The International Astrobiology Workshop 2013
(as the Japan Astrobiology Network Annual Meeting #6)

Program at a Glance

(Final Version as of November 15, 2013)

Day-1: Thursday, November 28, 2013

8:30-9:15 a.m.	ON-SITE REGISTRATION
9:15-9:45 a.m.	WELCOME AND INTRODUCTION
9:45 a.m. -12:00 p.m.	***METEORITICS AND COSMOCHEMISTRY***
12:00-1:30 p.m.	LUNCH TIME & POSTER VIEWING-: DAY-1
1:30-2:30 p.m.	*SPECIAL LECTURES-1*
2:30-4:30 p.m.	***EARLY EARTH, GEOCHEMISTRY, AND PLANETARY ENVIRONMENT***
4:30-5:00 p.m.	GROUP PHOTO DAY-1 & COFFEE BREAK
5:00-6:30 p.m.	***MOLECULAR CLOUDS AND PLANETARY FORMATION REGIONS***

Day-2: Friday, November 29, 2013

8:30-9:00 a.m.	ON-SITE REGISTRATION
9:00-9:30 a.m.	WEBCAST PRESENTATION-1
9:30 a.m.-12:00 p.m.	***SOLAR SYSTEM EXPLORATION AND EXPERIMENTS (SCIENCE, MISSION DESIGNS, INSTRUMENTS, AND ENABLING TECHNOLOGY)***
12:00-1:30 p.m.	LUNCH TIME & POSTER VIEWING-: DAY-2
1:30-2:30 p.m.	*SPECIAL LECTURES-2*
2:30-5:00 p.m.	***EXOPLANETARY SYSTEMS AND EXOPLANETS (THEORIES, MODELS, AND OBSERVATIONS)***
5:00-5:30 p.m.	GROUP PHOTO DAY-2 & COFFEE BREAK
5:30-6:30 p.m.	***POSTER SESSION-CORE TIME***
6:30-8:30 p.m.	RECEPTION AT THE ISAS DINING HALL

Day-3: Saturday, November 30, 2013

8:30-9:00 a.m.	ON-SITE REGISTRATION
9:00-9:30 a.m.	*WEBCAST PRESENTATION-2*
9:30-11:00 a.m.	***PANEL DISCUSSION: "ASTROBIOLOGY VS. SPACE EXPERIMENTS AND EXPLORATION"***
11:15 a.m.-12:30 p.m.	***LIFE IN EXTREME ENVIRONMENTS (1/2)***
12:30-2:00 p.m.	LUNCH TIME & POSTER VIEWING-: DAY-3
2:00-2:50 p.m.	***LIFE IN EXTREME ENVIRONMENTS (2/2)***
2:50-3:20 p.m.	GROUP PHOTO DAY-3 & COFFEE BREAK
3:20-5:50 p.m.	**RNA AND MOLECULAR BIOLOGY**
5:50-6:10 p.m.	FINDINGS AND CLOSING REMARKS
6:10 p.m.	ADJOURN

Oral Session Venue: ISAS Main Building 2F Conference Hall
Poster Session Venue: ISAS Main Building 1F "Bidding Room" (Nyusatsu-Shitsu)

Day-1

Thursday, November 28, 2013
WELCOME AND INTRODUCTION
9:15-9:45 a.m. ISAS Main Building 2F Conference Hall

Chair: Akihiko Yamagishi

9:15 a.m. Yamagishi A.*
Opening Remarks by Japan Astrobiology Network (President, JABN) ***[#1W1]***

9:25 a.m. Tsuneta S.*
Welcome Address by the Host Institution (Director General, JAXA/ISAS) ***[#1W2]***

9:35 a.m. Yano H.*
Meeting Agenda and Logistics from thr Local Organizing Committee ***[#1W3]***

Thursday, November 28, 2013
METEORITICS AND COSMOCHEMISTRY
9:45 a.m. -12:00 p.m. ISAS Main Building 2F Conference Hall

Chairs: **Kensei Kobayashi**
Motoo Ito

9:30 a.m. Krot A. N. * Doyle P. M. Nagashima K. Jogo K. Wakita S. et al. (Invited)
Aqueous Activity on Chondrite Parent Asteroids **[#1052]**
Aqueous alteration is a fundamental process in the early solar system that affected most groups of chondritic meteorites.

