

Table of Contents

List of Participants	xii
Preface	xvii
Introduction	
<i>Astrobiology: Process and Discovery</i>	3
Baruch S. Blumberg	
Extrasolar Planets	
<i>Extrasolar Planets and Prospects for Terrestrial Planets</i>	11
Geoffrey W. Marcy, R. Paul Butler, Steven S. Vogt, & Debra A. Fischer	
<i>Finding Planets - How do you do it?</i>	25
C. G. Tinney	
<i>PLANET II: A Microlensing and Transit Search for Extrasolar Planets ...</i>	35
Penny D. Sackett, M.D. Albrow, J.-P. Beaulieu, J.A.R. Caldwell, C. Coutures, M. Dominik, J. Greenhill, K. Hill, K. Horne, U.-G. Jorgensen, S. Kane, D. Kubas, R. Martin, J.W. Menzies, K.R. Pollard, K.C. Sahu, J. Wambsganss, R. Watson, & A. Williams	
<i>How Common are Earths? How Common are Jupiters?</i>	41
Charles H. Lineweaver, Daniel Grether & Marton Hidas	
<i>Chances for Earth-Like Planets and Life Around Metal-Poor Stars</i>	45
Hans Zinnecker	
<i>How Unusual are Stars with Planets?</i>	51
I. Neill Reid	
<i>Refining the Search for ^6Li in Stars with Planets</i>	55
A. M. Mandell, J. Ge, & N. Murray	
<i>High Resolution Millimeter Wave Images of HL Tau Reveal a Companion in the Disk</i>	59
William J. Welch, Zodiac Webster, Lee Mundy, Nikolaus Volgenau, & Leslie Looney	
<i>Masses and Orbits of Extrasolar Planets: Preparation of Astrometric Observing Programs</i>	65
Andreas Quirrenbach, Sabine Frink, & David Mitchell	
<i>Polarimetric & Spectropolarimetric Properties of FGK Type Stars and Extrasolar Systems</i>	69
S. Ortolani, F. Tamburini, & A. Bianchini	
<i>Radio Emission from Extrasolar Planets</i>	73
W. M. Farrell, T. Joseph W. Lazio, M. D. Desch, T. S. Bastian, & P. Zarka	
<i>Searching for Extrasolar Planets Using Transits</i>	77
M. G. Hidas, J. K. Webb, M. C. B. Ashley, C. H. Lineweaver, J. Anderson, & M. Irwin	
<i>Timing Detection of Eclipsing Binary Planets and Transiting Extrasolar Moons</i>	80
Laurance R. Doyle & Hans-Jörg Deeg	

<i>A Model for Estimating the Number of Stars for which Terrestrial Planets can be Detected Using Transits</i>	85
David Koch	
<i>HST/FGS High-Speed Photometric Observations of Transits of HD 209458b</i>	89
William F. Welsh, A. B. Schultz, W. Kinzel, M. Kochte, I. Jordan, F. Hamilton, F. Bruhweiler, H. Hart, D. P. Hamilton, G. Henry, C. Miskey, M. Rodrigue, D. Bennum, J. Rassuchine, A. Storrs, S. Vogt, J. A. Orosz, & R. Wittenmyer	
<i>Detecting Extrasolar Planet Transits from the South Pole</i>	93
Douglas A. Caldwell, William J. Borucki, Robert L. Showen, Jon M. Jenkins, Laurance Doyle, Zoran Ninkov, & Michael Ashley	
<i>UV Radiation in Different Stellar Systems</i>	97
A. P. Buccino, P. J. D. Mauas, & G.A. Lemarchand	
<i>Searches for Pulsar Planetary Systems</i>	101
T. Joseph W. Lazio, J. Fischer, & James M. Cordes	
<i>Planet Detection using the Advanced Camera for Surveys on the Hubble Space Telescope</i>	107
William B. Sparks, John Krist, Mark Clampin, & Holland Ford	
<i>Brown Dwarf Companions to Solar-Type Stars and other Brown Dwarfs ..</i>	111
Eduardo L. Martín, Mike Connelley, Dan Potter, & Hervé Bouy	
<i>Habitability of Brown Dwarf Planets</i>	115
Andrey Andreeshchev & John Scalzo	
<i>Atmospheres of Extra-solar Planets and Brown Dwarfs</i>	119
France Allard & Travis S. Barman	
<i>The Galactic Ecosystem</i>	123
Michael Burton	
Astrochemistry	
<i>The Virtual Planetary Laboratory: Towards Characterization of Extrasolar Terrestrial Planets</i>	129
Victoria Meadows & David Crisp	
<i>Extraterrestrial Chirality</i>	139
Jeremy Bailey	
<i>Circular Polarisation in Star Forming Regions: The Origin of Homochirality?</i>	145
P. W. Lucas, J. H. Hough, A. C. Chrysostomou, & J. A. Bailey	
<i>Diffuse Reflectance Circular Dichroism for the Detection of Molecular Chirality: An Application in Remote Sensing of Flora</i>	149
Ramon D. Wolstencroft, George E. Tranter, & Delphine D. Le Pevelen	
<i>Terrestrial and Astronomical Sources of Circular Polarisation: A Fresh Look at the Origin of OF Homochirality on Earth</i>	154
Ramon D. Wolstencroft	
<i>Searching for Biomolecules with the ATCA: First Results</i>	159
Maria R Hunt-Cunningham & Paul A Jones	
<i>Interstellar Dust and the Organic Inventories of Early Solar Systems</i>	163
D. C. B. Whittet	

