



# JSPS QUARTERLY

JAPAN SOCIETY FOR THE PROMOTION OF SCIENCE



■ FEATURE Global Symposium on  
Scientific Breakthroughs



No. 53 2015 Autumn



On May 26, the day prior to holding the annual meeting of the Global Research Council, JSPS hosted an open symposium, which filled the hall to capacity bespeaking the high level of public interest in the creative research policies and practices that various countries have initiated as they strive to cultivate seeds of scientific innovation and breakthroughs.

An opening message was given by Mr. Hakubun Shimomura, Minister of Education, Culture, Sports, Science and Technology (MEXT), on the societal importance of scientific breakthroughs and government's role in promoting them. Following him, JSPS President Dr. Yuichiro Anzai offered welcoming remarks.



MEXT Minister Mr. Hakubun Shimomura

## Keynote Speeches

A series of keynote speeches was given, led off by Dr. France Córdova, Director of the National Science Foundation (USA), and followed by Dr. Paul Boyle, President and Vice-Chancellor of the University of Leicester (former president of Science Europe), Dr. Ei-ichi Negishi, Nobel laureate and professor of Purdue University, and Dr. Erling Norrby, emeritus professor of the Royal Swedish Academy of Science. They delved into such topics as the growing demand for international collaboration in spawning breakthroughs and the merger of innovation with technologies that have wide practical use; striking a proper balance between pure and applied sciences and effectively measuring the social and economic impacts of breakthrough research; approaches for guiding and encouraging young scientists to assume the vanguard in advancing next-generation research; and society's need for time to absorb revolutionary innovations and discoveries delivered by scientific advances.



Prof. Ei-ichi Negishi

## Panel Sessions

The distinguished group of panelists included the above-mentioned keynote speakers along with Prof. Jean-Pierre Bourguignon, President of the European Research Council; Prof. Peter Strohschneider, President of the German Research Foundation; Dr. Michiharu Nakamura, President of the Japan Science and Technology Agency; and Mr. Yutaka Tokiwa, Director-General of MEXT's Research Promotion Bureau. Held in two parts, the panel session was moderated by Dr. Anzai.

### Part I. Panelist Interventions (two excerpts)

#### **Prof. Strohschneider**

Regarding innovation: It depends on scholarly insights and scientific breakthroughs which we did not expect, which we did not plan

for and which we did not predict or anticipate. It is these insights born out of scientific curiosity which lead to truly transformative breakthroughs that change the ways we think and act precisely because they openly break with our expectations.

#### **Prof. Bourguignon**

Evaluating ground-breaking projects: Besides breakthroughs achieved, we need to look into whether a project has had failures, because if there are no failures it means that no risks have been taken. Placing emphasis on young researchers: It is not that older scientists cannot make breakthroughs, but the new generation of scientists needs to feel that they are really trusted and empowered.

### Part II. Panel Discussion

Three themes were addressed in this part of the panel session.

On the theme, *Research with a high potential for scientific breakthrough*, elements needed to advance the kind of research that generates breakthroughs were discussed. These included achieving a concentration of talents as the "biggest factor in innovation"; supporting basic research that crosses different fields and focusing investment in mainly young researchers who can forge advances in the cross-disciplinary areas that emerge; and incentivizing policymakers to have a long-term commitment to sustaining a continuum of original research.

On the theme *Ensuring investment in research and accountability to the stakeholders*, ideas were discussed for securing budgets in support of basic research along with ways to help stakeholders better grasp the value of such research. From an investment viewpoint, it was stressed that extreme positions of distinction should be avoided between pure and applied research, and that a balance be struck between individual researcher and system perspectives. Regarding accountability to stakeholders, it was pointed out that there is a lack of sufficient communication with them across the spectrum of scientific research. Views were expressed that both the continuity and level of research funding can be elevated if researchers will work to raise interest in science by explaining the nature and outcome of their own research to the public, especially younger people.

On the theme *Building global research networks to accelerate breakthroughs*, a discussion was advanced on the role of a global



Panel discussion

Ideas and information derived from these discussions were used as inputs to the following day's GRC annual meeting. Please see a related article in *JSPS Quarterly* No. 52, or visit our webpage ([www.jsps.go.jp/english/e-quart/index.html](http://www.jsps.go.jp/english/e-quart/index.html))

network of researchers in propelling breakthroughs and the contribution that science-funding agencies can play within such a network. It was opined that global research networks are capable of achieving higher levels of excellence, but should also work to develop science at lower levels of excellence. Views were voiced that science-funding agencies should strike a balance between targeted research and serendipitous research, amass and analyze big data from countries all over the world in order to collaboratively tackle major challenges, and also facilitate the transfer and exchange of talented researchers.

## Roundtable on Building Education and Research Capacity in Africa

This second GRC preliminary meeting was held by JSPS in collaboration with the National Research Foundation (NRF) of South Africa, and the United Nations University Institute for the Advanced Study of Sustainability (UNU-IAS). It was attended by some 70 heads of research councils (HORCs) and aspiring young researchers.

### Dual Objectives

Two purposes underscored this event. The first was to provide an open and informal forum for researchers and administrators to discuss ways to strengthen the research capacity of young African scientists, which is a vital component of the GRC thrust. The other was to give an opportunity for the attending young researchers to create and expand networks with peers and potential collaborators.

### Two Discussion Segments

Held in two segments, the Roundtable kicked off with a video presentation to introduce the following panel discussion's theme of "sustainability." Delivering presentations, four distinguished panelists drove the discussion. They were Dr. Divine Fuh from the University of Cape Town, Dr. Orleans Mfuné from University of Zambia, Dr. Julia Tagüeña Parga, Deputy Director General for Scientific Development at Mexico's National Council on Science and Technology, and Dr. Eino Mvula, CEO of Namibia's National Commission on Research Science and Technology. Drs. Fuh and Mfuné spoke about issues that have a direct effect on young researchers in African universities, such as difficulty in securing research funding and acquiring partners, while Drs. Parga and Mvula, both HORCs, introduced initiatives being taken in their countries to effectively foster young researchers. Then, a vibrant Q&A dialogue, moderated by Prof. Masafumi Nagao of UNU-IAS, was held between the panelists and the floor. It probed such real issues as how to develop the next generation of frontrunner African researchers who must take the baton pass from the soon-to-retire older generation. For example, Dr. Fuh commented on the need of a transgenerational paradigm shift to spur innovative sustainable-development concepts and practices in Africa.

In the second segment, Prof. Nagao reported the outcome of a "stock-taking exercise" on a program carried out between JSPS and NRF South Africa aimed at expanding collaborative research networks between the two countries. He said that as projects between



Panelists and special guests

Japanese and South African researchers proceed, the relationship between them is transitioning from a "teacher-student" matrix to a more complementary, equal-footed relationship. Then, a discussion, moderated by Dr. Aldo Stroebel, Executive Director of NRF South Africa, was advanced on the subject of providing a platform for developing the capacity of young researchers. Addressing the topic not only in terms of numbers but also of quality, the need was pointed out for creating programs that both systematically and institutionally work to foster next-generation African researchers. Their acquiring of doctoral degrees will, it was said, be a key driver in accelerating capacity building on the Continent.

Outside the meeting hall, poster presentations were given by 19 exhibitors, and spirited discussions were enjoyed among the participants on academic exchange and other ideas related to enriching education and research in Africa.



Presentation for issue raising

# 2015 Recipient Chosen for International Prize for Biology

On 29 July, the Committee on the International Prize for Biology (chaired by Dr. Takashi Sugimura, president, the Japan Academy) decided to award the 31<sup>st</sup> (2015) International Prize for Biology to Dr. Yoshinori Ohsumi, Honorary Professor of Frontier Research Center, Tokyo Institute of Technology. The field of specialization for the 31<sup>st</sup> Prize is “Cell Biology.”

Dr. Ohsumi has made great and groundbreaking achievements in the field of autophagy (self-eating). At a time when this phenomenon was known only observationally by electron microscopy, he dissected it at a molecular level and not only determined its detailed mechanism but also demonstrated its importance in many aspects of life, including development, disease, and infection. This world-leading work has made autophagy research a cutting-edge field in the life sciences.