10:00 a.m. Jogo K. * Krot A. N. Nagashima K.
Metamorphosed Clasts in the CV Carbonaceous Chondrite Breccias Mokoia and Yamato 86009: Evidence for Strong Thermal Metamorphism on the CV Parent Asteroid **[#1042]**
We describe the mineralogy, petrography, and O-isotope compositions of the metamorphosed clasts in the CV chondrites. Obtained data suggest that the clasts formed by thermal metamorphism of heavily-altered chondrites on the CV parent asteroid.

10:15 a.m. Kebukawa Y. * Cody G. D.
Deuterium-Hydrogen Exchange Between Organic Matter and Water: Implications for Chemical Evolution During Asteroidal Processing **[#1025]**
Laboratory simulations of D-H exchange between organic matter and water were conducted considering; (1) IOM polymerization process starting with formaldehyde in the presence of water, and (2) D-H exchange between IOM and water.

10:30 a.m. Mimura K. * Sugahara H.
Comet Impacts as a Driving Force of Glycine Oligomerization **[#1012]**
We suggests that comet impacts can readily account for the oligomerization of glycine to form the precursors of life on the early Earth. Since comet impacts are ubiquitous phenomenon, they play an important role in organic chemical evolution.

11:00 a.m. Kobayashi K. * Kawamoto Y. El-Masry W. Eto M. Tokimura H. et al.
Evolution of Interstellar Organics to Meteoritic and Cometary Organics: Approaches by Laboratory Simulations **[#1016]**
We examined possible formation of amino acids and nucleic acid bases (or their precursors) from possible interstellar media, and alteration with high-energy photons, particles and hydrothermal reactions to study their fates in the solar system.

11:15 a.m. Ito M. *
Ultra High Spatial Resolution Ion Imaging with a NanoSIMS Ion Microprobe: Applications to Astrobiology **[#1044]**
NanoSIMS ion imaging is a powerful tool to investigate elemental and isotopic distribution with ultra high spatial resolution for variety of samples. We will present overview of current researches on microbiology and cosmochemistry using NanoSIMS.

(Moved from the Exploration Session)
11:30 a.m. Satoh T. * Kubota T. Fujita K. Okada T. Iwata T. et al.
Overview of Japan's MELOS1 Mission: Mars Exploration for Life/Organism Search **[#1049]**
We overview the current plan of Japan's MELOS1 Mars mission which we would like to launch early 2020's. The scientific target, its significance in broader areas of science, and a brief summary of probe system and mission scenario will be presented.

Thursday, November 28, 2013
LUNCH TIME & POSTER VIEWING-: DAY-1
12:00-1:30 p.m. ISAS Main Building 1F "Bidding Room" (Nyusatsu-Shitsu)

Thursday, November 28, 2013
SPECIAL LECTURES-1
1:30-2:30 p.m. ISAS Main Building 2F Conference Hall

Chair: Akihiko Yamagishi

1:30 p.m. Oshima T. O. * (Invited)
Puzzles of Biochemistry of Extraterrestrial Life **[#1043]**
Biological exclusion principles are briefly explained. The author would like to discuss whether or not the exclusion principle can also be applied on biochemistry and molecular biology of extraterrestrial life.

2:00 p.m. Maruyama S. * (Invited)
From Origin of Life to Systematization to Astrobiology **[#1064]**
Our proposed research is one of the biggest mysteries in science: "The Origin and Evolution of Life."