<i>A Spectral Survey of Molecules in the Orion Nebula from 455 – 507 GHz: An Inventory of Prebiotic Chemistry</i>	169
Glenn J. White, M. Araki, J. S. Greaves, & M. Ohishi	
<i>Abundances of Organic Molecules in Molecular Cloud Cores</i>	173
Edmund C. Sutton & Andrej M. Sobolev	
<i>From Stardust to Meteorites: The Synthesis of Inorganic and Organic Grains in AGB and Post-AGB Stars</i>	177
Sun Kwok	
<i>Synthesis of Organic Compounds in the Circumstellar Environment</i>	181
Sun Kwok	
<i>Prebiologically Important Interstellar Molecules</i>	185
Y.-J. Kuan, H.-C. Huang, S. B. Charnley, W.-L. Tseng, L. E. Snyder, P. Ehrenfreund, Z. Kisiel, S. Thorwirth, R. K. Bohn, & T. L. Wilson	
<i>An Interferometric Study of CO and CS in Comet Hale-Bopp (C/1995 O1) ..</i>	189
Y.-J. Kuan, M.-L. Pen, H.-C. Huang, J. M. Veal, & L. M. Woodney	
<i>Circumstellar Carbonaceous Material Associated with Late-Type Dusty WC Wolf-Rayet Stars</i>	193
Jean E. Chiar, A.G.G.M. Tielens, & E. Peeters	
Planetary Science	
<i>Life among the Craters</i>	199
Harrison H. Schmitt	
<i>Evidence for Past Life on Early Mars: How the Evidence Stands</i>	203
Everett K. Gibson, Kathie L. Thomas-Keprta, Simon J. Clemett, David S. McKay, Christopher Romanek, & Susan J. Wentworth	
<i>Preliminary Program for Mars Samples Analysis</i>	209
Marie-Christine Maurel & Jean-Louis Counil	
<i>Ground-based Support of Comet Nuclei Space Missions</i>	213
Jana Pittichová & Karen J. Meech	
<i>TNO Recovery, Unlocking the Early Solar System</i>	218
M. A. Kadooka, K. J. Meech, & T. Chun	
<i>From Near-Synchronously Rotating Planets to Tidal Lock: A New Class of Habitable Planets Examined for Forest Habitability</i>	225
Martin J. Heath & Laurance R. Doyle	
<i>Building Planets with Dusty Gas</i>	231
S. T. Maddison, R. J. Humble, & J. R. Murray	
Origins and Evolution of Life	
<i>Quantum Mechanics and the Origin of Life</i>	237
Paul Davies	
<i>Astrobiology: Towards an Understanding of the Emergence of Life in the Universe</i>	245
Antonio Lazcano	
<i>First Steps Towards Defining Galactic Niches</i>	255
Simon Conway Morris	

