



APRIL 2015 - MARCH 2016

ANNUAL REPORT FY 2015



THE INTERNATIONAL
HUMAN FRONTIER SCIENCE PROGRAM
ORGANIZATION



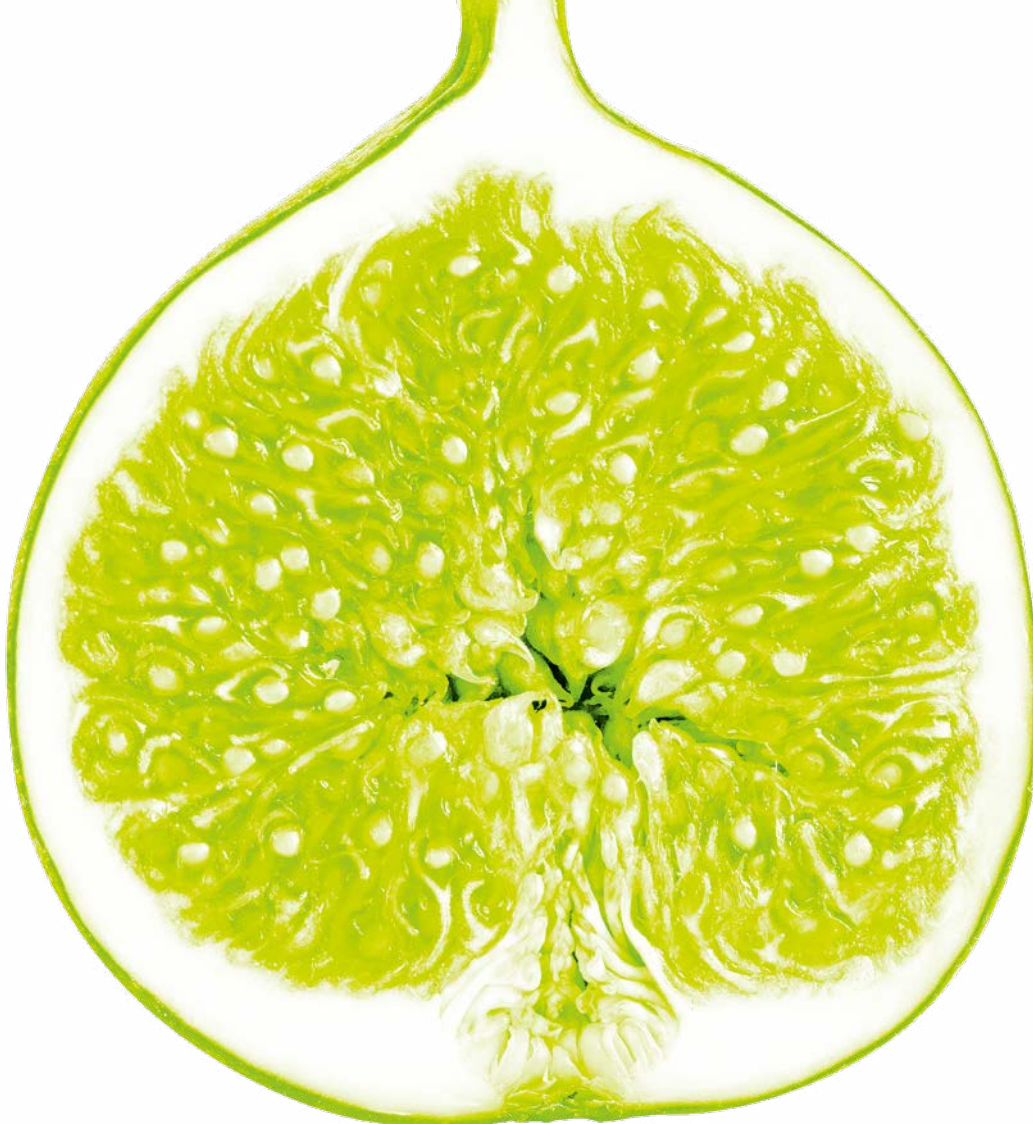
HUMAN FRONTIER SCIENCE PROGRAM

The Human Frontier Science Program is unique, supporting international collaboration to undertake innovative, risky, basic research at the frontier of the life sciences. Special emphasis is given to the support and training of independent young investigators, beginning at the postdoctoral level. The Program is implemented by an international organization, supported financially by Australia, Canada, France, Germany, India, Italy, Japan, the Republic of Korea, New Zealand, Norway, Singapore, Switzerland, the United Kingdom, the United States of America, and the European Union. Since 1990, over 7000 awards have been made to researchers from more than 70 countries. Of these, 26 HFSP awardees have gone on to receive the Nobel Prize.



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ANNUAL REPORT



The following documents are available on the HFSP website
www.hfsp.org:

Joint Communiqués
(Tokyo 1992, Washington 1997, Berlin 2002, Bern 2004, Ottawa 2007, Canberra 2010, Brussels 2013, London 2016):
<http://www.hfsp.org/about-us/governance/intergovernmental-conference>

Statutes of the International Human Frontier Science Program Organization:
<http://www.hfsp.org/about-us/governance/statutes>

Guidelines for the participation of new members in HFSP:
<http://www.hfsp.org/about-us/new-membership>

General reviews of the HFSP (1996, 2001, 2006-2007, 2010):
<http://www.hfsp.org/about-us/reviews-hfsp>

Updated and previous lists of awards, including titles and abstracts:
<http://www.hfsp.org/awardees>

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INTRODUCTION

Introduction

Message from the Secretary General
Board of Trustees
Council of Scientists
Secretariat



INTRODUCTION

The Human Frontier Science Program (HFSP) promotes fundamental research in the life sciences with special emphasis on novel and interdisciplinary research, international and, in particular, intercontinental collaboration and support for young investigators. Since its establishment in 1989, HFSP has demonstrated the value of creating a framework for competitive, collaborative, international research of the highest caliber and of providing young scientists with the opportunity to emerge as talented researchers capable of shaping the science of the future.

The International Human Frontier Science Program Organization (HFSP/O) implements the Program through the following mechanisms of research support, details of which can be found in the subsequent chapters:

- **Long-Term Fellowships** – for young scientists within three years of obtaining their Ph.D. who wish to broaden their scientific experience in a foreign laboratory.
- **Cross-Disciplinary Fellowships** – specifically for scientists with a Ph.D. in non-biological disciplines who seek training in the life sciences.

- **Career Development Awards** – for former HFSP fellows to help them set up their own independent laboratories in their home country or another HFSP member country.
- **Young Investigator Grants** – for interdisciplinary teams of young researchers who are within the first five years of their first independent positions and located in different countries.
- **Program Grants** – for interdisciplinary teams of researchers in different countries at any stage of their careers.

Since 1990, 1,029 Research Grants involving 3,804 scientists, 2,888 Long-Term, 106 Cross-Disciplinary Fellowships and 210 Career Development Awards have been awarded. Researchers from more than 70 countries have received HFSP funding so far.



The focus of research supported by HFSP is on the complex mechanisms of living organisms, ranging from the biomolecular level to that of behaving organisms. The life sciences have undergone a revolution in recent years, emerging as a leading scientific area with a convergence of interest from other disciplines such as physics, mathematics, chemistry, computer science and engineering on solving biological questions. HFSP aims to stay at the forefront of research by involving scientists from outside the life sciences as part of research collaborations and as postdoctoral fellows. To this end, the Young Investigator and Program Grants are specifically geared to fostering interactions between scientists from different disciplines and this is a major factor in the review of applications in these programs. In addition, HFSP has extended its commitment to interdisciplinary research by introducing Cross-Disciplinary Fellowships to equip young scientists from outside biology with the skills needed to tackle problems in the life sciences.

With a mission to the frontiers of science, HFSP supports the next generation of researchers who are in the strongest position to open new avenues of research. Several of the HFSP programs are specifically targeted towards early career scientists: the Fellowship programs, Career Development Award and Young Investigator Grant. In addition, Program Grant teams are encouraged to include young scientists with the result that a significant number of scientists under the age of 40 participate in this program. Taking these researchers together, approximately 70 % of annual HFSP funds are awarded to early career researchers.

HFSP is financed and managed by representatives of the Management Supporting Parties (MSPs). The MSPs are those countries that directly fund the HFSP programs plus the European Union, which represents the EU countries that do not contribute directly. The MSPs are: Australia, Canada, France, Germany, India, Italy, Japan, the Republic of Korea, New Zealand, Norway, Singapore, Switzerland, the United Kingdom, the United States of America and the European Union. Japan provided 39 % of MSPs' contributions for FY 2015.

HFSP is governed by a Board of Trustees (Board) consisting of representatives of the MSPs. The Board is advised by a scientific advisory body, the Council of Scientists (Council) and the Organization is run from the Secretariat in Strasbourg, France.

MESSAGE FROM the Secretary General

Frontiers - and without frontiers



Warwick Anderson
Secretary General of HFSP

Almost three decades ago, the founders of the International Human Frontier Science Program Organization from the G7 nations had a vision of excellence and cooperation in the life sciences. The science was to be at the frontiers of knowledge and the cooperation was to be regardless of national frontiers and borders.