Thursday, November 28, 2013
EARLY EARTH, GEOCHEMISTRY, AND PLANETARY ENVIRONMENT
2:30-4:30 p.m. ISAS Main Building 2F Conference Hall

Chairs: **Yuichiro Ueno**
Yasuhito Sekine

2:30 p.m. Tian F. * (Invited)
The Faint Young Sun Problem — How Can Early Earth and Mars be Warmed? **[#1056]**
We will review the new progress related to the faint young sun problem of Earth/Mars and link it to the habitability of known exoplantets.

2:45 p.m. Genda H. * Hamano K. Abe Y.
Formation and Early Evolution of Atmosphere and Ocean on the Earth **[#1031]**
We would like to review mechanisms of supply and loss of volatiles on the terrestrial planets. Additionally, we will discuss the cooling of magma ocean and formation of ocean. These processes are highly related to the habitability of planets.

3:05 p.m. Thomazo C. * (Invited)
Did Oceanic Biogenic Methan Cycling Regulate the Evolution of Early Earth Atmospheric Chemistry? **[#1063]**
One of the most remarkable changes in the Earth surface chemistry of our planet history was the biologically induced pervasive oxygenation of the ocean and atmosphere between 2.45 and 2.32 Ga.

3:35 p.m. Ueno Y. * Danielache S. O. Endo Y.
Unique Late Archean Atmosphere due to Enhunced Volcanic and Biological Activities **[#1010]**

3:55 p.m. Sekine Y. * Shibuya T. Postberg F. Hsu S. Suzuki K. et al.
Enceladus' Hydrothermal Activity: Another Habitable World? **[#1028]**
Water plumes with sodium salts erupting from the south-pole region of Enceladus suggest the presence of an interior ocean. We show experimental results of water-rock reactions in Enceladus, which suggest the presence of hydrothermal activity there.

Thursday, November 28, 2013
GROUP PHOTO DAY-1 & COFFEE BREAK
4:30-5:00 p.m. ISAS Main Building 2F Conference Hall

Thursday, November 28, 2013
MOLECULAR CLOUDS AND PLANETARY FORMATION REGIONS
5:00-6:30 p.m. ISAS Main Building 2F Conference Hall

Chairs: **Masatoshi Ohishi**
Aunaud Belloche

5:00 p.m. Belloche A. * (Invited)
Complex Organic Molecules in the Interstellar Medium in the Era of ALMA **[#1007]**
Sgr B2(N) is one of the key sites to search for new complex organic molecules in the ISM. I will describe the techniques used to decipher its molecular content. I will discuss the perspectives offered by ALMA in this context.

5:30 p.m. Ohishi M. * Hirota T. Kaifu N. Suzuki T. Motoki Y. et al.
Absorption Features of CH_3NH_2 Towards SgrB2(M) **[#1009]**
We surveyed CH_3NH_2 toward star-forming regions in April 2013 by the Nobeyama 45m telescope. We detected three low-energy CH_3NH_2 lines in clear absorption towards SgrB2(M). This would suggest that CH_3NH_2 is widely distributed in cold molecular clouds.

5:50 p.m. Kwon J. * Tamura M.
Near-Infrared Circular Polarimetry in Star Forming Regions: Implication for Astrobiology **[#1023]**
We show results from deep imaging linear and circular polarimetry of the massive star-forming region NGC 6334-V as well as our first CP survey results in star forming regions, supporting the extraterrestrial origin of homochirality of life on Earth.

6:10 p.m. Ishihara D. * Kaneda H. Oyabu S. Kondo T. Yamagishi M. et al.
AKARI Observations of Interstellar Polycyclic Aromatic Hydrocarbons **[#1048]**
We review the results from AKARI observations of PAHs. We also discuss our future prospect for this study using the next Japan-led infrared space mission, SPICA.

