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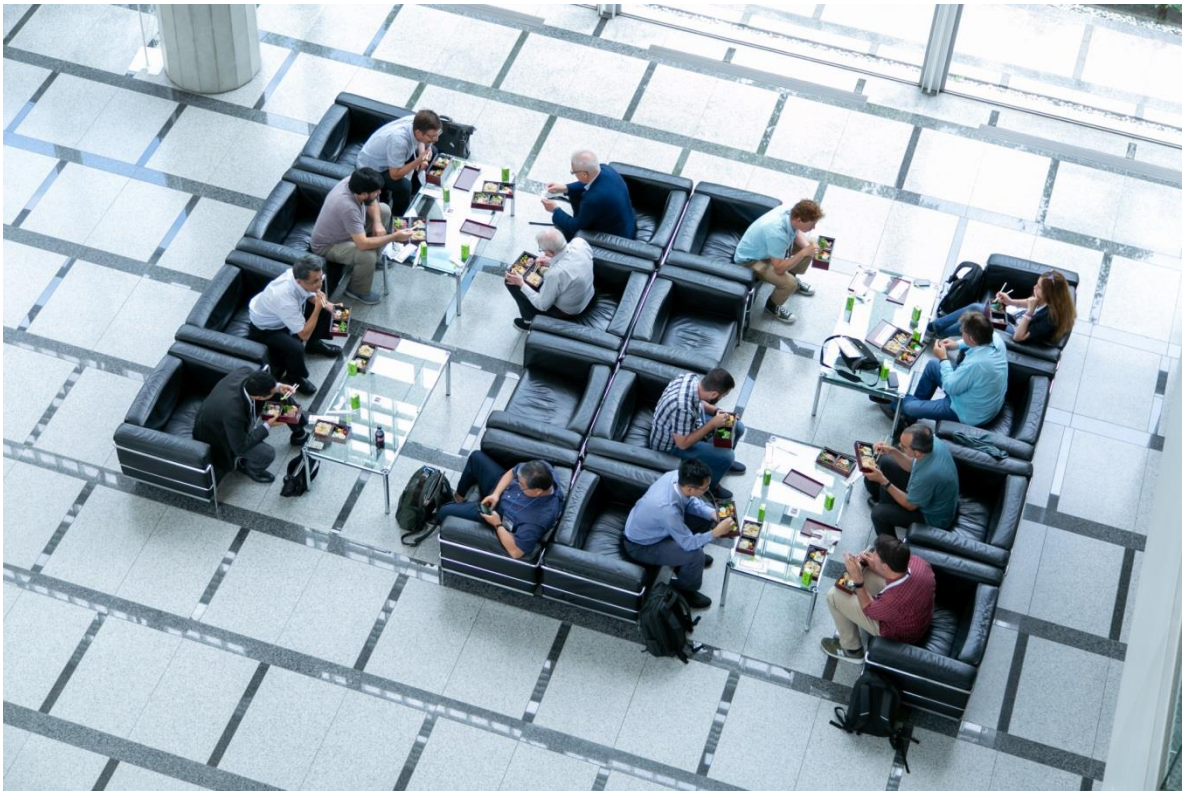
Pure diversity on display

Leading-edge life scientists gathered in Japan to present their latest results and learn from each other



The 19th HFSP Awardees Meeting in Tsukuba, Japan, provided many opportunities for life science researchers to mix with others working in diverse fields.

Just as the oceans teem with a diverse range of species, each making a unique contribution to the marine ecosystem, a multidisciplinary conference held in Japan in July 2019 brought together around 280 researchers teeming with rich perspectives to contribute to the global network of life science research.

In an age when conferences are becoming increasingly specialized, there are few forums where plant geneticists rub shoulders with gut microbiologists and animal behaviour scientists chat over coffee with cancer researchers. And yet, researchers really appreciate these interactions. “The diversity here is so refreshing,” comments Rashna Bhandari of the Centre for DNA Fingerprinting and Diagnostics in India.

The 19th Human Frontier Science Program (HFSP) Awardees Meeting was held in Tsukuba, Japan, on 10–12 July 2019 to commemorate the program’s Japanese origins on its 30th anniversary. Established in 1989, HFSP promotes basic research in the life sciences for the benefit of humanity. It was the brainchild of former Japanese Prime Minister Yasuhiro Nakasone, who turned 101 this year. His vision was to support international collaboration and foster early career scientists around the world. HFSP fulfils this vision by providing research grants and postdoctoral fellowships for innovative research at the frontiers of the life sciences: about 200 HFSP Research Grant and Postdoctoral Fellowship awardees attended this year’s event. The number of member countries has grown to 15.

Exploring how microbes interact in the ocean

Scientists funded by HFSP in Germany, Israel and the USA are trying to tease apart the many complex interactions between marine microbes by analysing their genomes — no easy task given the enormous diversity of microbial species and the richness of their metabolism. This challenging project has important implications since marine microbes are responsible for half the world’s primary production of oxygen and underpin the marine food chain. Furthermore, they have potential to sequester carbon dioxide from the atmosphere to reduce global warming.