<i>What can Rapid Terrestrial Biogenesis Tell Us about Life in the Universe?</i>	259
Charles H. Lineweaver & Tamara M. Davis	
<i>Comets and the Connection to Life</i>	263
K. J. Meech & J. M. Bauer	
<i>Comets and the Origin of Life: Structure of Comets Nuclei and Dust</i>	271
A.Chantal Levasseur-Regourd & Emmanuel Desvoivres	
<i>The Origin of Organic Matter in the Solar System: Evidence from the Interplanetary Dust Particles</i>	275
G. J. Flynn, L. P. Keller, C. Jacobsen & S. Wirick	
<i>Meteor Storms as a Window on the Delivery of Extraterrestrial Organic Matter to the Early Earth</i>	281
P. Jenniskens	
<i>The Frequency and Predicted Consequences of Cosmic Impacts in the Last 65 Million Years</i>	289
Michael Paine & Benny Peiser	
<i>Migration Processes and Volatiles Delivery</i>	295
Mikhail Marov & Sergei Ipatov	
<i>Post-Impact Hydrothermal Activity in Meteorite Impact Craters and Potential Opportunities for Life</i>	299
Christian Koeberl & Wolf Uwe Reimold	
<i>Constraints on Photosynthesis on Earth and Earth-Like Planets</i>	305
John A. Raven & Ramon D. Wostencroft	
<i>Photosynthetic Constraints on the Habitable Zone</i>	309
Michael C. Storrie-Lombardi, A. I. Tsapin, G. D. McDonald, M. L. Coleman, & V. S. Meadows	
<i>The Dual Life of RNA</i>	315
M. Meli & M-C. Maurel	
<i>Origins of Life and the RNA World: Evolution of RNA-Replicase Recognition</i>	321
Laura Guogas, James Hogle & Lee Gehrke	
<i>Total Organic Carbon in Red Paleosols and Basalts from ODP Leg 197 and their Potential use as Suitable Models for Mars Soil Analogues</i>	325
Rosalba Bonaccorsi	
<i>Feasibility Study for Giant Planet Origins of Life (GPOOLS)</i>	337
Len Troncale	
<i>Genetic Differences Between Humans and Great Apes – Implications for the Evolution of Humans</i>	343
Ajit Varki	
<i>Objectivity in the Study of Intelligence: The Cornerstone of New Methods and Discoveries</i>	349
Lori Marino	
Archea	
<i>Precambrian Surface Temperatures and Molecular Phylogeny</i>	355
David Schwartzman & Charles H. Lineweaver	

<i>Terrestrial Permafrost as a Model Environment for Bioastronomy</i>	359
A. Tsapin & G. D. McDonald	
<i>Life in Solid Ice on Earth and Other Planetary Bodies</i>	363
P. Buford Price	
<i>Central Metabolic Pathways of Hyperthermophiles: Important Clues on how Metabolism Gives Rise to Life</i>	367
R. S. Ronimus & H. W. Morgan	
<i>The Microbial Community of a Radon Hot Spring</i>	374
Roberto P. Anitori, Cherida Trott, David J. Saul, Peter L. Bergquist, & Malcolm R. Walter	
<i>A Microscopic Approach to Investigate Bacteria under In-Situ Conditions in Arctic Lake Ice: Initial Comparisons to Sea Ice</i>	381
Karen Junge, Jody W. Deming, & Hajo Eicken	
<i>Growth of Methanogens on a Mars Soil Simulant Under Simulated Martian Conditions</i>	389
Timothy A. Kral, Curtis R. Bekkum, & Christopher P. McKay	
Search for Extraterrestrial Intelligence (SETI)	
<i>Life, the Universe, and SETI in a Nutshell</i>	397
Jill Tarter	
<i>A Scheme for Targeting Optical SETI Observations</i>	409
Seth Shostak	
<i>Optical SETI at Lick Observatory: A Status Report</i>	415
Shelley A. Wright, Remington P. S. Stone, Frank Drake, Melesio Muñoz, Richard Treffers, Dan Werthimer, Robert A. Evans, Tero Isotalo, & Steven Vance	
<i>Three Years of SETI@home: A Status Report</i>	419
Eric J. Korpela, Jeff Cobb, Steve Fulton, Matt Lebofsky, Eric Heien, Eric Person, Paul Demorest, Robert Bankay, David Anderson, & Dan Werthimer	
<i>Search for Extraterrestrial Intelligence at 22 GHz with the Very Large Array</i>	423
Toshimichi Shirai, Tomoaki Oyama, Hiroshi Imai, & Shinsuke Abe	
<i>A High Resolution Survey of OH Masers in the Southern Hemisphere with a Parasitic SETI Program</i>	429
Guillermo A. Lemarchand	
<i>Megachannel Extraterrestrial Assay Candidates: No Transmissions from Intrinsically Steady Sources</i>	433
T. Joseph W. Lazio, Jill Tarter & Peter R. Backus	
<i>A Search for Dyson Spheres Around Late-type Stars in the Solar Neighborhood</i>	437
Jun Jugaku & Shiro Nishimura	
<i>Super-Eruptions and the Search for Extraterrestrial Intelligence (SETI)</i>	439
Michael R. Rampino	
<i>Algorithmic Communication with Extraterrestrial Intelligence</i>	445
B. S. McConnell	