Autophagy is a phenomenon which, under starvation conditions, allows the degradation and recycling of cellular components including organelles and proteins. Although it had been described in electron microscope observations of animal cells, its molecular mechanism remained a mystery. In the early 1990s, observing yeast cells under starvation conditions with a light microscope, Dr. Ohsumi saw structures that vigorously moved around appear in the vacuole—a discovery that opened up a completely new field of study. After identifying this phenomenon as a form of autophagy, Dr. Ohsumi succeeded in isolating a mutant yeast strain in which it did not occur. He then led the field with pioneering work that

identified responsible genes from a large number of autophagy-deficient yeast mutants and, in quick succession, established the functions of the proteins that these genes encoded. Much work continues to be done in this area today using animal and plant cells. From these studies, it has gradually emerged that autophagy-related (*ATG*) genes are well conserved in eukaryotes and that the process has a number of very important physiological roles. Life phenomena in which it is known to play a part range from early development and the avoidance of neonatal starvation to the elimination from cytoplasm of abnormal proteins and damaged organelles, response to bacterial and viral infections, and immunity. Autophagy has also been implicated in neurodegenerative diseases such as Alzheimer’s, and in cancer.

Thus, starting from a complete lack of molecular-level knowledge, Dr. Ohsumi’s research elucidated the mechanism by which the action of multiple *ATG* genes leads to autophagy, showed it to be an important life phenomenon widely conserved in the biological world, and established a major new field of the life sciences. Autophagy studies are currently undergoing explosive development, none of which could have happened without his work on yeast. These distinguished achievements make Dr. Ohsumi a worthy recipient of the International Prize for Biology.

## Presentation Ceremony

The presentation ceremony and a subsequent reception in honor of the Prize recipient



Dr. Yoshinori Ohsumi

are held around in December at the Japan Academy in the presence of Their Majesties the Emperor and Empress every year. This year’s date will be announced in due course.

## Commemorative Symposium

To commemorate the award to Dr. Ohsumi, a Commemorative Symposium for the 31<sup>st</sup> International Prize for Biology will be held on December 5 and 6, 2015 in Kyoto, co-organized by the Osaka University and the Japan Society for the Promotion of Science.

For more information about 31<sup>st</sup> (2015) International Prize for Biology, please visit our website: [www.jspg.go.jp/english/e-biol/index.html](http://www.jspg.go.jp/english/e-biol/index.html)

International Policy Planning Division

## JSPS Reopens Its Base in Brazil

On 1 May, JSPS reestablished its base in Brazil by appointing Dr. Masato Ninomiya, professor of the University of São Paulo, to the post of “JSPS Science Advisor” stationed in São Paulo.

Between the years 1989 and 2001, JSPS operated a liaison office in São Paulo to promote and contribute to scientific exchange between Brazil and Japan. Over recent years, Brazil and its surrounding countries have demonstrated dramatic progress in science and technology, spawning an increasingly strong need for JSPS to bolster its support for collaboration with Brazil and those countries. This recognition



Dr. Masato Ninomiya

eventuated the posting of a JSPS Science Advisor in São Paulo.

Newly appointed to that post, Dr. Ninomiya has exceptional qualifications for carrying out its mission. He has studied law both in Japan and Brazil, and is currently a professor in the law department of the University of São Paulo, while working as a practicing attorney in the São Paulo area. He is also serving on the faculty of Meiji University in Japan, where he has contributed greatly to the promotion of Japan-Brazil exchange. In his post of JSPS Science Advisor, Dr. Ninomiya will collect information on scientific trends in Brazil and its region and work to build a robust network between Brazilian and Japanese researchers, universities and research-promotion agencies, while disseminating information in Brazil and neighboring countries on JSPS’s programs and activities.

International Policy Planning Division

# Eleventh JSPS Prize Awardees: Their Work and Aspirations

As introduced in the last issue of the *Quarterly*, 25 researchers were awarded the eleventh JSPS Prize. Among them, six were also given the Japan Academy Medal. They describe their research initiatives in the following essays.

## Humanities and Social Sciences

### A Historical Sociological Study on the Zionist Worldview as a Background of the Israeli-Palestinian Conflict

My research has focused on the Zionist movement within the Russian Empire and in the Russian-speaking world in the first quarter of the twentieth century. Broadly, I am interested in how the Zionist movement has been connected with the Israeli-Palestinian conflict. The majority of Zionist leaders and immigrants to Palestine and later Israel were from the Russian Empire or the former Russian Empire, which included a major part of Poland. In fact, both first president and prime minister of Israel were born in the Russian Empire.

The emergence of the Zionist movement, or a kind of Jewish nationalist movement seeking a Jewish national home in Palestine, has generally been understood as a reaction to growing anti-Semitism in late nineteenth century and early twentieth century and as a phenomenon of the so-called Jewish consciousness that has continued from ancient times. My thesis emphasizes the role of the Empire as a

socio-political environment in shaping the Zionist ideology. In short, when establishing their own "national" home in Palestine, the Zionists tried to improve the status of the Jewish people by creating Jewish nation that should be respected as *such* within the Russian Empire.

To understand the Zionist idea in the context of the Empire from another angle, I am currently focusing on Jewish nationalism among Russian Jews. The Zionist idea emerged in the Empire but resulted in the State of Israel, which is generally defined as a nation state. The transformation of Jewish identity after the collapse of the Empire should be a key to understanding that transition to a Jewish state. I have published several articles and chapters in English and Japanese journals and books on this research, and am currently starting a book project with other scholars on East European Zionist history in the US, Israel, and Japan.



**Dr. Taro Tsurumi**

2014-present: Associate Professor, Saitama University  
2012: Visiting Scholar at New York University, Skirball Department of Hebrew and Judaic Studies, Taub Center for Israel Studies  
2010: Received PhD from University of Tokyo, Graduate School of Arts and Sciences  
2010: Postdoctoral Fellow, Hebrew University of Jerusalem, Faculty of Humanities  
2006: Visiting Scholar at Hebrew University of Jerusalem, Rothberg International School  
2004: Graduated from Tokyo University of Foreign Studies, Department of English

### Reconstructing History of the Northern Kingdom of Israel

Despite elaborate, even enthusiastic studies for more than a century, the history of ancient Israel for the most part still remains shrouded in mystery. Historical reliability of the detailed description in the Hebrew Bible has been recently questioned due to its theological and ideological nature. I have been attempting to reconstruct a history of ancient Israel, especially during the time of the divided kingdoms, by critical use of three types of sources: biblical text, contemporary epigraphic sources, and archaeological data.

The unique feature of my study lies in its methodology. Unlike similar studies that put weight on only one of the above three sources and use the other two to supplement information from their main source, I first investigate each of the three sources separately, and then synthesize the results. This process, I believe, enables me to reconstruct a more-balanced history, while reducing the danger of my study being based too much on one source,

which can entail a preconceived use of the other two sources.

In my doctoral dissertation, I reconstructed a history of the Northern Kingdom of Israel during the late-ninth to early-eighth centuries BCE. Now, I am investigating the last thirty years of that Kingdom in the late eighth century using the same 3-source methodology. Although that was one of the critical periods in the history of ancient Israel, there is still much to elucidate. We do not know who the Assyrian king was that conquered Samaria, nor do we know what the capital of Israel was at that time or exactly when it happened. Regarding these points, there are contradictions in the sources. Only a cautious and fastidious study using all three types of sources will enable us to unveil the mysterious history of that period.



**Dr. Shuichi Hasegawa**

2014-present: Associate Professor, College of Arts, Rikkyo University  
2012: Associate Professor, Faculty of Humanities, the University of Morioka  
2011: Received PhD from School of Jewish Studies, Tel Aviv University  
1997: Graduated from Rikkyo University

## Mathematics; Physical Sciences; Chemistry; Engineering Sciences

### Polymer Behavior at the Interface

The chemical and physical properties of polymers at interfaces are closely related to the manifestation of their functions. For example, the performance of polymer-based organic solar cells strongly depends on the structure and dynamics of the conjugated polymers at various interfaces. The durability of polymer nanocomposites is also correlated with polymer behavior at the interface with inorganic fillers. Furthermore, biocompatibility of polymers is controlled by bioevents at the polymer interface with a body fluid. The importance of studying polymer interfaces can be seen in not only the above examples but also in many other polymer applications.