Day-2

Friday, November 29, 2013
WEBCAST PRESENTATION-1
9:00-9:30 a.m. ISAS Main Building 2F Conference Hall

Chair: Hajime Yano

9:00 a.m. C. Conley *
Planetary Protection for Astrobiology Missions (NASA-HQ): TBD

Friday, November 29, 2013
SOLAR SYSTEM EXPLORATION AND EXPERIMENTS (SCIENCE, MISSION DESIGNS, INSTRUMENTS, AND ENABLING TECHNOLOGY)
9:30-12:00 a.m. ISAS Main Building 2F Conference Hall

Chairs: **Hitoshi Kuninaka**
Masaki Fujimoto

9:30 a.m. Horneck G. * (Invited)
Astrobiology Research on Board of the International Space Station as part of the European Space Exploration Initiative **[#1026]**
Exposure facilities on board of the ISS have provided unique opportunities to study a variety of questions of astrobiology importance. ESA has developed several astrobiology facilities (BIOPAN, STONE, EXPOSE-E, EXPOSE-R, EXPOSE-R2) for such studies.

10:00 a.m. Yano H. * Yamagishi A. Hashimoto H. Yokobori S. Kobayashi K. et al.
Tanpopo: Astrobiology Exposure and Micrometeoroid Capture, a Sample Return Experiment to Test Quasi-Panspermia Hypothesis Onboard the ISS-Kibo Exposed Facility **[#1040]**
As the first Japanese astrobiology experiment in space, the Tanpopo will test key concepts of the quasi-panspermia hypothesis by sample returns of microbe and bio-organics exposure and micrometeoroid capture onboard ISS-Kibo Exposed Facility ExHAM.

10:20 a.m. Tsou P. * (Invited)
Intact Capture, Aerogel, SOCCER, Stardust and LIFE **[#1050]**
In order to definitively determine many complex exploration curiosities, we must bring samples to terrestrial laboratories for detailed analyses by collaborating laboratories and analysts. We report this endeavor in SOCCER, NEARER, Stardust and LIFE.

10:50 a.m. Kuninaka H. * Hayabusa 2 Project
Hayabusa Asteroid Sample Return Mission **[#1053]**
Hayabusa executed scientific observation of asteroid Itokawa between September and October 2005.

11:10 a.m. Takano Y. * Yano H. Sekine Y. Funase R. Takai K.
A Strategy for Sample Retrieval and Possible Onboard Biosafety Controls: Perspectives **[#1054]**
Investigation of biological quarantine for planetary protection against both forward and back-contamination.

11:25 a.m. Kimura J. *
"Deep Habitat" in the Icy Moons: Structure and Evolution of the Internal Ocean **[#1062]**
Outer solar system may have a potentail habitat of extra-terrestial life.

11:45 a.m. Vance S. *
TBD

Friday, November 29, 2013
LUNCH TIME & POSTER VIEWING-: DAY-2
12:00-1:30 p.m. ISAS Main Building 1F "Bidding Room" (Nyusatsu-Shitsu)

Friday, November 29, 2013
SPECIAL LECTURES-2
1:30-2:30 p.m. ISAS Main Building 2F Conference Hall

Chair: Ken Takai

1:30 p.m. Kaifu N. * (Invited)
"Contact" with Extra-Terrestrial Life: An Astronomer's View **[#1014]**
From astronomical point of view contact with extraterrestrial life (in whatever situation) may occur within the coming half century. In case of life on exosolar planets the "contact" will happen by astronomical observations.

2:00 p.m. Hirose K. * (Invited)
Perspectives of ELSI Projects: The Origin of the Earth and the Origin of Life **[#1011]**
Perspectives of ELSI Projects: the origin of the Earth and the origin of life.

Friday, November 29, 2013
EXOPLANETARY SYSTEMS AND EXOPLANETS
(THEORIES, MODELS, AND OBSERVATIONS)
2:30-5:00 p.m. ISAS Main Building 2F Conference Hall

Chairs: **Takao Nakagawa**
Shigeru Ida

2:30 p.m. Narita N. * (Invited)
Toward Detections and Characterization of Habitable Transiting Exoplanets ***[#2A2]***

3:00 p.m. Omiya M. * Sato B. Harakawa H. Kuzuhara M. Hirano T. et al.
Search for Habitable Planets Around Low-Mass Stars Using the InfraRed Doppler Instrument **[#1037]**
We present strategies and plans for a new Doppler exoplanet survey of late-M dwarf stars to search for Earth-mass planets in the habitable zone around low-mass stars using a new near-infrared instrument for the Subaru telescope (IRD).