<i>Captain Cook, the Terrestrial Planet Finder and the Search for Extraterrestrial Intelligence</i>	451
Charles A. Beichman	
<i>The Technological Adolescent Age Transition: A Boundary to Estimate the Last Factor of the Drake Equation</i>	460
Guillermo A. Lemarchand	
<i>Against the Use of Power Law Luminosity Functions for ET Beacons</i>	467
John W. Dreher	
<i>Scaling For SETI: All The Sky, All The Time</i>	473
Kent Cullers	
<i>A New Search for μs Time Scale Radio Pulses</i>	479
Paul Demorest, Dan Werthimer, David Anderson, Aaron Golden, & Ron Ekers	
<i>Recurrent Neural Networks for Narrowband Signal Detection in the Time-Frequency Domain</i>	483
David Brodrick, Douglas Taylor, & Joachim Diederich	
<i>Searching for Extraterrestrial Technologies Within Our Solar System</i>	487
Allen Tough & Guillermo A. Lemarchand	

Post SETI

<i>How to Respond to a SETI Detection</i>	493
Ray P. Norris	
<i>Large-Size Message Construction for ETI: Self-Interpretation in LINCOS</i> 499	
Alexander Ollongren & Douglas A. Vakoch	
<i>The Potential for Archaeology Within and Beyond the Habitable Zones (HZ) of the Milky Way</i>	505
John B. Campbell	
<i>Wide Cultural Communications in Interstellar Messages</i>	511
Paulo Musso	
<i>Information Theory Applied to Animal Communication Systems and Its Possible Application to SETI</i>	514
Sean F. Hanser, Laurance R. Doyle, Brenda McCowan, & Jon M. Jenkins	
<i>The Ultimate Hacker: SETI Signals May Need to Be Decontaminated</i>	519
Richard A. Carrigan, Jr.	

Education and Outreach

<i>Voyages Through Time: Everything Evolves</i>	525
Jane Fisher, Jill Tarter, Edna DeVore, Yvonne Pendleton, Kathleen O'Sullivan, & Meg Burke	
<i>The Rise of Complexity in Nature</i>	531
Eric J. Chaisson	
<i>SETI and the Media</i>	535
Seth Shostak	
<i>Teaching Astrobiology Online</i>	542
S. T. Maddison	

<i>Creation of Educational Resources: A Research Scientist's Role</i>	545
Carol A. Christian	
<i>Bringing Breakthroughs in Science to the Public Through Webcasting</i>	549
Carol A. Christian	
<i>Using an Australian Mars Analogue Research Facility for Astrobiology, Education and Outreach</i>	553
Jennifer H. Laing, J. Clarke, J. Deckert, V. Gostin, J. Hoogland, L. Lemke, J. Leyden, G. Mann, G. Murphy, C. Stoker, M. Thomas, J. Waldie, M. Walter, & M. West	
<i>Origin and Evolution of the UCLA AstroBiology Society</i>	559
Laurel Methot & Jason Finley	
<i>An Upper Level Astrobiology Course with Discussion Sections</i>	563
Dave Theison	
<i>Integrated Science General Education Program (ISGE): Bioastronomy Connections</i>	567
Len Troncale	
<i>Science, Fiction and Curriculum Innovation</i>	572
Mark Brake & Martin Griffiths	