We found that the structure and physical properties of polymers at interfaces were not the same as those in the corresponding bulk phase. However, we lacked a clear understanding of the reason for this. Thus, as a benchmark effort, we started to clarify the controlling factors in polymer behaviors at interfaces with different phases using our original methodology. At the same time, studies geared towards the relation between the fundamental science of polymers at interfaces and the performance of polymer

thin devices, nanocomposites, biomedical chips (etc.) were also needed. To do this, we have conducted various kinds of experiments on topics of synthesis, structure, physical properties and functions of polymers at interfaces with different phases.

In short, while polymer dynamics become faster at interfaces with gas and liquids, they are slower at solid interfaces. When polymer chains reach a quasi-equilibrium state, the aggregation states of polymer chains at interfaces might be understood in terms of thermodynamics. In most cases, however, polymer behaviors at interfaces are dominated by competition between thermodynamics and kinetics.

Our findings have in part been adopted into practical use in designing and constructing polymer devices. However, we are still far away from gaining a clear understanding of polymer behaviors at interfaces. Therefore, we are struggling every day to elucidate the science of these behaviors. Once that can be done, it is our dream to help Japan become the inventor of many cutting-age devices and tough composites using polymers.



**Dr. Keiji Tanaka**

2009-present: Professor, Department of Applied Chemistry, Kyushu University  
 2005: Associate Professor, Department of Applied Chemistry, Kyushu University  
 2000: Assistant Professor, Department of Applied Chemistry, Kyushu University  
 1999: JSPS postdoctoral fellow, Department of Applied Chemistry, Kyushu University  
 1997: Research Associate, Department of Chemistry, University of Wisconsin-Madison, USA  
 1997: Received PhD from Department of Applied Chemistry, Kyushu University  
 1993: Graduated from Department of Applied Chemistry, Kyushu University

### Materials Research to Discover Novel Phenomena

The discovery of novel phenomena is at the forefront of research in condensed matter physics. This is the case with inorganic materials, which provide an important basis for current electronic and information technology. In particular, magnets in inorganic materials are central objects of basic research, as quantum correlations among Avogadro numbers of electrons lead to exotic macroscopic phenomena such as unconventional superconductivity, quantum criticality, and a novel type of Hall effect.

Various interesting phenomena appear through a phase transition to a state with a lower energy. There are two types of phase transition, i.e. thermal and quantum phase transitions. A phase transition at finite temperature, e.g. a ferromagnetic transition, is governed by thermal fluctuations. On the other hand, a phase transition may also occur at zero temperature due to quantum fluctuations. Such a quantum phase transition has attracted a great deal of attention to magnetic systems, as they show striking properties that are otherwise not available. We have successfully made new compounds and experimentally discovered

a new class of quantum phase transitions that induce exotic superconductivity, and anomalous metallic states that defy the current standard theory of metals.

Our study has also revealed significant properties of a new class of magnets, "spin liquid." In magnetic insulators, spins form a periodic array of their direction, which can be viewed as a "spin solid." With increasing quantum fluctuations, a magnetic "spin solid" becomes unstable and "melts" into a spin liquid, which is a new type of quantum liquid. Our experiments have found that a spin liquid may in some cases spontaneously exhibit a Hall effect even in the absence of a magnetic field or magnetic order. This type of Hall effect has never before been made since the discovery of the Hall effect in the late 19<sup>th</sup> century.

Our current study of the novel quantum magnetism discovered in new materials has led to new concepts for understanding magnetic materials, and further research will pave the way for developments useful in future applications.



**Dr. Satoru Nakatsuji**

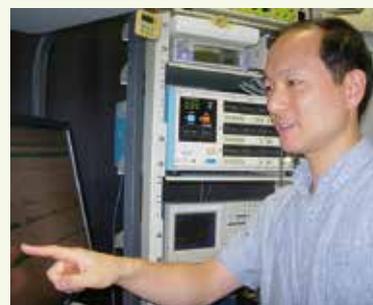
2012-present: PRESTO Researcher, Japan Science and Technology Agency  
 2006-present: Associate Professor, the Institute for Solid State Physics, the University of Tokyo  
 2003: Lecturer, Faculty of Science, Kyoto University  
 2001: JSPS Postdoctoral Fellow, National High Magnetic Field Laboratory, Florida, USA  
 2001: Received PhD from the Graduate School of Science, Kyoto University  
 1998: JSPS Research Fellow (DC1), Department of Physics, Graduate School of Science, Kyoto University  
 1996: Graduated from Faculty of Engineering, Kyoto University

**Biological Sciences; Agricultural Sciences; Medical, Dental, Pharmaceutical Sciences****Central Circuit Mechanism Controlling Body Temperature Homeostasis**

The regulation of body temperature is one of the most typical vital functions in homeothermic animals including humans. This "temperature homeostasis" is controlled by the brain and essential for keeping the physiological and biochemical conditions within the body at an optimum state. I have elucidated, with my collaborators, the fundamental neural circuit mechanisms that control body temperature homeostasis. By combining physiological and anatomical techniques, I discovered the neural pathways that transmit sensations of cool and warm environmental temperatures from sensors in the skin to the thermoregulatory center of the brain. I identified these pathways to be a novel thermosensory mechanism for regulating body temperature, distinct from the mechanism of "feeling" skin temperature. My research also revealed the neural mechanisms by which command signals from the thermoregulatory center are transmitted to peripheral organs to elicit physiological responses for maintaining body temperature. I found these brain circuits to also mediate fever and psychological stress-

induced hyperthermia as well as the normal regulation of body temperature. Therefore, the discovered circuit mechanisms function not only for temperature homeostasis in the body but also for defending life from various environmental stressors including infection and psychological stress.

Even with these accomplishments, several important questions still remain to be addressed. The neural circuit mechanism that determines the set-point of body temperature and metabolism is unknown, as is how psychological stress affects the circuit for body temperature regulation in causing psychogenic fever. I believe that our research projects will contribute to the progress of medicine for treating such diseases as psychogenic fever and obesity in the future.

**Dr. Kazuhiro Nakamura**

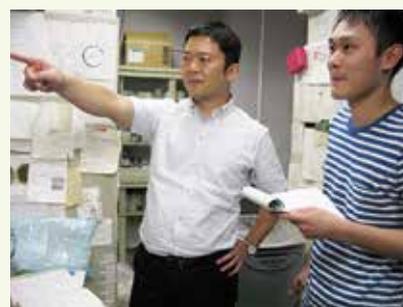
- 2015-present: Professor, Department of Integrative Physiology, Nagoya University Graduate School of Medicine
- 2014: Associate Professor, Career-Path Promotion Unit for Young Life Scientists, Kyoto University
- 2013: Senior Lecturer, Career-Path Promotion Unit for Young Life Scientists, Kyoto University
- 2009: Assistant Professor, Career-Path Promotion Unit for Young Life Scientists, Kyoto University
- 2005: Postdoctoral Research Fellow, Oregon Health & Science University, USA
- 2002: JSPS Research Fellow
- 2002: Received PhD from Graduate School of Pharmaceutical Sciences, Kyoto University
- 1997: Graduated from Faculty of Pharmaceutical Sciences, Kyoto University

**Biosynthetic Mechanism of Homopoly Amino Acids Produced by Microorganisms**

Peptide natural products and their derivatives, which are produced by microorganisms, are historically invaluable as a source of therapeutic agents. In microorganisms, their structural diversities are generated by two general mechanisms: ribosomal and nonribosomal. The ribosomal peptides synthesis, including protein biosynthesis, produces structural diversity by combining with the standard amino acids. Nonribosomal peptide synthetases (NRPSs) are known to be enzymes offering greater structural diversity, because they can utilize nonnatural and nonstandard amino acid building blocks for peptide synthesis. Although the microorganisms are thus able to assemble diverse peptide natural products from various amino acids, structurally simple peptides known as homopoly(amino acid)s have also been found in some microorganisms. However, their biosynthetic mechanisms have remained unclear for many years. To address this mystery, we focused on two bacterial homopoly(amino acid)s: poly ( $\epsilon$ -L-lysine) ( $\epsilon$ -PL) and oligo ( $\beta$ -lysine).

