kevin Zahnle** (NASA Ames) “Conditions on the Early Earth”
11:40 am – 11:50 am	Discussion
11:50 am – 12:20 pm	**Michael Russell** (NASA Ames) “The Alkaline Solution to the Emergence ofLlife”
12:20 pm - 12:30 pm	Discussion
12:30 pm	Lunch
1:30 pm - 4:00 pm	Free Time
4:00 pm - 6:00 pm	**Poster Session** Wine Mixer
6:00 pm	Dinner
7:30 pm – 9:30 pm	**Alternative Planetary Environments for Life** **Dirk Schulze-Makuch** (Washington State University, Pullman) Discussion Leader
7:30 pm – 7:50 pm	**Dirk Schulze-Makuch** (Washington State), “Venus, Mars … and What’s Life Got to Do with It?”
7:50 pm – 8:00 pm	Discussion
8:00 pm – 8:20 pm	**Darlene Lim** (NASA Ames), “Astrobiology and Mars Analogue Research in the Canadian High Arctic”
8:20 pm – 8:30 pm	Discussion
8:30 pm – 8:50 pm	**Athena Coustenis** (Observatoire de Meudon, France), “Exploring Titan and Enceladus for their Astrobiological Potentials”
8:50 pm – 9:00 pm	Discussion
9:00 pm – 9:20 pm	**Steve Benner** (Foundation for Applied Molecular Evolution, Florida), “Chemical Constraints on the Structure of Alien Biochemistries”
9:20 pm – 9:30 pm	Discussion
9:30 pm - ?	Continued discussion and wine at the poster session

TUESDAY

7:30 am - 8:30 am	Breakfast
9:00 am - 12:30 pm	**Early Chemical Steps on the Road to Life’s Origins** **George Cody** (Carnegie Institution) Discussion Leader
9:00 am - 9:30 am	**George Cody** (Carnegie Institution) “Early Chemical Steps on the Road to Life’s Origins”
9:30 am – 9:45 am	Discussion
9:45 am – 10:15 am	**Eric Smith** (Santa Fe Inst.) “Statistical Thinking and Plausible Theories of the Origin of Life"

10:15 am – 10:30 am	Discussion
10:30 am – 11:00 am	Coffee Break
11:00 am – 11:30 am	**Shelley Copley** (University of Colorado) "The Origin of the RNA World: Co-Evolution of Genes and Metabolism"
11:30 am – 11:45 am	Discussion
11:45 am – 12:15 pm	**Simon Nicholas Platts** (Carnegie Institution) "Discotic Polynuclear Aromatic Compounds as Mesophase Scaffolding for the Earliest Conceivable Pre-RNAs"
12:15 pm – 12:30 pm	Discussion
12:30 pm	Lunch
1:30 pm - 4:00 pm	Free Time
4:00 pm - 6:00 pm	**Poster Session** (if applicable)
6:00 pm	Dinner
7:30 - 9:30 pm	**Metabolism First: An Abundance of Worlds** **Robert Shapiro** (New York University) Discussion Leader
7:30 pm – 7:55 pm	**Robert Shapiro** (New York University), "A Simpler Origin of Life"
7:55 pm – 8:10 pm	Discussion
8:10 pm – 8:35 pm	**Arthur Weber** (SETI Institute, NASA Ames Research Center) "Sugar World Chemistry: Sugars as the Source of Energized Carbon for the Origin of Life"
8:35 pm – 8:50 pm	Discussion
8:50 pm – 9:15 pm	**Irene Chen** (Harvard University) "Cell-like Behaviors of Primitive Lipid Vesicles"
9:15 pm – 9:30 pm	Discussion
9:30 pm - ?	Continued discussion and wine at the poster session

WEDNESDAY

7:30 am - 8:30 am	Breakfast
9:00 am - 12:30 pm	**The Legacy of Stanley Miller: Heterotrophic Origins** **Jeffrey Bada** (Univ. California, San Diego) Discussion Leader
9:00 am – 9:30 am	**Jeffrey Bada** (University of California, San Diego) "Stanley Miller: The Father of Prebiotic Chemistry"
9:30 am – 9:45 am	Discussion
9:45 am – 10:15 am	**Antonio Lazcano** (UNAM, Mexico City) "Stanley Miller and the Origin of Life"
10:15 am – 10:30 am	Discussion