This vision has been achieved and exceeded.

We hear often of the conceptual breakthroughs that HFSP funded research has supported. And, because the highest quality research is the most likely to have a strong impact, many of our funded scientists let us know of the impacts that their research, initiated by a HFSP grant, has had.

These impacts can include opening up new areas of science and stimulating other great scientists to work on the problem in life science. The impact can be a conceptual breakthrough or a new way of understanding the biology of living beings.

But the impact can also be very concrete. We often hear about how some original HFSP funded research has proceeded into marvellous benefits for humankind. We have explained some of these on our website (<http://www.hfsp.org/frontier-science/hfsp-success-stories>). The stories include a new drug against basal cell carcinoma, new approaches to vaccines based on membrane proteins, and new virtual reality technology to help stroke victims, all of which can be connected to the initial fundamental research funded by HFSP.

HFSP is also proud that 26 of its awardees have since gone on to win a Nobel Prize. The awards illustrate how the frontiers in life science are not exclusively tackled by biological approaches since 12 of the 26 prizes were for work in chemistry or physics.

HFSP funds the most ambitious scientific research at the frontiers. The interesting problems, the important ones that lead to conceptual breakthroughs, often require knowledge, skills and expertise outside a single research group and research area. That is why the founders of HFSP were visionary in their approach to international funding decades ago by encouraging and promoting researchers in different disciplines in science to collaborate to tackle questions in the life sciences in the most creative way; combining the disciplines needed to transform the approaches.

So, as HFSPo enables the frontiers of knowledge to be crossed in its support of science, it also ignores national frontiers when selecting awardees. It was remarkable that back in the 1980s an international organization was established by the leading scientific countries to pool financial resources to fund scientists from anywhere in the world, the only criterion being excellence.

This fits, of course, with the spirit of science in general. Scientists readily cooperate in pursuing knowledge that can make the world a better place. In the last five years, scientists from more than 30 different countries have participated in HFSPo award competitions, from every corner of the globe. The quest to understand life in all its sophisticated complexity is shared by scientists from around the world and it knows no frontiers. The HFSPo helps make that quest a reality. In science, the issues that divide human beings in daily life mean little.

Basic research can be misunderstood. To an outsider, it can seem irrelevant to the needs of today. We need science to tackle the diseases that afflict us, we need science to come up with more efficient transport producing less pollution and advanced industrial technology, we need better ways to help ageing humans live a better life, we need to reduce the stress on our environment - the list is long.

Basic science might be viewed like the germination of a seed that later produces a giant tree. Without this small but crucial beginning, we don't get the trees of the rainforest, grape vines in Burgundy, cherry blossom in Japan, the redwood forests...

Basic science can be considered as equivalent to germination. It is where knowledge starts. The benefits to society that come from translational science are fed by and depend on understanding fundamental concepts.

So by supporting HFSPo, the current 14 member countries and the European Union are playing a unique and profoundly impactful role in the history of the life sciences, through their enduring support. Science doesn't have fixed frontiers and national frontiers don't get in the way of science.



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Left to right: **Warwick Anderson**, **Jill Husser**
and **Hideki Mizuma**

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CHAPTER



Fellowship Program



Left to right: **Carine Schmitt**, **Marie-Claude Perdigues**
and **Carmen Gervais**

- 1.1 Fellowship Awards in FY 2016
- 1.2 The 2016 Fellowship Review Committee
- 1.3 Long-Term and Cross-Disciplinary
Fellowships awarded in 2015
- 1.4 Career Development Awards in 2016
- 1.5 The 2016 CDA Review Committee
- 1.6 Career Development Awards in 2015



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FELLOWSHIP AWARDS IN FY 2016

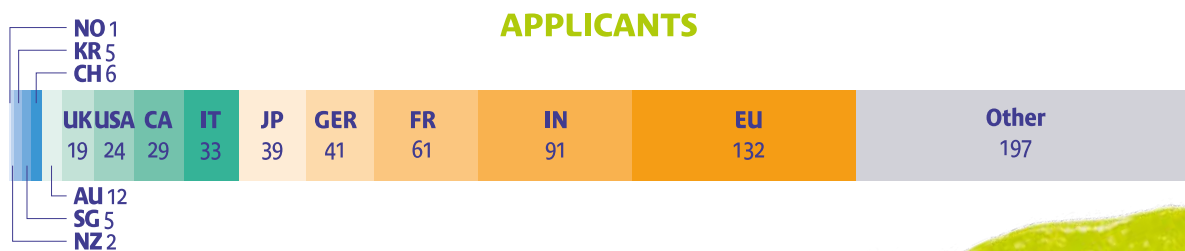
The HFSP Fellowship program is distinct from similar programs supporting postdoctoral researchers during an international exchange.

First, HFSP fellows must prepare a convincing proposal which provides unequivocal evidence that by moving to a new area of study the research project will broaden their skills and advance knowledge in this field. This is one reason why HFSP Fellowships are given to applicants with a Ph.D. in biology (Long-Term Fellowships) and to applicants coming from outside the life sciences with Ph.D. degrees in physics, chemistry, mathematics, engineering or computer sciences (Cross-Disciplinary Fellowships).

Second, HFSP Fellowships extend over three years, and the third year of funds is transportable to either the fellow's home country, their spouse's home country or any HFSP member country. HFSP Fellowships provide support that may be directly connected to making the next step in becoming an independent investigator by means of the Career Development Award (CDA).

Third, succeeding in the HFSP Fellowship competition means that the applicant has been through a global selection process that is reviewed by an international panel selecting the best from over 700 applications. HFSP supports applicants from an exceptionally diverse international pool. Applicants of 112 nationalities have participated since 1990. From these countries, 68 nationalities have been successful.

> Figure 1-1
Nationalities of fellowship applicants





In March 2016, HFSP0 announced the winners of the Fellowship competition that started the previous summer. There were 54 nationalities participating, and awards were recommended to 22 nationalities

(see table below). In the category for the Long-Term Fellowships, 69 young researchers were awarded the precious funding whereas the Cross-Disciplinary section saw 6 new awards.

> **Table 1-1**
Nationalities of Long-Term (LTF) and Cross-Disciplinary (CDF) applicants and awardees for FY 2016.

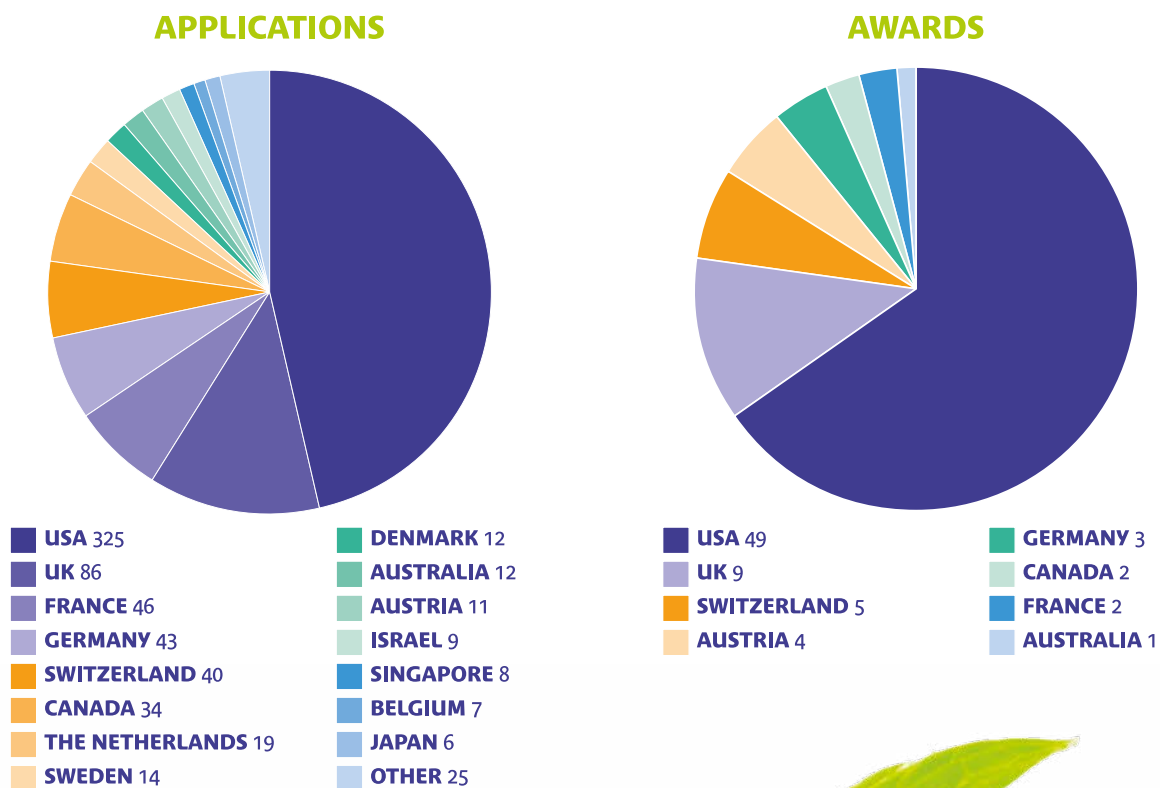
NATIONALITY	LTF applicants	LTF awardees	CDF applicants	CDF awardees	Total awardees
Australia	12	-	-	-	-
Canada	25	3	4	1	4
EU	121	7	11	1	8
France	57	4	4	1	5
Germany	40	10	1		10
India	85	5	6	1	6
Italy	30	2	3		2
Japan	39	5	-	-	5
Korea	5	1			1
New Zealand	1	-	1	1	1
Norway	1				
Singapore	4	1	1	-	1
Switzerland	6	1			1
UK	18	3	1	-	3
USA	21	3	3		3
Other	178	24	19	1	25
TOTAL	643	69	54	6	75



At the receiving end there is diversity as well. Since 1990, HFSP fellows have been hosted in 21 countries. This year 25 host countries were proposed and awards were recommended in 8 countries with the USA strongly dominating (Figure 1-2).