$\epsilon$ -PL produced by soil bacteria is currently used as a food preservative in several countries due to its antimicrobial activity. Oligo( $\beta$ -lysine), whose chemical structure is quite similar to that of  $\epsilon$ -PL, is a structural moiety of streptothricins. When we set about these studies, we hypothesized that a peptide synthetase (polymer synthetase) shares a mechanism that produces these cognate homopolymers. Interestingly, however, we unraveled the mystery, finding that different enzymes and mechanisms produced these cognate polymers. The peptide synthetase for  $\epsilon$ -PL was very unique due to the fact that it is the first example of a membrane protein with NRPS characteristics. Oligo( $\beta$ -lysine) was found to be produced by NRPSs with exceptional activity.

Investigations of these peptide synthetases as well as further exploration of homopoly(amino acid)s should facilitate biosynthetic engineering and help to create new classes of biopolymers.

**Dr. Yoshimitsu Hamano**

- 2015-present: Professor, Fukui Prefectural University
- 2011: Associate Professor,
- 2008: Lecturer, Fukui Prefectural University
- 2003: Assistant Professor, Fukui Prefectural University
- 2002: Postdoctoral Fellow, University of Arizona
- 2002: Received PhD from Toyama Prefectural University
- 1998: Department of New Drug Development, Sanofi K.K.
- 1996: Graduated from Teikyo University of Science

## Japanese-German Symposium Held on Agriculture and Food Supply

On 8-9 May, JSPS and the German JSPS Alumni Association (German JSPS Club) co-hosted the twentieth in the series of Japanese-German Symposiums, this time on the theme “Agriculture and Food Supply—Challenges and Perspectives.” With the world’s population predicted to reach 9 billion within the next 40 years, food supply has taken center stage within the global agenda. This symposium provided a timely platform for discussing issues related to this pressing global challenge.

Kicking off the event was Prof. Dr. Heinrich Menkhaus, chairman of the German JSPS Club, followed by a distinguished lineup of German and Japanese speakers who addressed topics ranging from food safety assessment and the Trans-Pacific Partnership (TPP) to genome sequencing of agricultural products.



Vigorous rounds of Q&A discussions continued beyond the scheduled session times. JSPS Bonn Office director Prof. Dr. Keiichi Kodaira gave closing remarks, saying that he greatly anticipated ever-more dynamic collaboration between Japanese researchers and their German colleagues.

Venued at University of Potsdam, the symposium attracted more than 150 participants, despite a threatening railway strike. The riveting content of the lectures and spirited discussions between their presenters and the participants colored the event as a perfect 20-year juncture for this vibrant symposium program.

For more information about this 20<sup>th</sup> Japanese-German Symposium, including the lecturers’ CVs and abstracts, please visit the following website: [www.jsp-s-bonn.de/veranstaltungen/treffen-der-jsp-s-stipendiaten/2015-agriculture-and-food-supply](http://www.jsp-s-bonn.de/veranstaltungen/treffen-der-jsp-s-stipendiaten/2015-agriculture-and-food-supply)

JSPS Bonn Office

## Indian Alumni Association Holds International Conference in Varanasi



Dr. Asashima (left) and MEXT State Minister Dr. Fujii

In Varanasi, India’s most holy Hindu city situated on the banks of the Ganges River, the 6<sup>th</sup> international conference on “Contemporary Advances of Science and Technology” was held by the Indian JSPS Alumni Association (IJAA) at Banaras Hindu University (BHU) on

7-9 August. The 3-day seminar was kicked off with remarks by Dr. Motoyuki Fujii, Japanese State Minister for the Education, Culture, Sports, Science and Technology. Some 27 lecturers from India, Japan and Singapore reported on state-of-the-art developments in their various fields. Besides the alumni, an audience of more than 420 people, including university and even high-school students, gathered from around India to attend this highly animated event. Giving the conference added thrust was the fact that this year marked the 30<sup>th</sup> anniversary of Japan-India Science and Technology Cooperation Program, was BHU’s centenary, and saw the launch of JSPS bilateral joint programs with Indian humanities and social sciences research organizations.



Kyoto University Executive Vice-President Kayo Inaba with students

A special session was held on the humanities for the first time in an IJAA conference, which set a new milestone in the program’s concept and design. The event was conspicuous in its allure of young participants: 242 research posters were submitted by them and 20 Japanese universities set up booths to attract them to their campuses. JSPS executive director Dr. Makoto Asashima offered remarks to inspire the young researchers, which emphasized four keywords: “passion, ideas, effort, and persistence.”

More information on the conference will be posted on its website: [www.indianjpsalumni.org](http://www.indianjpsalumni.org)

JSPS Fellows Plaza



### *Essay by a Former Fellow*

**Mark W Sherwood, Ph.D.**

Postdoctoral Researcher, INSERM (Institut national de la santé et de la recherche médicale), France

I obtained my PhD at the University of Liverpool (UK) and then moved to the RIKEN Brain Science Institute in 2007. At the time, I was eager to transition from studying exocrine physiology to neuroscience, and felt that making that change in research fields would be easiest in a lab studying both topics. It turned out that the most suitable place for me was in Japan in the laboratory of Dr. Katsuhiko Mikoshiba. In 2008, I was fortunate to be awarded a fellowship from JSPS; its generous support and the freedom given by Dr. Mikoshiba enabled me to advance my research.

RIKEN’s research environment is dynamic, giving me lots of

opportunities to meet postdocs and principal investigators. I found these interactions to be very rewarding. I was particularly impressed by the creativity, openness, and objectivity of the discussions I engaged in with my colleagues. In addition, I was very impressed by the efficiency of the Institute’s administrative and technical staffs.

In 2013, I returned to Europe for a postdoc stint at INSERM. In my current project, we are working together with Dr. Mikoshiba. I enjoy this collaboration and hope to continue it. My ties with Japan are not limited to work, indeed some of my greatest friendships were made there and I look forward to visiting Japan regularly.

## 4<sup>th</sup> World Conference Held on Research Integrity

Dr. Makoto Asashima, executive director of the Japan Society for the Promotion of Science, delivered a lecture at the fourth World Conference on Research Integrity (WCRI), attended by some 500 people from more than 40 countries. This conference was held in Rio de Janeiro in May, with the prior three in the series having been venues in Lisbon, Singapore and Montreal.



Dr. Makoto Asashima

Dr. Asashima's lecture was titled "Research Integrity and Its Process at Universities and Institutes in Japan." In it, he discussed the current state of research misconduct in Japan and its underlying causes, one of which he said to be a lack of research ethics education in the country. He stressed the importance of proliferating such education in both Japan and other countries around the world.

In that vein, he introduced the English edition of a book titled *For the Sound Development of Science*, which had been recently compiled by JSPS as a vehicle for advancing ethics education. Based on the color of its cover, it is called the "Green Book" for short. Targeting researchers and others aspiring to become researchers in all fields of the natural sciences, humanities and social sciences, the book edifies and informs them on matters related to research ethics. That said, the volume is not intended to be a "rulebook" per se. It compiles a broad scope of knowledge on such aspects as conducting

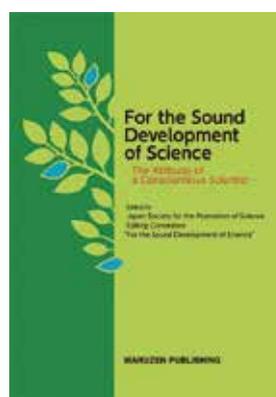
research activities and reporting research results.

Published in both Japanese and English editions in March and May respectively, the Green Book provides the underpinnings for creating an e-learning ethics education course, which applicants for Grants-in-Aid in Japan will be required to take.

Dr. Asashima concluded his lecture by saying that JSPS is working to foster a common global perception of research integrity while working on ways to move forward in realizing it. After his lecture, many of the conference participants gathered around Dr. Asashima, expressing interest in the Green Book.

Reference: JSPS webpage concerning education on research ethics  
[www.jsps.go.jp/j-kousei/rinri.html](http://www.jsps.go.jp/j-kousei/rinri.html)

Research Integrity Office



## Forum on Marine Biology Research Held in Washington, DC

The 20<sup>th</sup> "Science in Japan" Forum was held on 12 June at the Cosmos Club in Washington, DC. Themed "Frontiers of Research on Marine Biological Science," it featured distinguished speakers from Japan and the US. "Human society now depends heavily on ocean-based ecosystem services," said Dr. Yoshihisa Shirayama, executive director at the Japan Agency for Marine-Earth Science and Technology (JAMSTEC), during the opening session. He served as the forum coordinator.