10:30 am – 11:00 am	Coffee Break
11:00 am – 11:30 am	**H. James Cleaves** (Carnegie Institution) "Prebiotic Synthesis in Neutral Planetary Atmospheres"
11:30 am – 11:45 am	Discussion
11:45 am – 12:15 pm	**Peter Nielsen** (Univ. of Copenhagen) "Peptide Nucleic Acids, A Possible Beginning?"
12:15 pm – 12:30 pm	Discussion
12:30 pm	Lunch
1:30 pm - 4:00 pm	Free Time
4:00 pm - 6:00 pm	**Poster Session** (if applicable)
6:00 pm	Dinner
7:00 pm – 7:30 pm	Business Meeting
7:30 pm - 8:10 pm	**Progress towards Synthesizing an Artificial Cell** **Jack Szostak** (Harvard University and Mass General Hospital) Keynote Speaker
8:10 pm - 8:30 pm	Discussion
8:30 pm - 9:10 pm	**Origins and Evolution of Biochemical Homochirality** **Donna Blackmond** (Imperial College London), Speaker
9:10 pm – 9:30 pm	Discussion
9:30 pm - ?	Continued discussion and wine at the poster session

THURSDAY

7:30 am - 8:30 am	Breakfast
9:00 am - 12:30 pm	**The Legacy of Leslie Orgel: The Case for the RNA World** **John Sutherland** (Univ. of Manchester) Discussion Leader
9:00 am - 9:30 am	**John Sutherland** (Univ. of Manchester) "Prebiotic RNA Chemistry"
9:30 am – 9:45 am	Discussion
9:45 am – 10:15 am	**Harry Noller** (Univ. of California, Santa Cruz) "Thoughts on the Emergence of the Ribosome from the RNA World"
10:15 am – 10:30 am	Discussion
10:30 am – 11:00 am	Coffee Break
11:00 am – 11:30 am	**Reza Ghadiri** (Scripps Research Institute) "Possible Links Between RNA and Amino Acid/Peptide Chemistry"
11:30 am – 11:45 am	Discussion

11:45 am – 12:15 pm	**Ram Krishnamurthy** (Scripps Research Institute) "Alternative Heterocycles in the Search for Informational Oligomer Systems"
12:15 pm - 12:30 pm	Discussion
12:30 pm	Lunch
1:30 pm - 4:00 pm	Free Time
4:00 pm - 6:00 pm	**Poster Session** (if applicable)
6:00 pm	Dinner
7:30 pm - 9:30 pm	**Reconciling the Metabolism First versus RNA World Debate** **George Fox** (Univ. of Houston) Discussion Leader
7:30 pm – 8:10 pm	**Nigel Goldenfeld** (Univ. of Illinois) "What Does the Genetic Code Tell Us About Early Life""
8:10 pm - 8:30 pm	Discussion
8:30 pm – 9:10 pm	**Günter von Kiedrowski** (Ruhr University Bochum) "Systems Chemistry: Looking for Origins versus the Origin of Life"
9:10 pm – 9:30 pm	Discussion

Total Estimated GRC and GRS Expenses:

I.Speakers

32 speakers/chair @ $865 = $27,680 (maybe less $865 – Anbar; Platts)

Speakers' travel (estimated)

CA (9) x 100	900	
DC (4) x 600	2400	(maybe less $2400 from Sloan)
FL (1) x 600	600	
CO (1) x 400	400	
TX (1) x 500	500	
WA (2) x 300	600	
MA (3) x 600	1800	
NY (1) x 600	600	
IL (1) x 600	600	
AZ/NM (2) x 500	1000	(maybe less $500 - Anbar)
Mexico (1) x 800	800	
Europe (6) x 1500	9000	
Estimated Total Travel	$19,200	

Total for Speakers = $46,880

II.Poster presenters

62 Poster presenters x $500 = $31,000

III.Graduate Research Symposium

35 attendees x $200 = $7,000

Travel expenses 30 x $300 = $9,000

TOTALS:	Speakers	$46,880
	Posters	$31,000
	GRS	$16,000
		$93,880