3:15 p.m. Sorahana S. * Yamamura I. Suzuki T. K.
Brown Dwarfs Atmospheres Revealed by 2.5–5.0 μm AKARI Spectra **[#1045]**
Brown dwarf atmospheres cannot be determined by models with simple radiative equilibrium and solar metallicity. By comparing AKARI data with our improved models, we attempt to understand the complicated structure of brown dwarf atmospheres.

3:30 p.m. Enya K. *
Studies of Exoplanets with SPICA **[#1047]**
We present an introduction to SPICA, a coronagraph instrument for SPCIA, and exoplanet studies with SPICA. SPICA will be a powerful tool for such studies thanks to advantages of a space-based large (3m class) cryogenic IR telescope.

3:45 p.m. Hut P. * (Invited)
Why Life? Origins of Life Elsewhere in the Universe **[#1055]**
Given life as we know it, we ask how it originated and how it transitioned from chemical to biological.

4:15 p.m. Fujii Y. *
Toward Characterization of Exoplanetary Surface Environment **[#1020]**
How and how much can we potentially know about exoplanetary surface environment with future direct imaging observations? We discuss planetary scattered light as a probe of surface materials as well as clouds, which are relevant to habitability.

4:30 p.m. Takahashi J. * Itoh Y. Akitaya H. Okazaki A. Kawabata K. et al.
Polarimetric Signatures of the Earth Extracted from Earthshine Observations **[#1034]**
We present the results of Earthshine polarimetry. Observed wavelength dependence in phase variation of polarization spectra might be a signature pointing toward Earth-like atmosphere. We also compare polarization difference between ocean and land.

4:45 p.m. Ueta S. * Sasaki T.
Conditions of Surface H_2O of Snowball Planets with High-Pressure Ice **[#1039]**
We discuss the conditions that terrestrial planets must satisfy for an internal ocean to exist by considering the effects of ice under high pressure (high-pressure ice). Such high-pressure ice is likely to affect the habitability of the planet.

Friday, November 29, 2013
GROUP PHOTO DAY-2 & COFFEE BREAK
5:00-5:30 p.m. ISAS Main Building 2F Conference Hall

Friday, November 29, 2013
POSTER SESSION-CORE TIME
5:30-6:30 p.m. ISAS Main Building 1F "Bidding Room" (Nyusatsu-Shitsu)

Struck J.-T.
Man Made Elements Periodic Table, Astronomical Periodic Table, Geographic Periodic Table-Dimitri Mendeleev Imitation in the 21st Century **[#1003]**
A man made elements periodic table, including every single current element not just synthetic elements can be built differently than the naturally occurring element periodic table. Implications for knowing producable elements in space travel.

Takahashi J.
Polarized Space Radiation and Biological Homochirality **[#1030]**
A most attractive scenario of the origin of terrestrial biological homochirality is that the single-handedness phenomenon was originated by asymmetric chemical reactions stimulated by polarized space radiation.

Takano Y.
Abiogenic and Biogenic Chiral Amino Acids for Further Enantiomer-Specific Isotope Analysis (ESIA) **[#1046]**
Abiogenic and biogenic chiral amino acids for further enantiomer-specific isotope analysis (ESIA).

Yuko Y. K. Yinjie Y. Y. Narutoshi N. K. Keisuke K. S. Masako M. T. et al.
The Possible Interplanetary Transfer of Microbes: Assessing the Viability of Deinococcus spp. Under the ISS Environmental Conditions for Performing Exposure Experiments of Microbes in the Tanpopo Mission **[#1013]**
In the Tanpopo mission, we have proposed to carry out experiments on capture and space exposure of microbes at the ISS. In this paper, we have examined the survivability of Deinococcus spp. under the environmental conditions in ISS in orbit.