Dr. Shirayama argued that the future of the marine ecosystem is not necessarily a bright one as it faces various problems caused "directly or indirectly by human activities." Prof. Lisa Levin, director of Center for Marine Biodiversity and Conservation and distinguished professor at Scripps Institution of Oceanography, UC San Diego, said that exploiting the wealth of the ocean while maintaining the integrity of its ecosystems and their diversity, functions and services will require a cross-disciplinary dialogue coupled with interdisciplinary research. These actions, she added, must occur "at the intersection of biodiversity, climate science, law, policy, and resource economics and must involve full stakeholder engagement."

Throughout the day, the speakers' talks spurred lively Q&A discussions with the participants, who numbered over 100 and included researchers from universities, research institutes, and government agencies. Members of the press were also in attendance. The forum was co-sponsored by the American Association for the Advancement of Science, American Chemical Society, Consortium

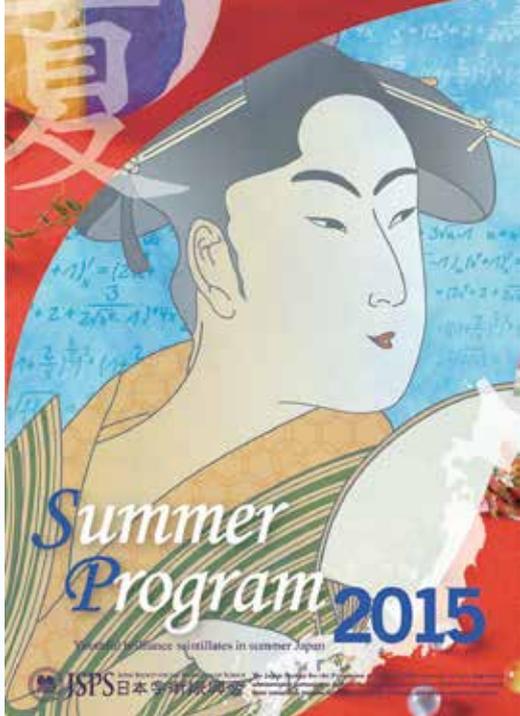
for Ocean Leadership, U.S. Department of Energy, JAMSTEC, Japan Science and Technology Agency, National Oceanic and Atmospheric Administration, and National Science Foundation. This strong show of support from leading US organizations testified to the excellent relationship enjoyed between America and Japan, which the JSPS Washington Office is striving to cultivate even further.

For the more details on this event, please visit the Washington Office's website.

<http://jspsusa.org/wp/sijforum>

JSPS Washington Office





## JSPS Summer Program

Attended by 115 young pre- and postdoctoral researchers from the US, the UK, France, Germany, Canada and Sweden, the JSPS Summer Program, cosponsored by SOKENDAI (the Graduate University for Advanced Studies), was held over a two-month period from 9 June to 19 August.

Featuring a research internship for the participants at host institutions, the program began with a one-week orientation held in the seaside town of Hayama. At it, the fellows received special lectures, gave poster presentations, attended classes in Japanese language learning, participated in a group discussion, engaged in Japanese culture activities, and experienced Japanese living through homestay with a Japanese family. After the orientation, the young researchers went their separate ways to their respective host institutions. Their summer internships afforded them an experience upon which to consider coming back to Japan to do research at future junctures in their careers. On the day before the program ended, the participants reassembled to present reports on their summer research activities.

Overseas Fellowship Division

The centerpiece of the JSPS Summer Program is the fellows' internship at a host research institution, where they take part in research activities with frontline Japanese researchers in their respective fields. The following are comments offered by two of the fellows on their research and culture experiences.

### Ms. Pauline Girard

(PhD student, University of Nantes, France) at Osaka University  
Her host: Prof. Hiroshi Miyasaka

This stay in Japan has been an amazing experience, both professionally and personally. During these two months, I performed picosecond transient absorption spectroscopy measurements in one of the most world-renowned groups in the ultra-fast spectroscopy domain. Their expertise has been very precious in helping me to understand the collective properties of photochromic and magnetic nanoassemblies, which I have been developing for my PhD, and to make progress in my research. Moreover, the discussions I've had with Japanese researchers and students constitute true intercultural exchanges, through which I have learned a lot about the Japanese culture. I am very grateful to the JSPS for allowing me to discover Japan and for its exceptional organization of the Summer Program. Moreover,

I would like to deeply thank Miyasaka-sensei and his team, who welcomed me under such extraordinary conditions, for their kindness and great help.

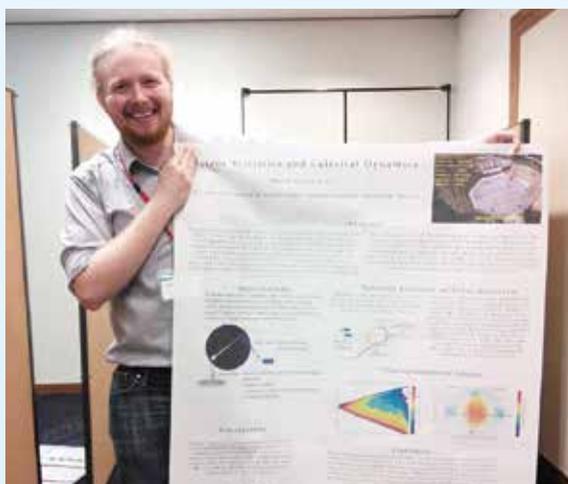


Ms. Girard with her host Prof. Miyasaka and his team

### Mr. Daniel Kastinen

(Master's student of Luleå University of Technology) at the National Institute of Polar Research (NIPR) in Tachikawa  
His host: Prof. Takuji Nakamura

Writing a 100-word article about the Summer Program does not give my experience in it due justice. I have had the opportunity of meeting so many wonderful people, not only in my own field of research but from other departments and also at the *karate dojo* where I train. These people have all made my time here a wonderful experience! My work consists of celestial mechanics, meteor science, and numerical simulation of these subjects. The input I have gotten and discussions I've had with my teammates here have been invaluable to me. They have given me the opportunity to learn a lot about Japanese culture and also about the Japanese way of doing research. Needless to say, I can't wait to return at the next chance I get!



Mr. Kastinen at JSPS poster presentation during orientation week

# Introducing JSPS Alumni Associations

## Bangladesh JSPS Alumni Association (BJSPSAA)

The Bangladesh JSPS Alumni Association (BJSPSAA) was inaugurated on 19 December 2009.

The alumni association's objectives are three fold: (1) To promote scientific exchange, research and cultural collaboration between Bangladesh and Japan, (2) to establish collaborative networks between JSPS alumni and Japanese scholars by holding scientific meetings and symposia, and (3) to create collaboration between JSPS/STA fellows in Bangladesh and JSPS/STA fellows in other countries around the world.

BJSPSAA has three membership categories: Life members, general members and honorary members. There are now 127 active members, of which 116 are life members and 11 general members. The association invites Japanese host researchers to become honorary members so as to sustain and strengthen the relationship between Bangladesh and Japan in all spheres of science and technology.

BJSPSAA's Executive Committee consists of 21 office-bearers: A president, three vice-presidents, a general secretary, treasurer, joint secretary, organizing secretary, research and publication secretary, cultural secretary, and 11 other members. The General Assembly elects the Executive Committee for a period of two years.

Recently, the Executive Committee met with Mr. Shiro Sadoshima, former Ambassador of Japan to Bangladesh, and discussed the establishment of a Japan-Bangladesh Academy of Sciences in Bangladesh. The members have also interacted with the Japan Embassy's education adviser, the Bangladeshi State Minister for Science and Technology, representatives of the Bangladesh Academy of Sciences, and the chairman of the University Grants Commission of Bangladesh, in an effort to strengthen the linkage between Bangladeshi and Japanese scientists.

BJSPSAA and the Japanese Universities Alumni Association in Bangladesh (JUAAB) jointly held a break-the-daily-fast *Iftar* party during Ramadhan on 12 July 2013 at Dhaka. They also jointly organized a Hiroshima-Nagasaki Day event on 6 August 2013.

The following symposia and workshops have been held by the association during the period from FY 2013 to present.