> Figure 1-2

Host country of Long-Term and Cross-Disciplinary Fellowship applicants and awardees in FY 2016





Peter Koopman

Chair of the Fellowship Review Committee

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The Queensland Institute of Medical Research,
Brisbane
Peter KOOPMAN,
The University of Queensland, Brisbane

Canada

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The Hospital for Sick Children, Toronto
Jennifer GOMMERMAN,
University of Toronto
Sheila SINGH,
McMaster University, Hamilton

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Friedrich Miescher Laboratorium of
the Max Planck Society, Tübingen
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Saarland University, Saarbrücken

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CSIR - Central Drug Research Institute, Lucknow



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Université Laval, Québec, Canada



.3

LONG-TERM AND CROSS-DISCIPLINARY FELLOWSHIPS AWARDED IN 2015

1. Long-Term Fellowships

Name	Nationality	Host institute	Host country
ARAGONA Mariaceleste	ITALY	Université Libre de Bruxelles	BELGIUM
ARIOTTI Silvia	ITALY	University of California, Berkeley	USA
AUER Thomas	GERMANY	University of Lausanne	SWITZERLAND
BAO Huan	CHINA	University of Wisconsin, Madison	USA
BETHGE Philipp	GERMANY	University of Zürich	SWITZERLAND
BIAN Xin	CHINA	Yale University, New Haven	USA
BIFFI Giulia	ITALY	Cold Spring Harbor Laboratory	USA
BOSKOVIC Ana	CROATIA	University of Massachusetts Medical School, Worcester	USA
CARNEVALE Federico	ARGENTINA	Cold Spring Harbor Laboratory	USA
CASANOVA María	SPAIN	Icahn School of Medicine at Mount Sinai, New York	USA
CHAN Yujia Alina	CANADA	Harvard Medical School, Boston	USA
CHOUCHANI Edward	CANADA/GREECE	Dana-Farber Cancer Institute, Boston	USA
CLANCY Kelly	USA	University of Basel	SWITZERLAND
CULIK Robert	USA	University of Toronto	CANADA
DANG Shangyu	CHINA	University of California, San Francisco	USA
DUSS Olivier	SWITZERLAND	The Scripps Research Institute, La Jolla	USA
ELLIS Stephanie	CANADA/UK	Rockefeller University, New York	USA
FLUMAN Nir	ISRAEL	Stockholm University	SWEDEN
FUKAYA Takashi	JAPAN	Princeton University	USA
GAL Asaf	ISRAEL	Rockefeller University, New York	USA
GARREAU DE LOUBRESSE Nicolas	FRANCE	Harvard University, Boston	USA
GATI Cornelius	GERMANY/ HUNGARY	Cambridge University	UK
GOLOMB Lior	ISRAEL	Harvard Medical School, Boston	USA
GOUZY Alexandre	FRANCE	Weill Cornell Medical College, New York	USA
GRINSTEIN Mor	ISRAEL	Massachusetts General Hospital, Boston	USA
HALLACLI Erinc	TURKEY	Whitehead Institute for Biomedical Research, Cambridge	USA
HARJUNMAA Enni	FINLAND	Max Planck Institute, Tübingen	GERMANY
HERRERA Salvador	SPAIN	New York University	USA

HONDELE Maria	GERMANY	ETH, Zurich	SWITZERLAND
INABA Masafumi	JAPAN	University of Southern California, Los Angeles	USA
IVANOVITCH Kenzo	FRANCE	Centro Nacional de Investigaciones Cardiovasculares, Madrid	SPAIN
JUPE Florian	GERMANY	The Salk Institute of Biological Studies, La Jolla	USA
KAMINKER Ilia	ISRAEL	University of California, Santa Barbara	USA
KAMINSKI Lina	ISRAEL	Albert Einstein College of Medicine of Yeshiva University, Bronx	USA
KIMMIG Philipp	GERMANY	ETH Zurich	SWITZERLAND
KOHL Johannes	GERMANY	Harvard University, Cambridge	USA
KONSTANTINIDES Nikolaos	GREECE	New York University	USA
KRETZSCHMAR Kai	GERMANY	Hubrecht Institute, Utrecht	THE NETHERLANDS
LAPINAITE Audrone	LITHUANIA	University of California, Berkeley	USA
LI Kun	CHINA	The Rockefeller University, New York	USA
LONFAT Nicolas	SWITZERLAND	Harvard Medical School, Boston	USA
LUNDBERG Derek	USA	Max Planck Institute for Developmental Biology, Tübingen	GERMANY
MACE Emilie	FRANCE	Friedrich Miescher Institute for Biomedical Research, Basel	SWITZERLAND
MANSOUR Abed Alfatah	ISRAEL/STATE OF PALESTINE	The Salk Institute for Biological Studies, La Jolla	USA
MARICHAL Nicolás	URUGUAY	Johannes Gutenberg University, Mainz	GERMANY
MCCLOSKEY Asako	JAPAN	The Salk Institute for Biological Studies, La Jolla	USA
MELAMED Ze'Ev	ISRAEL	University of California, San Diego	USA
MULIYIL Sonia	INDIA	University of Oxford	UK
PENCHEVA Nora	BULGARIA	The Netherlands Cancer Institute, Amsterdam	THE NETHERLANDS
PEREIRA CARDOSO AZEVEDO Estefania	BRAZIL	The Rockefeller University, New York	USA
PEREZ-ESCUADERO Alfonso	SPAIN	Massachusetts Institute of Technology, Boston	USA
SALVI Jayesh	CANADA	Stanford University, Palo Alto	USA
SAMANT Rahul	UK	Stanford University	USA
SHIBUYA Hiroki	JAPAN	The Harvard University, Boston	USA
SINGH Deepankar	INDIA	Friedrich Miescher Institute for Biomedical Research, Basel	SWITZERLAND
SORKIN Raya	ISRAEL	Vrije Universiteit, Amsterdam	THE NETHERLANDS
STANLIE Andre	INDONESIA	National Institutes of Health, Bethesda	USA
STEINMETZ Nicholas	USA	University College London	UK
TANG Hong-Wen	TAIWAN	Harvard Medical School, Boston	USA
TERASAKA Naohiro	JAPAN	ETH Zurich	SWITZERLAND
UEHATA Takuya	JAPAN	New York University	USA
WEI Wei	CHINA	Massachusetts General Hospital, Boston	USA
YABUKARSKI Filip	BULGARIA	Stanford University	USA
YANG Yu Hsuan Carol	CANADA	Max Planck Institute for Heart and Lung Research, Bad Nauheim	GERMANY
YOUNTS Thomas	USA	University College London	UK
ZENKER Jennifer	GERMANY	Agency for Science, Technology and Research, Singapore	SINGAPORE
ZIV Omer	GERMANY/ISRAEL	University of Cambridge	UK

2. Cross-Disciplinary Fellowships

Name	Nationality	Host institute	Host country
ARTONI Pietro	ITALY	Harvard Medical School	USA
KRIEG Elisha	GERMANY/ISRAEL	Dana-Farber Cancer Institute, Boston	USA
MANONI Francesco	ITALY	University of California, Los Angeles	USA
ORBACH Ron	ISRAEL	Yale University, New Haven	USA
PALMER Benjamin	UK	Weizmann Institute of Science, Rehovot	ISRAEL
POWER Rory	UK	Max Planck Institute of Molecular Cell Biology and Genetics, Dresden	GERMANY
ROUDOT Philippe	FRANCE	University of Texas Southwestern Medical Center, Dallas	USA
TYCH Katarzyna	UK	Technische Universität München, Garching	GERMANY





4

CAREER DEVELOPMENT AWARDS IN 2016

The Career Development Award (CDA) strengthens the global network of frontier-style researchers and complements the postdoctoral fellowships. The program supports the best and brightest as they establish their first independent laboratory either in their home country or any other HFSP member country.

