

Report on the 3rd Japanese-American-German Frontiers of Science Symposium
(JAGFOS)

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During the period from June 15th through 18th, the 3rd Japanese-American-German Symposium (JAGFOS) was held in Irvine, California. The symposium had been scheduled for 2020; due to the effects of the corona pandemic, however, it had to be postponed for two years. As for myself, I had participated as an introductory speaker in the first JAGFOS symposium, held in 2017. Then in 2019, I participated in the second symposium as a planning group member (PGM) for the Chemistry/Materials Science session. Now, I've participated in the third JAGFOS symposium, this time as a PGM co-chair. As it had been quite a while since a JAGFOS symposium had been held outside Japan, I felt a bit tense while playing my role in this one.

Frontiers of Science (FoS) symposiums provide a platform for talented young researchers to lodge together and engage in cross-disciplinary discussions on leading-edge scientific topics. The symposiums give the young researchers an opportunity to expand their academic horizons and to transcend conventional modes thinking in freely expressing their ideas. In this process, they contribute to pioneering new scientific domains, hone leadership skills, and build novel networks among peers.

In FoS symposiums, sessions are held in six subject areas: Biology/Life Sciences, Chemistry/Materials Science, Earth Science/Geosciences/Environmental Sciences, (Applied) Mathematics/Computer Science/Engineering, Physics/Astrophysics, and Social Sciences. Each brings together young and energetic researchers in a vibrant environment.

The symposiums are co-organized by three institutions which play pivotal roles in supporting scientific research in their respective countries: Japan Society for the Promotion of Science (JSPS), U.S. National Academy of Sciences (NAS), and Alexander von Humboldt-Foundation (AvH). For each session, each of these countries provides one PGM, one speaker, and two discussants. Accordingly, 72 people participate in the sessions (4 persons x 6 sessions x 3 countries). The participants are young researchers of 45 years old and younger who have a PhD or researchers who have obtained their PhDs within the past 15 years. All are top scientists in their respective fields. The speakers are researchers who are playing active roles on the frontlines of research fields chosen as topics for each session. They are selected via a scrupulous vetting process carried out by the PGMs.

At this symposium, each session was held for two hours. They were attended by three speakers (one from each country), one of whom acted as the introductory speaker. S/he took 20 minutes to describe the background of the session's research topic, after which the other two speakers took 20 minutes each to introduce their research. In the remaining hour, the session participants engaged each other in discussion. These energy-packed discussions across disciplines are what give FoS symposiums their special flavor. The first time I participated in a FoS symposium, I was taken aback by the way that these discussions were animated by cascades of question from diverse perspectives. For the Japanese participants who tend to be a bit handicapped when it comes to speaking

English, such discussions can be challenging. However, they offer us an ideal opportunity to undaunting in challenging ourselves mentally.

In May, a pre-meeting was held in Japan. Attended by only the researchers on the Japanese side, we practiced our presentations in Japanese and held a discussion which yielded knowledge that would be very helpful for us in performing our roles in the upcoming symposium. As is the custom, we did not learn about the symposium agenda until assembling at the venue. As the speakers did not know on what days their presentations were scheduled until their arrival, everybody was a bit nervous (the program being passed out to all the participants on the day before the event).

One thing that I find particularly interesting about FoS symposiums is that excellent researchers in fields mostly other than one's own all engage each other in discussions on the session topics. As the speakers must convey the content of their research in a way that is easy to understand by researchers of different fields, they must be innovative when preparing their remarks. For example, in my field of chemistry, we use various examples of molecular chemical structure when speaking at conferences. Physicists, on the other hand, tend to line up series of numerical formulas. This specialized way speaking is not allowed in FoS symposiums. If the speakers were to talk in such a manner, it wouldn't take long before everybody would suffer an allergic reaction. The use of specialized diagram and technical jargon is discouraged, the point being that advanced science has to be conveyed in a way that allows everybody to participate in the discussions. Achieving this is not easy; however, striving to do so provides an opportunity for the speakers to hone and demonstrate their communication ability. When preparing the presentations, it is also necessary for the PGMs along with the session members to act as a single body.

Now, I'd like to talk about what transpired at the symposium during the four days of its implementation.