Nishizawa M. Sasaki S. Miyakawa A. Imai E. Yoshimura Y. et al.
Fluorescent Dye Handling System for MELOS1 Life Detection Microscope **[#1017]**
Dye solution handling system for the microscope in MELOS1 mission will be reported. The effect of metal foil treatment on the solution drop will be discussed.

Kiyonaga Y. Sasaki S. Odashima T. Okudaira K. Imai E. et al.
Method for Biological Contamination Monitoring During Aerogel Cutting Process in Tanpopo Project Using Bioluminescent Bacteria Photobacterium Kishitanii **[#1018]**
A novel method to monitor biological contamination of the aerogel during the cutting procedure is reported. The advantage of using bioluminescent bacteria for the monitoring will be presented.

Mita H. Hashimoto H. Higashiide M. Imai E. Kawaguchi Y. et al.
Exposure Experiments of Organic Compounds on the JEM, ISS, in the Tanpopo Mission **[#1019]**
In order to discuss the possibility of delivery of organic compounds from space, alteration of prebiotic compounds in space environments should be clear. Therefore, we will expose some organic compounds on the exposure facility at ISS-JEM.

Tomita-Yokotani K. Kimura S. Kimura Y. Igarashi Y. Ajioka R. et al.
Dried Colony in Cyanobacterium, Nostoc sp. HK-01 — Several high Space Environment Tolerances for "Tanpopo" Mission **[#1033]**
A cyanobacterium, Nostoc sp. HK-01, has high several space environmental tolerance. Nostoc sp HK-01 would have high contribution for the "Tanpopo" mission in Japan Experimental Module of the International Space Station.

Tabata M. Yano H. Kawai H. Imai E. Hashimoto H. et al.
Silica Aerogel for Use in Cosmic Dust Collectors Utilized in the Tanpopo Mission **[#1038]**
We are developing silica aerogels for use in cosmic dust collectors utilized in the Tanpopo mission. In this paper, we present the recent development of a box-framing aerogel in contamination-controlled environments.

Yamamoto M. Nakamura R. Oguri K. Kawagucchi S. Suzuki K. et al.
Possibility of Environmental-Electro-Ecosystem (E3) Around Deep-Sea Hydrothermal Vents **[#1008]**
We used in situ electrochemical analyses to demonstrate that deep-sea hydrothermal vents have the ability to generate electricity. Some chemolithotrophic microbial components living in chimney may directly utilize the electrons as an energy source.

Hayashi N. Nosaka J. Ando R. Hashimoto H. Yokobori S. et al.
Interplanetary Migration of Eucaryotic Cell, Spore of Schizosaccharomyces Pombe **[#1032]**
The Tanpopo mission to examine possible interplanetary migration of microbes is progressing. Spore of Schizosaccharomyces pombe are considered as the exposed samples. In this paper, results of preliminary experiments for the exposure are shown.

Hoshino T. Tsutsumi M. Morono Y. Inagaki F.
Global Census of Microbial Life in Marine Subsurface Sediments **[#1041]**
Using newly developed molecular ecological approaches, we are conducting global census of microbial life in marine subsurface sediments and provide us a new information of absolute quantify of the microbes in the deep subseafloor biosphere.

Mizuuchi R. Ichihashi N. Usui K. Yomo T.
Evolution and Adaptation of the RNA Coupled with an Artificial Life-Like Self-Replication System to a Severe Translational Environment **[#1006]**
We adapted the RNA in a severe environment in which early life could have been through a life-like self-replication system which allows Darwinian evolution. The results show how powerful evolution is and what problems early life might have overcome.

Karasawa S.
Evolution of Intelligence in a Network of Chain Reactions **[#1021]**
This report presents a concept of network of chain reaction which represents activities. Concurrently activated portions are able to link by intermolecular bond via thermal motion of molecules. Annex system makes possible to replay similar reaction.