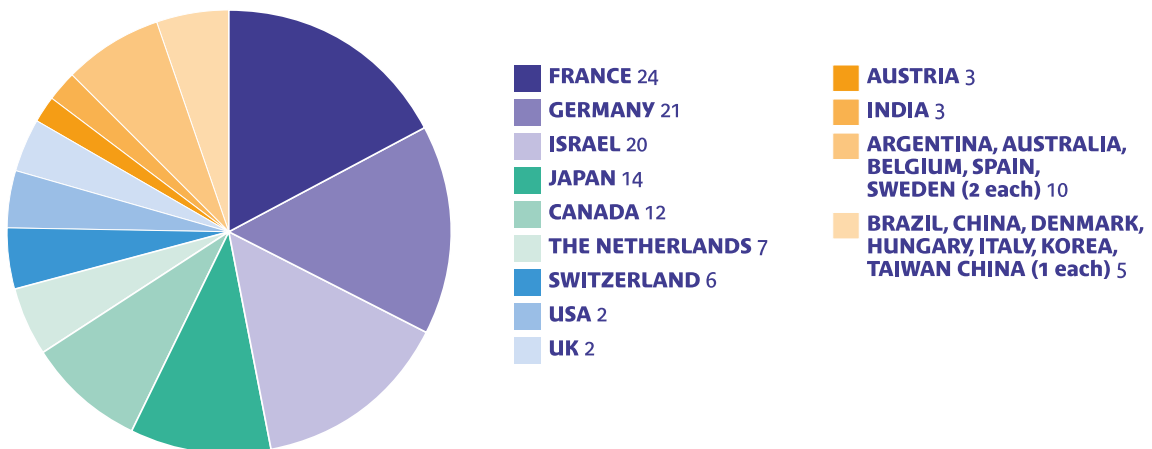
Entry of new researchers into the ranks of independent scientists is essential to the health and development of every country's research enterprise. Early career researchers are technologically savvy and are open to novel scientific approaches.

The CDA program has become an important element in supporting bright young scientists after their postdoctoral period. HFSP has seeded new faculty members in many different countries since the inception of this program (see figure below).

The transition from a mentored position into a principle investigator role is one of the most challenging career stages. Out of the 57 applications, a total of 8 were selected for funding and their laboratories are located in Germany, Israel, India, the Netherlands, Sweden, the UK and two in the USA (the complete list of awards is available at www.hfsp.org).

> Figure 1-3
Host countries for Career Development Awards from 2007-2016

AWARDS





Yuval Rinkevich
Munich, GER

Yuval Rinkevich leads the DZL-Junior Research Group “Cell Therapeutics in Chronic Lung Disease” at the Comprehensive Pneumology Center, Institute of Lung Biology and Disease, Helmholtz Zentrum München. During the award he will investigate the cellular and molecular mechanisms of mammalian scar inception. This project carries far-reaching implications as comparable patho-mechanisms are involved in fibrotic diseases. New findings in this area have a high potential to be translated to innovative therapeutic approaches.



Nikta Fakhri
Cambridge, USA

Nikta Fakhri started her laboratory at the Department of Physics of MIT in Cambridge, MA. She is interested in non-equilibrium physics in living systems and tries to engineer functional active matter. She combines concepts from physics, biology and engineering to decode non-equilibrium mechanisms in active living matter to exploit these mechanisms for engineering functional active materials and to identify universal behaviour in this broad class of internally driven systems.



Magda Bienko
Stockholm, SWE

Magda Bienko is head of the Laboratory for Quantitative Biology of the Nucleus in the Department of Medical Biochemistry and Biophysics at the Karolinska Institute in Stockholm, Sweden. Her lab is mapping genome organization and expression landscapes in single cells in early embryonic development to understand chromosome organization and its influence on gene expression.





Daniel Kiehart

Chair of the Career Development Award Review Committee

Chair

Daniel KIEHART,
Duke University, Durham, USA

Vice-Chair

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Karolinska Institute, Stockholm, Sweden



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EMBL Monterotondo, Italy



.6

CAREER DEVELOPMENT AWARDS IN 2015

Name	Nationality	Institute of CDA	Country of CDA
BATHELLIER Brice	FRANCE	CNRS, Gif sur Yvette	FRANCE
BROZ Petr	CZECH REPUBLIC / SWITZERLAND	Biozentrum / University of Basel	SWITZERLAND
DRESCHER Knut	GERMANY	Max Planck Institute for Terrestrial Microbiology, Marburg	GERMANY
LAGHA Mounia	ALGERIA/FRANCE	IGMM / CNRS, Montpellier	FRANCE
LEVY Emmanuel	FRANCE/ISRAEL	Weizmann Institute of Science, Rehovot	ISRAEL
PAULI Andrea	GERMANY	Research Institute of Molecular Pathology, Vienna	AUSTRIA
SCHRAMEK Daniel	AUSTRIA	Mount Sinai Hospital / University of Toronto	CANADA
SORRE Benoît	FRANCE	Université Paris Diderot	FRANCE





CHAPTER



Research Grant Program



Left to right: **Geoffrey Richards**, **Armelle Koukoui**
and **Carole Asnaghi**

- 2.1 Funding frontier research
- 2.2 Frontier projects in award year 2016
- 2.3 Media snippets following the release of the 2016 HFSP Research Grants
- 2.4 The 2016 Review Committee for Research Grants
- 2.5 Research Grants awarded in 2015



FUNDING FRONTIER RESEARCH

Research Grants finance innovative collaborative projects of fundamental biological research for a period of three years. Both types, the Young Investigator Grants and the Program Grants, constitute international, and preferably intercontinental, teams of two to four scientists having their laboratories in different countries.

All teams are expected to develop new lines of research through the collaboration, hence the biggest challenge in the review process is to identify novel frontier research. Frontier science is often associated with the first appearance of a novel technology (e.g. microscopy, protein labelling, transgenic models, computational programs) which soon becomes widely available after its first appearance in the HFSP competition. A recent example would be the use of CRISPR technology which is now a tool in a very large number of applications. Similarly a project considered frontier one year, because of a novel combination of expertise, may be considered as routine a couple of years later. In the absence of technological breakthroughs, fields stagnate for a year or two while teams concentrate on exploiting the last wave of innovation. In that case projects from such teams may well be high quality science destined for major journals, but may be considered standard in HFSP terms.

Out of the total of 871 letters of intent submitted in March 2015, the HFSP Board of Trustees approved 32 awards of which 7 went to Young Investigator teams and 25 to teams within the Program Grants. The complete breakdown of the two-step review process for the HFSP Research Grants is shown in the table below.

> Table 2-1

Number of applications submitted and awards approved for the 2016 HFSP Program Grants and Young Investigator Grants.

	Program Grants	Young Investigators	Total
Number of letters of intent	672	199*	871*
Number of full applications	65	22	87
Number of awards	25	7	32
% of awarded grants, based on letters of intent	3.7	3.5	3.7
% of awarded grants, based on full applications	38.5	31.8	36.8

*1 ineligible (1 YI)



Scientists funded by HFSP Research Grants can be found around the world including an ever expanding list of research institutions from the Asia-Pacific region. The 32 Principal Applicants have their laboratories in many member countries but a large number of Co-Applicants are located in the USA (although not all of them are US nationals). The complete listing of the 2016 HFSP Research Grant teams is available at <http://www.hfsp.org/awardees/newly-awarded>

> **Figure 2-1**

Countries in which awardees are working. EU Awarded (Finland 1, The Netherlands 6, Austria 1, Portugal 2, Spain 2, and Sweden 1). Non-MSP Awarded (Israel 3).

PRINCIPAL APPLICANTS



CO-APPLICANTS





FRONTIER PROJECTS IN AWARD YEAR 2016

■ Analog computations underlying language mechanisms

Why the human brain, with the same design as that of any other mammal, can express the language faculty has remained a mystery. This project brings together for the first time quantitative knowledge of the complex phenomenology of dyslexia, expertise with self-organizing continuous representations and the capacity to treat analytically distinct types of transitions between stored memories.

■ Constructing accessory lymph nodes in situ for control of mammary carcinoma

The project is conceptually highly innovative because proof-of-concept for an antitumor function of de novo established aLNs in the vicinity of tumors will open a novel field of research and will provide a new treatment and prevention paradigm for cancer medicine. Second, the project is technologically innovative since the latest genetic, systems biological and in vivo micromanipulation technologies will be combined.

■ Complete cell lineage trees inferred by in situ genotyping of induced somatic mutations

Most cell lineages are unknown because current methods have low resolution or rely on continuous direct observation. The team's retrospective lineaging method can be applied to several models and tuned to different timescales. Using naturally occurring somatic mutations to infer cell lineage is limited by the rarity of mutations and difficulty of identifying these in situ. Novel technologies such as CRISPR give us control over mutation rate and genomic location. Also the FISSEQ technology allows one to identify the mutations in individual cells within their native context.

The top 5 Research Grants deal with a broad range of topics ranging from expression of language to the role of lymph nodes in mammary carcinomas, genotyping of cell lineages, photosynthetic adaption in dark arctic waters to metabolic profiling of humming birds.