- A day-long JSPS program briefing on 14 September 2013 in Dhaka chaired by BJSPSAA president Prof. Dr. M. Afzal Hossain, former vice-chancellor, Hajee Mohammad Danesh Science & Technology University (HSTU), Dinajpur and present



BJSPSAA members

dean, Faculty of Agriculture, Bangladesh Agricultural University (BAU), Mymensingh.

- The 5<sup>th</sup> International Symposium on the theme "Education for Sustainable Development" on 1 March 2014 at Bangladesh Agricultural Research Council (BARC), Dhaka.



Professor Dr. M. Afzal Hossain

- JSPS program briefing on 5 September 2014 at BAU, Mymensingh.
- The 6<sup>th</sup> JSPS International Symposium on 21 March 2015 at BAU, Mymensingh, on the theme "Safe Food, Healthy Nation." BJSPSAA president Prof. Hossain opined that in the new and emerging world, science needs to be combined with values for mankind's peaceful existence. An annual General Meeting was also held and a new 23-member Executive Committee was formed for the 2015-16 period. Both the president and general secretary of the previous committee were selected for the same positions in the new committee.



BJSPSAA Executive Committee

During the period from FY 2009 to present, the association nominated 13 members to visit Japan via the JSPS BRIDGE Fellowship Program.

In the future, BJSPSAA will increase its effort to expand its membership. The association intends to act on its interest in building a network with JSPS alumni organizations in other countries. It is also keen on establishing a Japan-Bangladesh Academy of Sciences in Bangladesh.

More information on our alumni association can be found on its website: [www.bjspasaa.org/](http://www.bjspasaa.org/)

Bangladesh JSPS Alumni Association



## Groundbreaking Research at the Border between Materials and Life

At Institute for Integrated Cell-Material Sciences (iCeMS) our mission is to develop new insights into the principles of life that distinguish living things from non-living things, and harness these ideas to create bio-inspired super materials and devices that will revolutionize health-care, medicine, industry and the environment, and create a sustainable world for all.

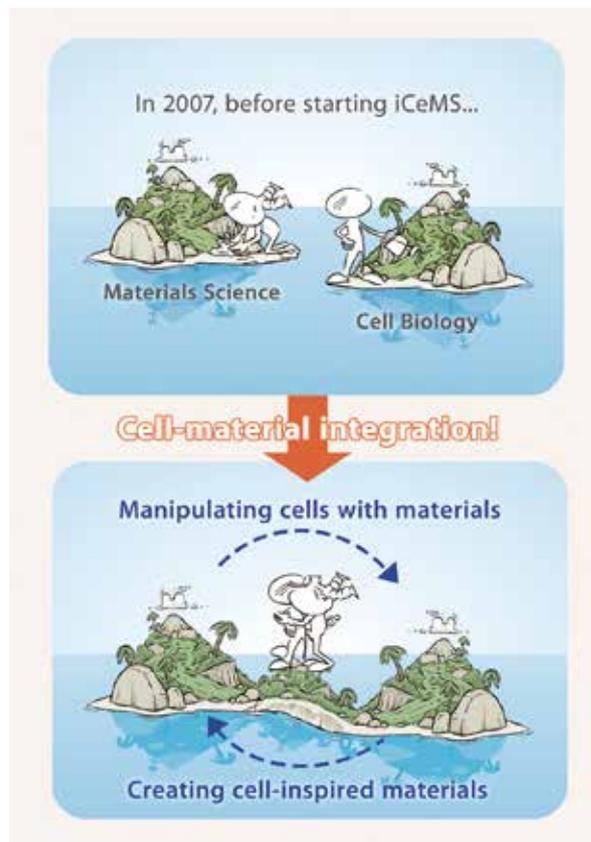
Our Institute at Kyoto University was founded in 2007, as one of the first five research centers within the WPI program established by Japan's Ministry of Education, Culture, Sports, Science and Technology (MEXT). iCeMS' international team of 19 principal investigators (PIs) and 160 researchers, a third of whom are drawn from overseas, concern themselves with the science of biochemical and biophysical processes within DNA, proteins, cells and beyond.

"Cells are capable of creating copies of themselves and also creating the inert material world around them. However thus far in human history, materials are incapable of enacting self-creation or reproduction," explains iCeMS PI Dr. Easan Sivaniah. "This is just one of the profound chasms between the synthetic and biological worlds. Here at iCeMS we are attempting to bridge that divide."

Combining Kyoto University's established strength in cell biology, chemistry and physics, iCeMS scientists are thus creating a unique new research field: integrated cell-material science. Research arenas encompass coordination chemistry, polymer science, bio nanotechnology, chemical biology, stem and germ cell biology, neural stem cell biology, developmental neurobiology, biological physics, interface science and active bio-matter, and membrane biology. Cognitive rejuvenation, heart regeneration, "wearable organs" and a replacement for fossil fuels are just a few of our goals.

"Our long-term goal is to see if we can reproduce cellular structures with unique materials of our own design, so-called cell-inspired materials," explains institute Director, Dr. Susumu

Kitagawa. "The great physicist Richard P. Feynman once wrote 'What I cannot create, I do not understand.' In other words, only in the process of creation can we achieve true understanding. That's iCeMS."



Source: iCeMS

### Dr. Easan Sivaniah



Profile  
2013-present: iCeMS Associate Professor, Kyoto University  
2000: JSPS Research Fellow, Kyoto University  
1998: PhD, University of Cambridge

Kyoto is really a great place to live. The mountains are within sight and an exciting downtown is nearby. You never need to worry about catching the last train home if you have been staying overly long in the office, or at a *nomikai* (drinking party) held to introduce you to your future collaborators.

I was attracted to iCeMS because it has really been the pioneer, world-wide, in successfully developing a research institute that interfaces the worlds of physics, chemistry and biology based around processes occurring in cells and their extrapolation to bio-inspired materials.

It is fascinating work. One of our recent focuses is on making materials that can be used to clean water or air—that is, to remove global-warming gases such as carbon dioxide. Moreover, it will be possible to use the same kind of materials in healthcare to provide portable artificial lungs or kidneys. The significant progress we are making has led to the Japanese government funding our development of a Japanese University-led start-up initiative.

Settling in at iCeMS is easy. As these matters are taken care of by the staff, researchers coming from abroad hit the ground running, ready to work with state-of-the-art facilities in achieving their research dreams. The Japanese funding system is also excellent and grant applications can be submitted in either English or Japanese. Why not come join us?

For more detailed information about iCeMS, please visit its website: [www.icems.kyoto-u.ac.jp](http://www.icems.kyoto-u.ac.jp)



## The Science Dialogue Experience of Two JSPS Fellows



Dr. Coates (left) and Dr. Diebold

On June 17, Dr. James H. Coates and Dr. Sebastian Diebold visited Toyama High School to give lectures under JSPS's Science Dialogue to 80 second-year students assembled in two classrooms.

### Dr. James Coates: "Kangaroo from Ikebukuro"

Students of the high school's humanities course looked puzzled but intrigued when Dr. Coates put a slide on the screen captioned "Kangaroo from Ikebukuro." An Australian, Dr. Coates is currently conducting a postdoctoral study in the Graduate School of Asia-Pacific Studies at Waseda University. The title of his lecture was "An Australian anthropologist in Ikebukuro," a major metropolitan area in Tokyo where he currently conducts his research. Dr. Coates discussed ways that a multicultural environment exerts influences on peoples' sense of belonging and political attitudes.

Dr. Coates started the lecture by telling the students about Australia using a set of beautiful nature photographs, quickly gaining their attention. With more slides, he explained how he had become interested in his research theme "Chinese immigrants in Japan." Growing up in a multicultural country had, he told the students, kindled his interests in different peoples and cultures.

He conducted a group session aimed at leading the students to think about such topics as one's sense of belonging in society and immigration issues in Japan. Separating into small groups, the students engaged in an active exchange of views with Dr. Coates. He introduced them to



his hypothesis that Chinese immigrants who stayed in Japan for long periods of time tend to shift from a national level political orientation to a strong inclination toward cosmopolitan ideals and local social networks. In order to improve how we conceptualize international relations, he said that it is important to know how people of different cultures understand and accommodate each other in an everyday sense.