Yokobori S. Nakajima Y. Akanuma S. Yamagishi A.
Moelcular Phylogenetic Analyses of G1P Dehydrogenase and G3P Dehydrogenase Suggest the Late Origin of Archaea-Type Membrane **[#1024]**
Phylogenetic analyses of G1PDH and G3PDH suggested that the common ancestor of Bacteria/Archaea had cellular membrane with G3P formed by G3PDH. The archaeal ancestry acquired G1PDH, and then the membrane with G3P was replaced with that with G1P.

JUICE JAPAN (Saito Y. Fujimoto M. Sasaki S. Kimura J. et al.
Exploration of Jovian System by ESA-JUICE Mission: Participation of Japanese Teams ***[#2P1]***
JUICE (Jupiter Icy Moon Explorer) is the ESA's first Large-class mission of Cosmic Vision 2015-2025 program. It will be launched in 2022 and will reach Jupiter in 2030.

Day-3

Saturday, November 30, 2013
WEBCAST PRESENTATION-2
9:00-9:30 a.m. ISAS Main Building 2F Conference Hall

Chair: Hajime Yano

9:00 a.m. C. McKay *
Astrobiology in US Space Program (NASA Ames): TBD

Saturday, November 30, 2013
PANEL DISCUSSION: "ASTROBIOLOGY VS. SPACE EXPERIMENTS AND EXPLORATION"
9:30-11:00 a.m. ISAS Main Building 2F Conference Hall

Moderator: Hajime YANO (JAXA/ISAS)

Panel Members: Gerda HORNECK (European Astrobiology Network Association)
Hitoshi KUNINAKA (JAXA/JSPEC, JSPEC Space Exploration Committee)
Ken TAKAI (JAMSTEC)
Akihiko YAMAGISHI (Japan Astrobiology Network)
Hiroshi YAMAKAWA (Kyoto University, ISAS Space Engineering Committee)

Panel Discussion: "Astrobiology vs. Space Experiments and Exploration"

Saturday, November 30, 2013
LIFE IN EXTREME ENVIRONMENTS (1/2)
11:15 a.m.-12:30 p.m. ISAS Main Building 2F Conference Hall

Chairs: **Ken Takai**
Daiki Horikawa

11:15 a.m. Nicholson W. L. * (Invited)
Can Terrestrial Microbes Grow on Mars? **[#1051]**
Recent work in our laboratory has concentrated on investigating the possibility that prokaryotes from Earth could either (i) live on Mars in their current form, or (ii) evolve the ability to live under Mars conditions.

11:45 a.m. Horikawa D. D. *
Astrobiological Research on Tardigrades: Implications for Extraterrestrial Life Forms **[#1035]**
Tardigrades have been considered as a model for astrobiological studies based on their tolerance to extreme environments. Future research on tardigrades might provide important insight into the possibilities of existence of multicellular life forms.

12:00 p.m. Gusev O. * Shagimardanova E. Bosch T. Okuda T. Kikawada T.
Interaction of the Sleeping Chironomid with Microorganisms: "Uchi-Soto" in the World of Anhydrobiosis **[#1005]**
In the current paper we outline our current knowledge about interaction of microorganisms and an anhydrobiotic insect in the acquiring desiccation resistance and in the processes related to it.

12:15 p.m. Kitadai N. *
The Energetics of Amino Acid Synthesis and Polymerization as a Function of Temperature and pH **[#1029]**
This study performed thermodynamic calculations for amino acid synthesis and polymerization as a function of temperature and pH. Results showed that favorable environmental conditions for the two reactions are different.

Saturday, November 30, 2013
LUNCH TIME & POSTER VIEWING-: DAY-3
12:30-2:00 p.m. ISAS Main Building 1F "Bidding Room" (Nyusatsu-Shitsu)

Saturday, November 30, 2013
LIFE IN EXTREME ENVIRONMENTS (2/2)
2:00-2:50 p.m. ISAS Main Building 2F Conference Hall

Chairs: **Ken Takai**
Daiki Horikawa

2:00 p.m. Inagaki F. * Hinrichs K.-U. Kubo Y. IODP Expedition 337 Scientists
Limits of Life in the Deep Subseafloor Biosphere: New Insights from IODP Expedition 337 **[#1022]**
The Integrated Ocean Drilling Program (IODP) Expedition 337 provides an unprecedented opportunity to explore how life persists and evolves in the deep subseafloor ecosystem and to expand our knowledge of habitability and limits of life on Earth.