■ Green life in the dark

Many photosynthetic organisms sustain long periods of darkness in a resting but physiologically-active state. This is particularly true for microalgae often carried into the deep ocean interior prior to initiating massive blooms at the surface, and even more so at high latitudes where the intriguing polar night lasts several months. Although potentially of fundamental importance for many phototrophs on earth, the physiological mechanisms and molecular underpinnings that allow survival over long periods of dark remain a mystery. Diatoms, the dominant oceanic eukaryotic photosynthetic organisms, and more specifically species populating arctic waters will serve as models to characterize the physiological, cellular, genomic, epigenomic, and metabolic state of cells during several months of darkness and the subsequent transition to light. The challenge is to identify the key mechanisms used by diatoms to adapt to these extremes.

■ Optimization of metabolic flux in the hummingbird: from enzymes to ecology

Complete understanding of metabolic regulation, from molecular mechanism to emergent phenotype, has traditionally only been possible in model organisms (yeast, *Drosophila*, mouse) involving many different labs working in parallel. This has left the broad diversity of metabolic phenotypes largely unexplored. This project will uncover how natural selection has worked within the fundamental constraints of biological function to hone a supercharged metabolism by rapidly accelerating the application of tools to study unique hummingbirds that have heretofore only been available for model systems.

On the downside there was an overwhelming presence of ‘-omics’ projects and the computational handling of the ‘big data’ results. There were proposals for ‘single cell’ omics in many systems, while in others, particularly ecology or evolution it consisted of massive samplings of individuals. This was extended typically by ‘before and after’ treatments, samples from different habitats etc. Even within the ‘controlled’ environment of single cell experiments in the laboratory, these proposals seemed to originate simply because it is now technically possible, rather than being a well argued necessity and it was not clear whether this will really advance our knowledge in most systems.

Two other techniques were present in a large number of applications. CRISPR, the clear ‘second wave’ technology of the last cycle, was cited even more often, but now mostly with the status of a standard approach for genetic manipulation rather than with novelty claims. The second, cryo-EM and its derivatives, showed a steady growth and featured in very many structural studies. Again there were few claims of novelty but rather that this is now the technique of choice both for the study of individual proteins and larger protein complexes.





.3

MEDIA SNIPPETS FOLLOWING THE RELEASE OF THE 2016 HFSP RESEARCH GRANTS

MBI Researchers Yan Jie and Timothy Saunders awarded grants from the International Human Frontier Science Program Organization (HFSP)

The Mechanobiology Institute Singapore proudly congratulates two of its Principal Investigators, Dr. Yan Jie and Dr. Tim Saunders, for receiving 2016 Research Grants in recognition of their novel, collaborative, and frontier research projects which focus on the complex mechanisms of living organisms. Yan Jie shares a Program Grant with colleagues in the Netherlands, UK, and Canada for their project 'Control of cell migration and polarity by a mechanosensory complex linking adhesion and microtubules'. Timothy Saunders becomes the first Singapore-based scientist to be awarded the Young Investigator Grant, which he shares with colleagues from Austria, Spain, and Portugal for their project 'Reconstitution of cell polarity and axis determination in a cell-free system'. The prestigious HFSP Research Grants are awarded to innovative and ground-breaking research projects carried out by interdisciplinary teams of scientists across the globe.

OIST Professors Awarded HFSP Grant

Ichiro Masai and Greg Stephens, both faculty at the Okinawa Institute of Science and Technology Graduate University (OIST), have been awarded a Human Frontier Science Program (HFSP) grant together with Joshua Shaevitz of Princeton University. "From the stunning displays of large bird flocks to fish schools or even human crowds, collective behavior has long fascinated and engaged scientists across disciplines," said Stephens, who led the grant proposal and is also a professor at Vrije Universiteit in Amsterdam. "Here, in the social swimming of zebrafish, we have an opportunity to connect these dynamics to their foundations in genetic and neural circuits." The team's research is titled 'The physics of social behavior in the 3-dimensional shoaling of zebrafish, *Danio rerio*'. "With this research we will combine biological expertise, with 3D motion tracking and theoretical ideas drawn from statistical physics," Masai commented. "It is a well-suited collaboration that will enable us to describe and understand fish behaviour at an exceptional level."

Two scientists from Instituto Gulbenkian de Ciencia awarded with Young Investigator grants from the Human Frontier Science Program of over 1 million USD

Ana Domingos, group leader of the Obesity group and Ivo Telley, group leader of the Physical Principles of Nuclear Division group at the Instituto Gulbenkian de Ciência (IGC, Portugal), received a Young Investigator grant from the HFSP.

Ana Domingos will team up with two other research groups: Paul Cohen (Rockefeller University, USA) and Daniel Razansky (The Helmholtz Institute for Biological and Medical Imaging, University of Munich, Germany) to better understand the anatomy and function of neurons surrounding fat tissue, combining novel techniques of genetics and optoacoustic microscopy. The Portuguese researcher states: “To find a cure for obesity we have to be at the forefront of obesity research, what often requires interdisciplinary and a risk-taking stance - HFSP only funds projects with these traits.”

Ivo Telley, Swiss, originally studies the positioning of the nucleus and the role of the cell skeleton during this process in living cells. For the HFSP project, he proposes to investigate the spatial arrangement of molecules inside cells that impact the animal body plan during its development. In particular, “we study how this positioning takes place and why the same molecules always go to the same places, i.e., how and why the system is so robust,” explains Ivo Telley. The biggest limitation to understand these mechanisms relates to the complexity of the living cell or organism. Therefore, in this project, Ivo Telley joins forces with the groups of Martin Loose (Institute of Science and Technology, Austria), Sebastian Maurer (Center for Genomic Regulation, Spain) and Timothy Saunders (Mechanobiology Institute, Singapore) to ‘rebuild’ biochemically the self-organization of molecules in an artificial cell, and to visualize the process using the latest high resolution microscopy technology. “This funding allows our group here at IGC and the three partners to work on an important aspect of biology we have not tackled before but always been curious about. Our team provides a perfect combination of expertise to make this ambitious project a success. It is a great honour to be recognized for good ideas and their proposed implementation,” says Ivo Telley, adding that “the Human Frontier Science Program takes a central role in supporting high-risk research projects such as this one, and is both prestigious and extremely important to science.”



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Vice-Chair

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University of Waikato, New Zealand

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University of New South Wales, Victoria

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Jorge GONCALVES,
University of Luxembourg, Esch /Alzette
Pieter MEDENDORP,
Radboud University Nijmegen, The Netherlands
Barbara C. NAWROT,
Polish Academy of Sciences, Lodz, Poland
Vladana VUKOJEVIC,
Karolinska Institute, Stockholm, Sweden

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INRIA, Saint-Ismier
Sophie ZINN-JUSTIN,
Institute of Biology and Technology Saclay,
Gif-sur-Yvette

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The Institute of Mathematical Sciences, Chennai



Nancy Forde

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International School for Advanced Studies (SISSA),
Trieste

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Yasunori HAYASHI,
RIKEN, Wako

Republic of Korea

Sung Hee BAEK,
Seoul National University

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University of Oslo

Singapore

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Switzerland

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Apurva SARIN,
National Centre for Biological Sciences, Bangalore,
India



.5

RESEARCH GRANTS AWARDED IN 2015¹

Note that nationality is given in brackets if different from country of laboratory

YOUNG INVESTIGATORS

Mechanisms of centrosome biogenesis

GOPALAKRISHNAN Jayachandran, (India), Germany
LI Haitao, China

Deciphering chromatin dynamics during programming and reprogramming of pluripotent cells

GREENLEAF William, USA
HANNA Yaqub (Jacob), Israel

Mechanical control of progenitor cell renewal and differentiation during vertebrate limb formation

GROS Jérôme, France
CAMPAS Otger, (Spain), USA

Quantitative characterization of fratricide in *S. pneumoniae*

KIM Minsu, (Republic of Korea), USA
HERMSEN Rutger, The Netherlands

An integrated multi-level investigation of neural codes in sensory processing

KOHL Michael, (Germany), UK
KWAG Jeehyun, Republic of Korea
RICHARDS Blake, Canada

Hormone delivery in plants: mechanisms and physiological roles of gibberellic acid transporters

NOUR-ELDIN Hussam Hassan, Denmark
KAWATE Toshimitsu, (Japan), USA
SHANI Eilon, Israel

Dissecting the roles of network architecture and parameter fine-tuning in metabolic adaptations

OYARZÚN Diego, (Chile), UK
ZHANG Fuzhong, (China), USA

Interplay of eukaryotic symbionts with gut microbiome and influence on immune-mediated disorders

POMAJBIKOVA Katerina, Czech Republic
PARFREY Laura Wegener, (USA), Canada

Unraveling dynamical coupling between gene expression and cellulosome assembly

TAN Cheemeng, (Malaysia), USA
NASH Michael, (USA), Germany

Adaptive function and evolutionary capacity for a transitory epithelial structure

WANG Yu-Chiun, (Taiwan), Japan
KHAN Zia, USA
LEMKE Steffen, Germany

PROGRAM GRANTS

WildCog: Evolution and local adaptation of cognitive abilities and brain structure in the wild

CHAINED Alexis, France
MORAND-FERRON Julie, Canada
SERRE Thomas, USA
VERHOYE Marleen, Belgium

Molecular mechanisms of meiotic feedback regulation by the conserved chromosome axis

CORBETT Kevin, USA
HERZOG Franz, (Austria), Germany
TOTTH Attila, (Hungary), Germany

Interrogating bacterial social interactions in droplets

DE VISSER Johannes, The Netherlands
BIBETTE Jérôme, France
BRENNER Naama, Israel
RAINEY Paul, New Zealand

Stabilizing RNA virus vaccine strains by elucidating triggers and mechanisms of recombination

DEKKER Nynke, The Netherlands
CAMERON Craig, USA
SHIH Shin-Ru, Taiwan

Cellular and biophysical mechanisms of virus-vector interactions mediating disease transmission

DRUCKER Martin, (Germany), France
BUTT Hans-Jürgen, Germany
NG James, (Singapore), USA

RNAi memories: functional genomics of small RNA-mediated epimutations in *C. elegans*

DUCHAINE Thomas, Canada
MISKA Eric, (Germany), UK
SAROV Mihail, (Bulgaria), Germany

Deciphering brain oxytocin circuits controlling social behavior

GRINEVICH Valery, Germany
BUXBAUM Joseph, USA
HANSEL David, France
WAGNER Shlomo, Israel

Mammalian lipid droplets: a central role in the organismal antibacterial response?