Thursday, 15 September: Session Coordination Meeting and Welcome Reception

In the evening of the 15th, the PGMs and speakers of each session gathered at the hotel to hold a session coordination meeting. The PGMs had already met each other at the previous JAGFOS symposium, but it was first time for the speakers to meet. At the meeting, the speakers showed each other their presentation slides and a discussion was held on ways to adjust the content of their presentations to make them more easily understandable. The PGMs didn't hesitate to chip in when they thought their suggestions could help to animate the sessions. Unfortunately, there were some PGMs and speakers who were unable to make it to symposium due the effects of the pandemic. This could have made it difficult to prepare for their sessions; nevertheless, at the symposium the sessions went off without a hitch.



After the coordination meeting, a welcome reception was held on the hotel patio. It kicked off with welcome remarks from Dr. Ursula Wurstbauer, the German PGM co-chair, and a toast by Mr. Edward Patte, the FoS director at NAS. Sitting at each table were people who hadn't meet for three years since the last symposium along with new faces. While

they chatted with some nostalgia and deepened their acquaintances, a speech was given by Prof. Iriki Atsushi (RIKEN), chairman of the JSPS FoS Symposium Advisory Board on the Japan side, whose message to the participants was both deep and warm. I was my impression that both the Americans and Germans sitting at the table with me were deeply impressed by Prof. Iriki's remarks. We all looked forward to next day when the third JAGFOS symposium would start in earnest.



Friday, 16 September: First Day of Symposium

Around 7 a.m., we boarded buses from the hotel and travelled about 10 minutes to NAS's The Beckman Center, JAGFOS's venue. After eating breakfast, at last the symposium got underway. Opening remarks were offered by Mr. Ken Fulton, NAS Executive Director, and others, after which I gave an overview of JAGFOS and described the symposium schedule. (This was one of my main jobs as a PGM co-chair.) Then, we plunged into the sessions.



The top batter was the session on Earth Science/Geosciences/Environmental Sciences, whose topic was "Slow Earthquakes"—earthquakes whose fault slip releases energy at a much slower speed than regular earthquakes. As these earthquakes are continuously active over long periods from several hours to several years, their movement is not usually felt by the human body. Following presentations by the three speakers, time began for the Q&A. During it, the speakers sat on chairs provided for them on the stage. In the past, the PGMs went around the room with a mic. Due to cautionary measures taken in response to pandemic situation, this time, however, people with questions were asked to



line up in order in front of two standing microphones. This saw about ten people always waiting in line for their turn. They asked volleys of questions such as whether slow earthquakes could be a key to predicting earthquakes.



A poster session followed. In prelude, flash talks were given. This was an opportunity for each presenter to take one minute to introduce their research. Then, everybody moved to the poster room to start the poster session. Spirited conversations took place in front of the posters including those of the speakers in each session.



In the afternoon, the session was held on (Applied) Mathematics/Computer Science/Engineering. Preceding it, Ms. Mira Albus of AvH and JSPS executive director Dr. Mizumoto Tetsuya gave introductions to their organizations activities. The topic of the session was “Algorithms for Fairness in the Real World.” As depicted in the concept “envy-free cake cutting,” it addressed how things could be equitably divided among many people. The discussion, however, tended to reaffirm the difficulty of achieving equity. If equity could be obtained using mathematical and algorithmic methods, it was ventured that problems and conflicts that occur in various aspects of real society would be eliminated, but



Saturday, 17 September: Second Day of Symposium

The day began with the session on Physics/Astrophysics, whose theme was “Origin of Elements.” Namely, the discussion revolved around the question of how elements came into being. I found it interesting to learn from the discussion that the origins of elements differ by their weight. As in the past, this session on Physics/Astrophysics generated a highly animated discussion. The Social Sciences session was held in the afternoon. Its topic was “Ethnocentrism in Science: What are We missing and Why?” Ethnocentrism defined as meaning placing the highest value on one’s culture and thinking it superior to

all others. As the discussion progressed, it prompted some deep thinking. We may all possess such thoughts to one degree or another without being conscious of it.

After the session, we embarked on a cultural tour. The first stop was an environmental conservation area called Bolsa Chica Conservancy, where we all took a walk around the wetlands. Then, we went for dinner to a restaurant in Huntington Beach, which commanded a beautiful view of the ocean. The exquisite scenery evoked a feeling of really being there in California and merged our conversations with the surrounding nature. Of course, the meal was delicious.