### Dr. Sebastian Diebold: "Electrical Engineer Traveling the World"

Hailing from Germany, Dr. Diebold is currently conducting postdoctoral research in the field of electrical engineering in the Graduate School of Engineering Science at Osaka University. His lecture was delivered to the students of a natural science course. After giving them a self-introduction, he talked about how learning English and studying engineering has given him opportunities to travel all over the world. He explained how electrical engineering has improved our daily lives in various familiar ways such as the development of the television and the smartphone.

During his lecture, Dr. Diebold demonstrated how a Doppler radar works. It emits and receives waves, such as light waves, to get velocity information of remote objects, such as cars. His demonstration of a Doppler system was so fascinating to the students that many of them jumped up from their chairs to see it better. He ended his lecture by encouraging the students, and reminding them that doing engineering research requires a strong and active commitment to one's studies.

After their lectures the two JSPS fellows told us that they had enjoyed a very active engagement with the students, whose initial shyness soon vanished. Both said that, given the chance, they would be more than happy to participate in the Science Dialogue program again.



The following fellows participated in JSPS's Science Dialogue Program during the period from April through June 2015. For details about the program, please see its website: [www.jsp.go.jp/english/e-plaza/e-dialogue/](http://www.jsp.go.jp/english/e-plaza/e-dialogue/)

Overseas Fellowship Division

Venue	Lecturer	Nationality
Saitama Prefectural Kumagaya Girls' High School	Bernd Martin M. Schmidt	Germany
Junior and Senior High School at Komaba, University of Tsukuba (Tokyo)	Miklos Lajko	Hungary
	Federico Perche	France
	Jonathan T. Young	USA
Tokyo Metropolitan High School of Science and Technology	Ronin Wu	Taiwan
Toyama Prefectural Toyama Senior High School	James H. Coates	Australia
	Sebastian Diebold	Germany
Fukui Prefectural Fujishima Senior High School	Tamas K. Panda	India
Fukui Prefectural Wakasa High School	Felix G. Marx	Austria
	Timothee Nicolas	France
	Sang Phil Shin	Korea
Yamanashi Prefectural Hikawa High School	Yeong Liang Ling	Australia
	Vincent Pujol	France
Yamanashi Prefectural Tsuru High School	Ali Boyali	Turkey
	Gamal Elmasry	Egypt

Venue	Lecturer	Nationality
Nagano Prefecture Suwa Seiryō Senior High School	Claudia S. Leite Vicente	Portugal
Shizuoka Kita High School	Nikhul D. Patel	Australia
Shizuoka Prefectural Numazu Higashi Senior High School	Lee A. Burton	UK
Aichi Prefectural Kariya High School	Sukalyan Bhadra	India
	Joachim F. Luginbuehl	Switzerland
Aichi Prefectural Nishio Senior High School	Ali Motamedi	Canada
	Cristian Tosa	Romania
Shiga Prefectural Hikone Higashi High School	Quang-Duy Dao	Vietnam
Ritsumeikan Senior High School (Kyoto)	John C. M. Sha	Singapore
Osaka Prefectural Hirakata Senior High School	Li-Kun Phng	Malaysia
Osaka Prefectural Tondabayashi High School	Christopher J. Vavricka	USA
Mukogawa Women's University Junior & Senior High School (Hyogo)	Benjamin D. Lindner	Germany
Nara Prefectural Seisho High School	Federico Scaroni	Italy

*Hailing from Nicaragua, Dr. Jorge Luis Espinoza Calderon has been conducting research with his host professor Dr. Shinji Nakao at Kanazawa University under a JSPS postdoctoral fellowship. We asked him about his research and life in Japan.*

**Please tell us about your background.**

Before coming to Japan, I had been working as a medical doctor at a national university in Nicaragua. I was trained in emergency medicine there. At some point, I decided to switch to another field. I was motivated to study cancer, but in my country I didn't have an opportunity to do so. We didn't have a research culture because clinical treatment was given higher priority. Then, I found that the embassy of Japan in Nicaragua was offering a scholarship to go to Japan to take a doctoral course.

I completed my doctoral program under the mentorship of Dr. Nakao at Kanazawa University, thanks to a MEXT scholarship. Thereafter, I moved to the US to do a postdoctoral fellowship at NIH. During my tenure in the US, I continued my research collaboration with Dr. Nakao. Early last year, I met him at a symposium in the US and we talked about applying for a JSPS fellowship to conduct an advanced study using the iPS technology to understand the pathogenesis of aplastic anemia.

**How is that research going under the JSPS fellowship?**

At the Department of Cellular Transplantation Biology in Kanazawa University and in collaboration with researchers from Kyoto University, I am using iPS cells derived from patients with aplastic anemia to generate functional hematopoietic cells (blood cells) for the purpose of identifying potential mechanisms that cause this life threatening disease and to ultimately design novel treatments. This disease is characterized by a failure in the production of blood cells resulting from the destruction of the patient's blood stem cells (blood cells in the bone marrow that give rise to all other blood cells).

It is known that in aplastic anemia the blood stem cells are destroyed by the patients' own immune cells as part of an abnormal immune response, which is triggered by still unknown mechanisms. Because of the low number of blood cells in the bone marrow of patients with aplastic anemia, it has been intrinsically difficult to study this disease systematically. Taking advantage of iPS cell technology, we are now able to generate a sufficient number of blood stem cells from patients with aplastic anemia. These cells will be excellent tools for understanding the cause of this disease and thus developing novel therapeutic approaches.

At the same time, in collaboration with other researchers in Japan, I am trying to identify new pharmacological agents (preferentially non-toxic drugs) with therapeutic potential for certain types of blood cancers that are refractory to currently available treatments and therefore have a poor prognosis.

**That's a very interesting research subject. How did you become engaged in it?**

When I was doing my doctoral and postdoctoral research, I was involved in several projects, one of them being the identification of mechanisms that make the immune cells of aplastic anemia patients destroy their own blood stem cells. The discovery in 2006 by Dr. Shinya Yamanaka of Kyoto University that adult cells can be genetically reprogrammed to a pluripotent stem cell state revolutionized the stem cell field, offering a new tool for scientists to study the ways diseases develop, opening the potential use of iPS cells in regenerating damaged tissues of the body. I was wondering whether iPS cell technology could be effectively applied to the study of aplastic anemia.

**How did you get to know your Japanese host, Dr. Nakao?**

I found him through an Internet search and learned about his clinical work at Kanazawa University. I was very impressed by the success that he and his staff achieved with a novel technique called "mini-transplant" for the effective treatment of certain blood cancers. That mini-transplant is less toxic than a normal transplant. His research work on aplastic anemia is also highly recognized throughout the world. I wanted to do research related to clinical practice because of my background as a doctor, so I found that Dr. Nakao's laboratory would be a good place for me.

**What are your research achievements so far working with Dr. Nakano?**

Over the past few months, we have optimized a method for generating blood cells from iPS cells in the laboratory. We have succeeded in generating blood stem cells from iPS cells derived from patients with aplastic anemia, and we have characterized those cells in terms of certain factors that may determine their susceptibility to destruction mediated by the patient's immune cells.

In the other studies, I have found a highly promising agent that may be effective in the treatment of acute myeloid leukemia. In our assays, this agent has shown extraordinary efficacy in eliminating cancer cells while sparing normal cells, a feature that accounts for its low toxic profile.

**You have research experience in both the US and Japan. What is your impression of Japan's research environment?**

I think there are clear cultural differences between the countries. In general, it seems that Japanese scientists tend to work under a hierarchical model of research, in which tradition plays a crucial role. Conversely in the US, scientists tend to work in a rotating model. Although there are differences in the ways research is conducted, I believe that Japanese scholars are also conducting excellent research. Regarding more specific differences, I think that one big difference is the budget. In the US, research grants from NIH are several times more than those in most institutions in



**Dr. Jorge Luis Espinoza Calderon**

JSPS Postdoctoral Fellow, Institute of Medical, Pharmaceutical and Health Sciences, Kanazawa University, 2014-present

Visitor Research Fellow, Hematology Branch, National Institutes of Health, USA, 2012-2014

Research Fellow, Department of Cellular Transplantation Biology, Kanazawa University, 2010-2012

Emergency Medicine Attendant Physician, Department of Emergency Medicine, Baptist Hospital of Nicaragua, 2002-2005

Clinical Medicine Instructor, National University of Nicaragua, 2002-2005

M.D., National University of Nicaragua, 1997

Japan. Another important difference is that in the US there is more collaborative research between academic institutions and industry.