GROSS Steven P., USA
BOZZA Patricia T., Brazil
PARTON Robert, Australia
POL Albert, Spain

Predictive modeling of the impact of vir genes on dispersal within pathogen-vector-host interactions

HOGENHOUT Saskia, (The Netherlands), UK
GROVES Russell, USA
IMMINK Richard, The Netherlands
MAREE Athanasius, (The Netherlands), UK
POSPIESZNY Henryk, Poland

The causes and consequences of sperm mediated non-genetic inheritance

IMMLER Simone, (Switzerland), Sweden
CAIRNS Bradley R., USA
MUELLER Ferenc, (Hungary), UK

Evolution of seasonal timers

LOUDON Andrew, UK
BURT David, UK
HAZLERIGG David, Norway
YOSHIMURA Takashi, Japan

Establishing microfluidic cell-free systems for the rapid prototyping of synthetic genetic networks

MAERKL Sebastian, (Germany), Switzerland
MURRAY Richard, USA

Cooperation strategy and information processing in and between germinal centre reactions

MEYER-HERMANN Michael, Germany
DUSTIN Michael, (USA), UK
VICTORA Gabriel, (Brazil), USA
VINUESA Carola, Australia

Towards self-reproduction of protocells and minimal cells: evolution versus engineering

NOIREAUX Vincent, (France), USA
LIBCHABER Albert, (France), USA
MAEDA Yusuke T., Japan
OTT Albrecht, Germany

Quantifying and predicting the influence of translation kinetics on nascent proteome behavior

O'BRIEN Edward, USA
BUKAU Bernd, Germany

Revealing bacterial free energy dynamics during loss of viability

PILIZOTA Teuta, (Croatia), UK
BAI Fan, China
LO Chien-Jung, Taiwan

A unified approach for studying adaptation in sensory cortices

PRIEBE Nicholas, USA
FAIRHALL Adrienne, (Australia), USA
LAMPL Ilan, Israel
NELKEN Israel, Israel

Photosynthesis light utilisation dynamics and ion fluxes: making the link

SZABO Ildiko, (Hungary), Italy
CHANG Chris, USA
FINAZZI Giovanni, (Italy), France
SHIKANAI Toshiharu, Japan

Odor-background segregation and source localization using fast olfactory processing

SZYSZKA Paul, Germany
KANZAKI Ryohei, Japan
NOWOTNY Thomas, (Germany), UK
SMITH Brian H, USA

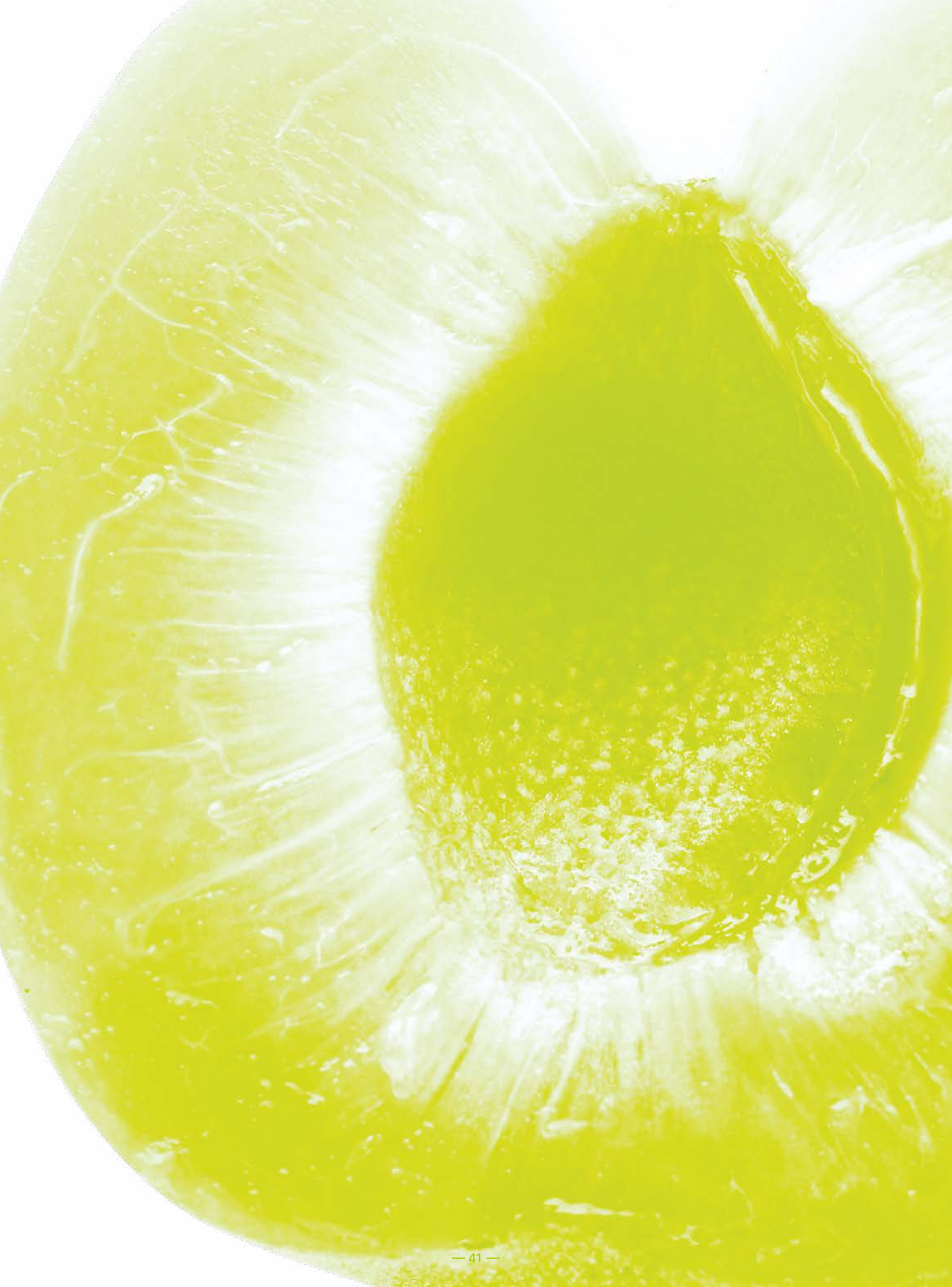
Molecular patterns of influenza virus envelope adaptation to interspecies transmission