2:15 p.m. Morono Y. * Terada T. Ito M. Hoshino T. Inagaki F.
Technological Challenges for the Advanced Study of Deep Subseafloor Life **[#1027]**
We have accumulatively developed techniques to analyze deep subseafloor life. The systematic analytical scheme and it's current application to some representative deep-biosphere samples will be shown.

2:30 p.m. Takai K. * Shibuya T. Sekine Y. Russell M. J.
Microbial Community Development in Deep-Sea Hydrothermal Vents in the Earth, and the Enceladus **[#1004]**
We estimate bio-available energy potentials in mixing zones between hydrothermal fluids and seawater in the Enceladus subsurface ocean. The results suggest that abundant living ecosystem should be present in the Enceladus ocean.

Saturday, November 30, 2013
GROUP PHOTO DAY-3 & COFFEE BREAK
2:50-3:20 p.m. ISAS Main Building 2F Conference Hall

Saturday, November 30, 2013
RNA AND MOLECULAR BIOLOGY
3:20-5:50 p.m. ISAS Main Building 2F Conference Hall

Chairs: **Daisuke Kiga**
Yutetsu Kuruma

3:20 p.m. Ueda T. * (Invited)
The Pure System for Artificial Cells **[#1057]**
The ultimate goal of biology is to obtain the answer to the question, "what is life?" We have two approaches to reach the goal: analytical and synthetic.

3:45 p.m. Ichihashi N. * Usui K. Yomo T.
Darwinian Evolution in a Translation-Coupled RNA Replication System Within a Cell-Like Compartment **[#1060]**
The construction of an artificial cell or model protocell is hypothesized to provide important insights into the emergence of life from an assembly of non-living molecules.

4:10 p.m. Kimoto M. * Hirao I.
Variation of Genetic Alphabets of Nucleobases **[#1061]**
Nucleic acids are unique biopolymers, which work as both genetic information materials and functional molecules, such as a catalyst and ligands.

4:30 p.m. Bessho Y. *
Bioimaging by X-Ray Laser Diffraction at SACLA **[#1036]**
The XFEL facility, SACLA is soon expected to be useful for new bioimaging method with an accuracy on the order of ten femto-seconds. We recorded coherent X-ray diffraction patterns from intact Microbacterium cells in solution at SACLA.

4:45 p.m. Becerra A. * Islas S. Hernandez-Morales R. Lazcano A. (Invited)
RNA and the Nature of the Last Common Ancestor **[#1059]**
It is possible to reconstruct some of the characteristics of the last universal common ancestor or cenancestor.

5:15 p.m. Akanuma S. * Nakajima Y. Yokobori S. Yamagishi A.
Experimentally Testing the Hypothesis of a Limited Amino Acid Repertoire in Primitive Proteins **[#1015]**
It has been argued that a fewer amino acids were used in primitive proteins and later the repertoire increased up to 20. To test this hypothesis experimentally, we restricted the amino acid usage of a reconstructed, ancestral protein to reduced sets.

5:35 p.m. Amikura K. * Kawahara-Kobayashi A. Kiga D.
Simplification of the Genetic Code: Restricted Diversity of Genetically Encoded Amino Acids **[#1058]**
We will show the generality of our method for the simplification, by constructing other types of further simplified codes including a 16-amino-acid code.

Saturday, November 30, 2013
FINDINGS AND CLOSING REMARKS
5:50-6:10 p.m. ISAS Main Building 2F Conference Hall

Chair: Ken Takai

5:50 p.m. Yano H. *
Workshop Findings

6:00 p.m. Takai K. *
Closing Remarks

(END OF PROGRAM)