Sunday, 18 September: Third Day of Symposium

This last day of the symposium started with the session on Biology/Life Sciences, whose topic was “Synthetic Biology, Artificial Organisms, and Artificial Ecosystems.” The discussion was advanced with a focus on synthetic biology and artificial ecosystems. As it unfolded, one was made to feel the power possessed by microbes and plants. The final session was held in my field, Chemistry/Materials Science. It had as its topic “Small Molecule Activation and Conversion by Inorganic Complexes and Materials.” That is, the discussion explored how the power of chemistry can be used to challenge issues related to creating carbon-neutral societies and providing energy resources. The use of advanced catalytic chemistry to produce material conversion reactions was, for example, introduced. During the session, the PGMs reflexively started asking questions, which had not happened in the PGMs’ own sessions in the past. Some started their questions with, “Uh, I’m a PGM, but. . . .” This, as it turned out, added an interesting dimension to the discussion as questions were broached that probed the heart of the subject matter. Though one would think that everybody should have been exhausted by this time on the last day, spirited discussions pressed on. The thirst for knowledge exhibited by these top scientists was truly impressive.



At the end of the day, the American PGM Dr. Sarah Cowie delivered closing remarks and Mr. Marcus Hoffmann of AvH introduced the plan for the next JAGFOS symposium,

which will be held in Germany. At that, the curtain fell on this resoundingly successful event.

Though it was unfortunate that there were some researchers who were unable to participate due to the situation with the pandemic, we were able to hold this symposium in an in-person format. After all, it's important for researchers to participate in face-to-face exchange with each other. Therefore, it was ideal that we could bring the participants together for this symposium. For the people of the co-organizers—NAS, AvH and JSPS—to put on this in-person symposium, it must have been a herculean task, one requiring considerable adjustment and harmonization. I take this opportunity to reiterate our appreciation for your hard work and dedication. The participants on the Japanese side wish to extend a hearty thanks to the JSPS staff for the assistance they accorded us from time of our pre-meeting to the end of the symposium, starting with Ms. Yamaoka Naoko of JSPS's International Program Department as well as Ms. Tanabe Izumi and Ms. Kadomatsu Ayumi, who accompanied us to the symposium in California, not to leave out JSPS executive director Dr. Mizumoto Tetsuya. We are grateful for the valuable advice we received from the members of the JSPS FoS Symposium Advisory Board. On behalf of the participants, I wish to extend a special thanks to the JSPS FoS Symposium Advisory Board Chairperson Prof. Iriki (RIKEN) and to Prof. Kato Koichi (Institute of Molecular Science) who attended the symposium with us.

To the other Japanese PGMs who along with me worked dedicatedly to make each session a success I extend a hearty word of thanks: Prof. Wada Takehiko, Dr. Yamamichi Masato, Dr. Yasunari Teppei J., Dr. Nobuhara Shohei, Dr. NakataYoshifumi, and Dr. Goto Jun. As the co-chair, I don't feel that I did anything special; it was these PGMs whose efforts created such superb sessions.

On the pages above, I have reported on the third JAGFOS symposium. I've been fortunate to have participated in three JAGFOS symposiums. Deriving powerful stimulus from each of these experiences, JAGFOS has given me the opportunity to reexamine my own research and my life as a researcher. It left a strong impression on me that the Committee members, who are the icons of the FoS program, also said that their FoS experiences continue to animate their lives as researchers. Moreover, if I hadn't participated in JAGFOS, I probably wouldn't have met and become friends with so many excellent researchers of other fields, who for me have become irreplaceable assets. I can't help but thinking that my FoS colleagues have a special relationship to me, one whose essence is different from my good relationships with colleagues in my field. Rich in individuality, the young participants exuded an aura of being the researchers who will lift on their shoulders the future of scientific advances in their fields.

I hope that by reading this report you will have gained, if even a little, a familiarity with JAGFOS symposiums. It's my ardent wish that those of you who are young researchers will have found the JAGFOS program to be interesting and will want to join your peers from counterpart countries as participants in future symposiums. I strongly invite you to do so.