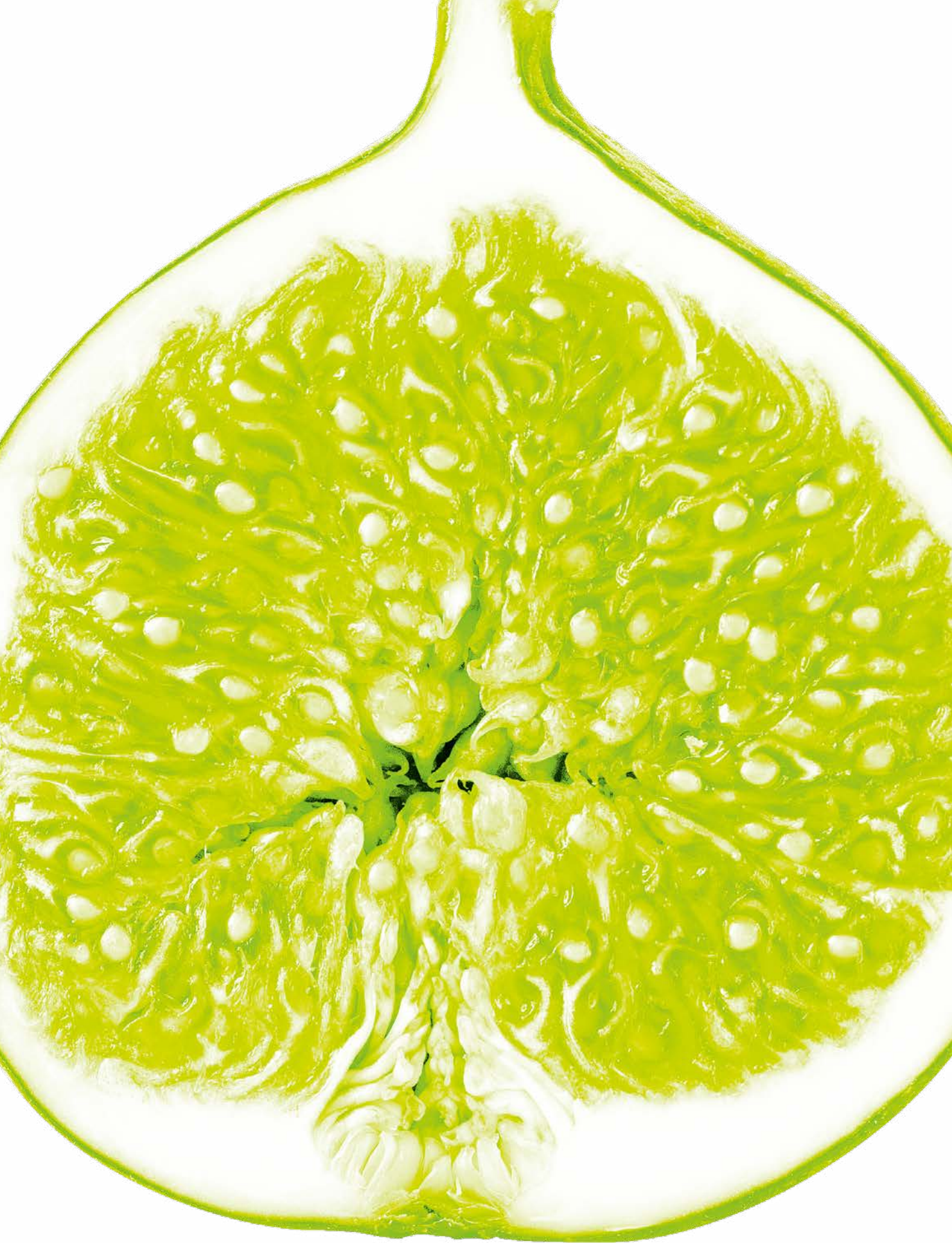
TAMM Lukas, (Switzerland), USA
GRÜNEWALD Kay, (Germany), UK
VEIT Michael, Germany
WENK Markus, (Switzerland), Singapore

Development of solid-state nano-voltage sensors

WEISS Shimon, USA
ENDERLEIN Joerg, Germany
ORON Dan, Israel
TRILLER Antoine, France

⁽¹⁾ These awards were initiated during FY 2015. For a list of the Research Grants awarded in 2016, see the HFSP website (<http://www.hfsp.org/>).





CHAPTER



Outreach and Networking



Right to left: **Guntram Bauer**, **Rosalyn Huie** (Communications)
and **Xavier Schneider** (IT manager and webmaster)

- 3.1 The 2016 HFSP Nakasone Award
- 3.2 Connecting the world's best
- 3.3 Start of a new era in the HFSP Secretariat
- 3.4 Inspiring science
- 3.5 Honours and prizes



.1

THE 2016 HFSP NAKASONE AWARD

Emmanuelle Charpentier and Jennifer Doudna have been awarded the prestigious 2016 HFSP Nakasone Award for their seminal work on the CRISPR-Cas9 system. This technology has begun to revolutionize biology by providing a new application for functional genomics in experimental systems.

Since 2010, the HFSP Nakasone Award recognizes scientists who have undertaken frontier-moving research in biology, whether these be conceptual, experimental or technological breakthroughs.

The award honors the vision of former Prime Minister of Japan Nakasone for his efforts to launch a program of support for international collaboration and to foster early career scientists in a global context. Traditionally the award ceremony is held at the annual HFSP Awardees Meeting where the winner delivers the HFSP Nakasone Lecture.

Their work arose out of a discovery in the late 1980s of neighboring bacterial DNA segments consisting of repeating nucleotide sequences, which flank short segments. Recent studies have shown that pathogenic bacteria possess an immune defense system against predators, and particularly against attacks by viruses (bacteriophages). This defense system works for *Streptococcus pyogenes*, using a duplex of two small RNA molecules that contain sections of the virus genome called “clustered regularly interspaced short palindromic repeats” (CRISPR), which carry the memory of a previous attack.



Emmanuelle Charpentier and Jennifer Doudna delivering the HFSP Nakasone Lecture at the 2016 Awardees Meeting in Singapore



HFSP President **Nobutaka Hirokawa** congratulates **James Collins** for receiving the 2015 HFSP Nakasone Award during the Awardees Meeting in July 2015

Through their collaborative work, Charpentier and Doudna discovered that CRISPR furthermore acted as the guide for a protein (Cas9), which kills the virus by cleaving its genome. Thus, these two entities grouped together form the CRISPR-Cas9 complex, allowing *Streptococcus* bacterium to resist virus attacks.

The scientists used this existing defense mechanism in bacteria to turn CRISPR-Cas9 into a real tool for cleaving the DNA of bacterial and also human cells. These “genetic scissors” can be used for targeting any gene in a cell in order to modify it. With this revolutionary technology, it is much easier to modify gene expression, to switch a gene “on” or “off,” or to change, repair, or remove genes. This new tool is now used in molecular biology laboratories around the world, and has the potential to revolutionize medicine by paving the way to finding new forms of treatment for currently incurable diseases.

Their collaboration led to a seminal study from which resulted this so called “genome editing technology”, which exploits the fact that the CRISPR system, which is present in *S. pyogenes*, uses Cas9 for interference. Cas9 is an enzyme that acts alone thereby providing a very simple system to edit genomes in various ways. The rapid progress in developing Cas9 into a set of tools for cell and molecular biology research has been remarkable, likely due to the simplicity, high efficiency and versatility of the system. The development of efficient and reliable ways to make precise, targeted changes to the genome of living cells is a long-standing goal for biomedical researchers. The CRISPR-Cas9 system has a potential that reaches beyond DNA cleavage, and its usefulness for genome locus-specific recruitment of proteins will likely only be limited by our imagination.





.2

CONNECTING THE WORLD'S BEST

Fifteenth HFSP Awardees Meeting,
La Jolla, USA, 12-15 July 2015.

The aim of the Awardees Meeting is to bring together Grant, Fellowship and Career Development Award holders from all over the world and from different scientific disciplines in order to present and discuss their work. The meetings are an integral element in strengthening the HFSP community by creating an international network of scientists that spans all fronts of the biological frontiers. These interactions have become a source of inspiration for awardees and have led to new collaborations.

Exactly 10 years after the 2005 meeting in Bethesda (Maryland), the 2015 Awardees Meeting was back in the United States for an exciting gathering at the Salk Institute of Biological Studies in La Jolla, California that attracted more than 200 participants. The Salk Institute is a special venue due to its iconic architecture and the outstanding reputation of the institute's scientific work, carried out, among others, by many HFSP awardees.

“*My expectations were exceeded. The science was outstanding and enlightening on so many levels. The people were so nice and interactive, and I met so many interesting people.*”