**What is your impression of your host institution?**

Kanazawa University is a medium-sized national university with a respectable research infrastructure. I am very impressed with how much the research facilities in the university have improved over the last few years with the acquisition of modern equipment and cutting-edge apparatuses to perform advanced research. Dr. Nakao's laboratory provides a free environment in which to pursue research with talented students and faculty staffs. That creates a friendly and harmonious atmosphere for the overseas researchers.

I also remember that when I was in the doctoral course, I received very good service from the university's international office. They organized trips within Japan for the international students and were always very nice. They also offered Japanese learning classes at the university's main campus, which I used to attend.

**Your Japanese pronunciation is very good. Did you begin learning Japanese before you came to Japan?**

I feel the same when I talk with Japanese people who have learned Spanish, which is my native language. I think the phonetic sounds in the two languages are quite similar.

I studied *hiragana* (a set of about 50

Japanese characters) in Nicaragua, and thought that Japanese was easy to learn. However, when I came to Japan I realized that *kanji* (a set of over 2,000 characters derived from Chinese) is most important in one's everyday life. Learning kanji, however, is difficult for me.

#### *What do you think of life in Japan—its culture and customs?*

Japan is completely different from the country where I grew up; however, Japan has transformed me in many aspects. Japan's orderliness and civility are virtues that amazed me from the first time I had contact with this country. Another stunning characteristic of Japan is the perfect mixture of modernity and tradition, while obviously safety and efficiency are distinctive of this country as well. My country was devastated by civil wars from 1970 toward 1990 and during that time the nation was also shocked by various natural disasters, including an earthquake that completely destroyed the capital city in 1972. Unfortunately, our responses to those adversities were not the best. I wish we could have had a little of the perseverance, civility and stoicism and all those virtues that have helped Japan to recover from massive natural disasters and the destruction caused by World War II.

#### *When do you feel Japanese civility in your daily life?*

I can feel it almost every day. For example, if you come to Japan, even when passing through immigration at an airport, you will really feel welcome. That is not only at airports, but

everywhere you go Japanese people are very kind. Even if you don't speak Japanese, they will try to help you.

#### *What do you do outside your research work?*

I love outdoor recreation, and Kanazawa and nearby towns have plenty of places for cycling and hill walking. Also I enjoy my free time with my family. Because I have children, I enjoy going to parks, visiting a well-maintained insect museum in the city of Kanazawa, and Japanese gardens which transmit peace and the beauty of nature. Whenever I have the opportunity, I enjoy traveling and exploring Japan.

#### *What do you plan to do after your fellowship ends?*

I will go back to my home country. Hopefully the faculty position in the university hospital will still be open to me. If so, I will have a chance to not only work as a healthcare provider, but also to continue my scientific research. I want to share the knowledge and experiences I have gained in Japan with colleagues and students in Nicaragua. My ultimate goal is to achieve discoveries that can be effectively translated into therapies, so I will be focused on studies that have clinical potential.

#### *Please give some advice for young researchers who may be thinking about doing research in Japan?*

I think the JSPS program offers a great opportunity not only to conduct advanced research for your professional development but also to enjoy life in Japan. I am really grateful to

have been awarded this fellowship. Japan may be quite different in many ways, particularly for Westerners. However, I believe that enjoying Japan's unique culture and customs is the first step to turning differences into a successful experience. In addition, it is crucial to have a good relationship with your host researcher and colleagues. I would like to end by paraphrasing Facundo Cabral, who was a Latin-American philosopher. He said something that may seem obvious and quite simple but it is filled with a lot of wisdom, "Be aware of the present because life is here and right now, take care of the present, because in it, you will live the rest of your life." We have the tendency to pay too much attention to the future and do not pay enough attention to the present, but in fact the present is the only time we can give to what's important while living in this world.

*After our interview with Dr. Luis Espinoza, we met his host Dr. Nakao and laboratory colleagues, and were very impressed with the glowing and close-knit collegial relationship they share. Dr. Luis Espinoza's conversation with us demonstrated just how productive such close collaboration can be as they work to apply iPS cells to elucidating the pathology of diseases whose causal mechanisms have been difficult to understand. He and his colleagues are already achieving significant results that can lead to the development of much needed and hoped for treatments and cures. We are greatly encouraged that even after returning to Nicaragua, Dr. Luis Espinoza will continue working with his Japanese colleagues in an effort to "achieve discoveries that can be effectively translated into therapies."*

## Introducing Japan: Kanazawa

Kanazawa city is located in Ishikawa Prefecture about 400 kilometers west of Tokyo. As did Kyoto, Kanazawa was spared the air raids of World War II, allowing the city to preserve its traditional architecture, notably influenced by the past residence of *samurai* and their lifestyle. Narrow streets, lined in the old Geisha District with vintage wooden tea houses, and the Kanazawa Castle coexist in harmony with city's modern buildings. With the recently opened Hokuriku Shinkansen (bullet train) Line, travel from Tokyo to Kanazawa takes only 2.5 hours. Once in the city, it offers many unique attractions such as the Kenroku-en Garden, Kanazawa Castle, and the 21<sup>st</sup> Century Museum of Contemporary Art.

I would first of all recommend visiting the Kenroku-en Garden, which is said with great confidence to be one of the three most beautiful gardens in Japan. Its fascinating design includes waterfalls, ponds, flower fields and a *koto* (Japanese harp) shaped stone lantern that is the symbol of the garden. Seasonal beauty is another of the garden's lures. I particularly like going there in the spring to view the cherry blossoms and in the late fall to see the leaves changing color. Winter is also a nice season to visit the garden, when ropes are strung from

above its tree in a conical array to protect their branches from breaking under the weight of heavy snow. In early November, about 500 workers put up these conical arrays of rope called *yukizuri* ("snow hangings") on around 800 trees and shrubs. Over the winter months, this spectacle of *yukizuri* is lit up in the evening.

Next to the Kenroku-en Garden is the Kanazawa Castle, built in the 16<sup>th</sup> century as a fortress by the Maeda family, who, by the way, cultivated the garden while ruling the Kanazawa domain during Edo Period. Repeatedly restored over time, the castle contains unique vestiges of Japanese carpentry, such as the complex web of pillars and beams within its watch tower, white roof of weathered lead tiles, white-mortar, double-earthen walls, and distinctive stonework. The 3-story watch tower commands an incredible view of the surrounding park set against a beautiful backdrop of snowy mountains.

Then, there is also the 21<sup>st</sup> Century Museum of Contemporary Art, which, with its round shape, glass walls and doors opening in all directions, is itself a work of architectural art. It exhibits works by acclaimed contemporary artists, some designed to be interactive with the visitor, who can have fun touching and even

sitting on them. Thus, the museum offers an enjoyable experience for the whole family.

Kanazawa is also a mecca for traditional crafts. It boasts a 400-year history of producing gold leaf (just 1/10,000 mm in thickness) and is now the only place in Japan where gold leaf is still made. At the Kanko Bussankan (local product center), you can try your hand at creating your own traditional art-and-craft souvenirs, even at making traditional Japanese sweets!

These and many other interesting attractions make Kanazawa a fascinating place to work or visit.



Old Geisha District





**Cover photo:**

*Hoshigaki* (dried persimmon)

In Japan, persimmons come in two kinds, sweet and bitter. The latter are sweetened and preserved by drying. Often hung under the eaves, *hoshigaki* create an orange curtain that gives people a feeling of autumn waning into winter.

## About JSPS

The Japan Society for the Promotion of Science (JSPS) operates as an independent administrative institution to perform the following main functions: fund scientific research, foster researchers, promote international scientific exchange, and advance university reform.

## Crowing Rooster



From days of old in Japan, it has been the belief that the vigorous cry of the rooster in the gray of the morning augurs the coming of a new and bright day. As the crowing rooster can therefore be thought of as a harbinger of the kind of new knowledge that promises a brilliant future for humankind, it was chosen as the emblem of the Japan Society for the Promotion of Science. This emblem was designed in 1938 by Professor Sanzo Wada of Tokyo Fine Arts School to depict the rooster that symbolizes the breaking dawn in a verse composed by Emperor Showa.

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