Investigating the forgotten biopolymer

HFSP also promotes curiosity-driven research — often neglected for more commercial imperatives — such as work being done on polyphosphate,

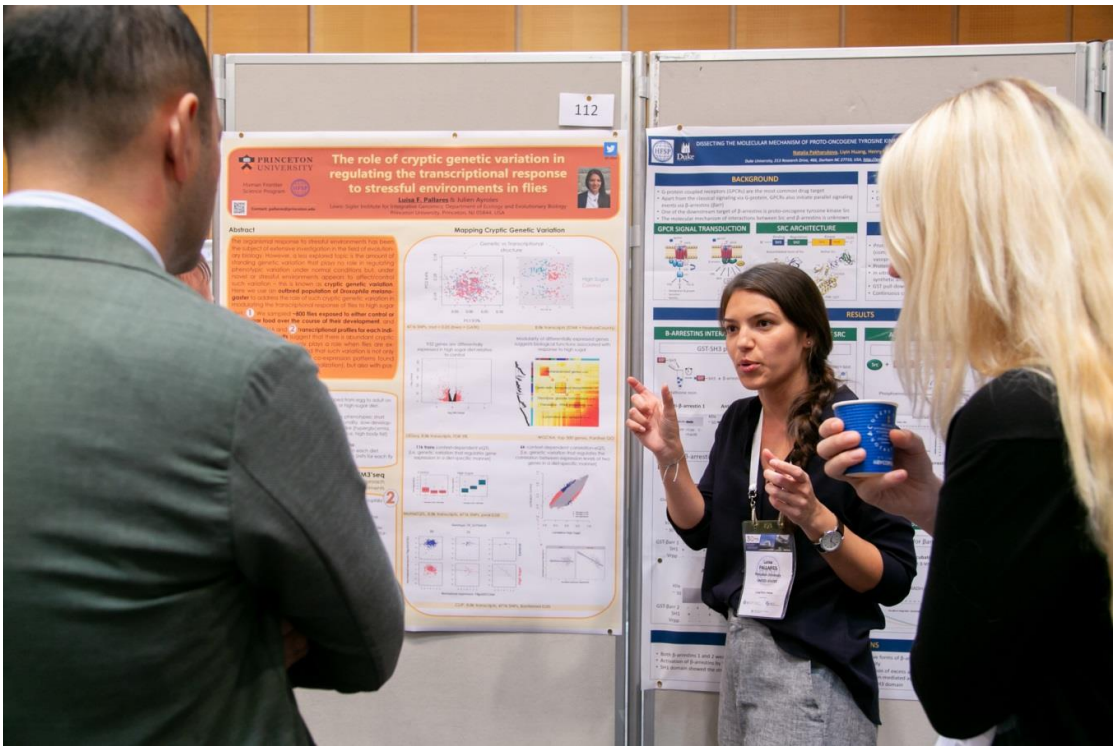
which Bhandari refers to as the “forgotten biopolymer”. Bhandari, who was awarded a HFSP program grant in 2016, along with Henning Jessen (University of Freiburg, Germany) and Paul Wender (Stanford University, USA), described how this essential biomolecule is present in every living organism, and yet in many ways has been neglected. “When we look at this molecule, we feel how biochemists felt in the 1950s and 60s about DNA,” Bhandari says. “There’s just so much that we don’t know.” Her team is trying to discover how this molecule is synthesized in mammals. HFSP funding is allowing her to address this under-researched field in which she estimates there are fewer than ten papers published annually. “There’s a false dichotomy that’s been created between basic and applied research,” she notes. “I was very pleased with the concept of HFSP as proposed by Nakasone. Blue-sky research has become a bad word in some parts of the world. But it’s so essential.”

Rashna Bhandari talking about polyphosphate, which she describes as the forgotten biopolymer.

Stressing flies with sugar

For Luisa Pallares, HFSP long-term fellow at Princeton University, HFSP was able to sweeten the switch to a new area of research. Pallares is investigating the genes that make flies robust against stressors in the environment, in particular a high-sugar diet. “Historically, we’ve never had so much sugar in our diet, which leads to all these diet-associated diseases, such as diabetes and cardiac problems.” she explains. “But some people can eat crazy amounts of sugar and never get fat or sick. So there has to be something in the organism that regulates how you respond to this stress.”

Pallares first became interested in this question while doing her PhD, but pursing this work required striking out in a completely new direction as well as switching organisms from mice to flies. “When I found out about the fellowship, I was like ‘This is what I need!’” she recalls. “It’s encouraging me as a young researcher to go out of my comfort zone and explore new fields or questions, which normally I won’t get funding to do because I’m not an expert in them.”



By subjecting flies to high-sugar diets, Luisa Pallares is investigating the genes that make flies robust against stressors in the environment.

An incubator for Nobel laureates

Each year since 2010, an award named in honour of Nakasone has been conferred on a scientist deemed to have made frontier contributions to the life sciences. This year it was awarded to Michael Hall of the Biozentrum at the University of Basel in Switzerland for his discovery of the master regulator of cell growth, the target of rapamycin (TOR) kinase, which has enabled better understanding of cell growth and its role in development, disease and ageing as well as opening new frontiers. In his award lecture, he described the mechanisms by which mammalian TOR gives rise to cancer.

The winner of the 2019 Nakasone Award, Michael Hall, describing his work on the target of rapamycin (TOR) kinase, which controls cell growth.

Evidence that HFSP's bold approach is working is found in the achievements of its alumni, which include 28 Nobel laureates — almost one for every year of the organization's existence. One of those HFSP alumni Nobel laureates, Ada Yonath, gave a fascinating overview of ribosome biology at the conference. She described how these subcellular protein factories are both the microbial origin of life and hold the promise of next-generation antibiotics.

Both Bhandari and Pallares regret having not been able to attend previous conferences. "I wished I had been able to come to earlier meetings," says Bhandari. "I really regret not having been able to come to the other ones," concurs Pallares, "So now retrospectively I will tell people 'Totally go'".