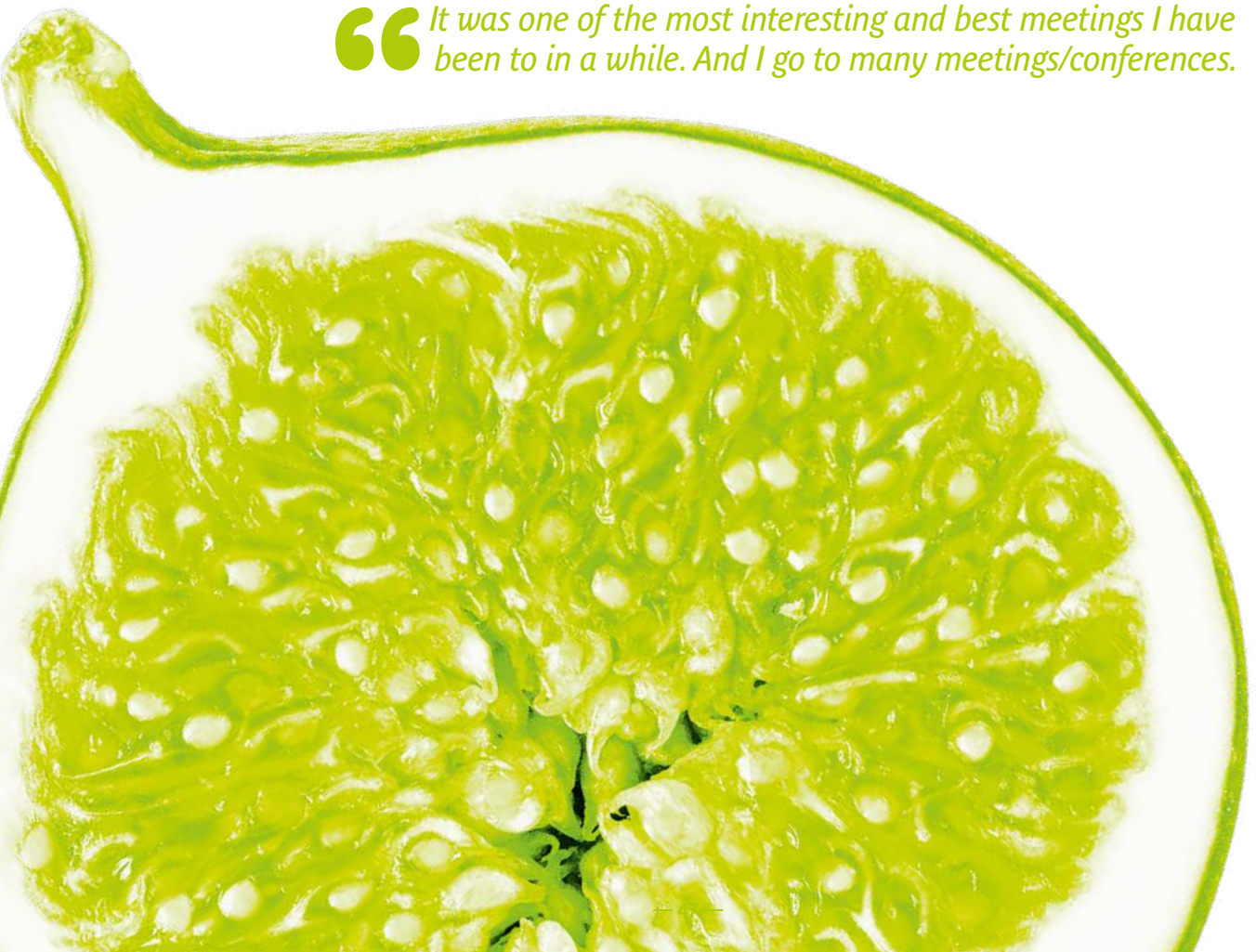
Awardees Meeting at the Salk Institute

“ *The biggest advantage is meeting and discussing issues with the HFSP leadership and Council. The second biggest advantage is the number of collaborations that are produced. I came home with two serious, new collaborations.*

Maybe it was the stunning views onto the Pacific Ocean that inspired the participants as there was an all-around sense that this meeting was unique, excelling in terms of the science presented. The talks featured biology that was much more predictive and innovative than in the past due to the influence and subsequent use of quantitative approaches from physics, mathematics, and engineering.

The keynote presentations also pointed in that direction. HFSP Nakasone Award winner James Collins talked about “Life redesigned: the emergence of synthetic biology”, and Ehud Isacoff presented his latest results on optical control of neurotransmitter receptors. The scientific endeavours were rounded up by a plenary talk by Inder Verma from the Salk Institute about the plasticity of cancer cells. Also new was a personal perspective on scientific publishing provided by Science Magazine Senior Editor, Laura Zahn.

“ *It was one of the most interesting and best meetings I have been to in a while. And I go to many meetings/conferences.*





.3

START OF A NEW ERA IN THE HFSP SECRETARIAT

First, the City of Strasbourg decided to bestow an honorary medal on previous Secretary General, Ernst-Ludwig Winnacker, in recognition of his support of the city of Strasbourg.



Warwick Anderson (left) and Ernst-Ludwig Winnacker

On Monday, 23 November 2015, two HFSP Secretary Generals and many friends of our Program in Strasbourg were united for a very special event in the beautiful Grand Salon of the city's 18th century Hôtel de Ville. The gathering was on the invitation of the Mayor of Strasbourg, Roland Ries, and the President of the Eurométropole of Strasbourg, Robert Herrmann, and had a dual purpose.

Second, for the city, represented by its Vice President, Catherine Trautmann, it was a wonderful occasion to officially welcome HFSP's new Secretary General, Warwick Anderson. She was joined in her remarks by the new General Consul of Japan, Shinsuke Shimizu, and the Australian Ambassador to France, Stephen Brady, who was excited about the prospect of having a Secretary General from Australia at the helm of HFSP, seeing it as an unmistakable signal of the global importance of the Program. Indeed Anderson is the first Secretary General from the Asia-Pacific region and has since settled in Strasbourg.





4

INSPIRING SCIENCE

HFSP is all about funding frontier research on the complex mechanisms of living organisms. Our programs support projects at all levels of biological complexity from biomolecules to the interactions between organisms. Key elements of HFSP's mission are:

- Support for innovative, cutting edge research at the frontiers of the life sciences
- Encouragement of high risk research
- Promotion of international collaboration in the spirit of science without borders
- Support for financial and intellectual independence for early career researchers

Exemplary research projects along these very lines of priorities have produced very innovative results in 2015 such as...

...From biological adhesion to new composite materials. HFSP Research Grant holder Alfred Crosby and colleagues from the University of Massachusetts Amherst, USA looked at hierarchical structures within natural materials that are known to provide advantageous combinations of stiffness, toughness, and friction. It appeared that a combination of polyampholyte hydrogels and woven fabrics offered an attractive route to take advantage of multi-scale interactions and advantageous swelling histories to provide a new class of composite materials with properties that match those of wet biological tissues.

...How mice see colour. HFSP Long-Term Fellow Maximilian Joesch and colleagues investigated neurons in the mouse's eye that compare rod and cone signals to inform the brain about color. In humans, an analogous circuitry can explain color experiences in twilight. This article highlight reached more than 1500 people via Facebook.

...Coral on a chip: a microfluidic platform for the study of reef-building corals. HFSP Young Investigator Grant holders Roman Stocker and Assaf Vardi and colleagues established the 'Coral on a Chip' platform which combines micro-propagation and microfluidic approaches to investigate the complex interactions

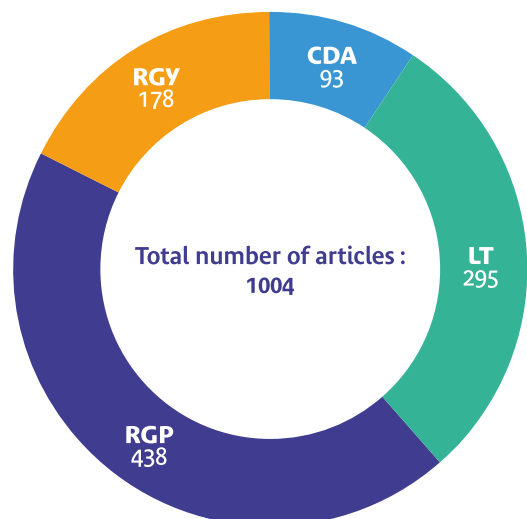
between reef corals, their environment, and the myriad of microorganisms associated with them. This novel experimental setup enables the study of microscale processes in reef-building corals at unprecedented spatio-temporal resolution, providing a unique view into the lives of these important organisms and the underlying causes leading to their continuous decline.

...Spider toxins to detect sodium channel interactions. HFSP Young Investigator Grant holders Frank Bosmans and Filip Van Petegem and colleagues recorded electrical signals in the human body that are conveyed through neurons into and out of the central nervous system. These small signals are generated by ions moving through specialized protein complexes that are found in the cell membrane. One of these complex members is a 'sodium channel', through which sodium ions move down their electrochemical gradient. Miniscule changes in the 3D structure of the sodium channel can cause severe diseases such as epilepsy and cardiac arrhythmias, so it is crucial that we know how the complex works.

Each year in March there is a build-up of excitement in and around the office as the HFSP Secretariat prepares the announcement of the new awards. Thanks to social media, there is immediate and rewarding feedback following the publication of the results on our website and the publication of the corresponding press releases. A collection of press releases published by host institutions of the 2015 HFSP awards is available on the HFSP website.

> **Figure 3-1**
Overview of articles in peer reviewed journals published by HFSP awardees in 2015

Peer Reviewed Journal Articles citing HFSP Support (2015)





.5

HONOURS AND PRIZES

HFSP GRANTEES AWARDED THE NOBEL PRIZE

Nobel Laureate	HFSP Research Grant	Nobel Prize
Christiane NÜSSLEIN-VOLHARD	1993	1995 (Physiology or Medicine)
Rolf ZINKERNAGEL	1994	1996 (Physiology or Medicine)
Stanley PRUSINER	1994	1997 (Physiology or Medicine)
John WALKER	1996	1997 (Chemistry)
Steven CHU	1993	1997 (Physics)
Paul NURSE	1994	2001 (Physiology or Medicine)
Tim HUNT	1992/1997	2001 (Physiology or Medicine)
John SULSTON	1991	2002 (Physiology or Medicine)
Peter AGRE	2000	2003 (Chemistry)
Linda BUCK	1995	2004 (Physiology or Medicine)
Avram HERSHKO	1998	2004 (Chemistry)
Roger KORBERG	1990/1993/1997/2000	2006 (Chemistry)
Roger TSIEN	1995	2008 (Chemistry)
Jack SZOSTAK	2001	2009 (Physiology or Medicine)
Venkatraman RAMAKRISHNAN	2000/2009	2009 (Chemistry)
Ada YONATH	2003	2009 (Chemistry)
Jules HOFFMANN	1995	2011 (Physiology or Medicine)
Ralph STEINMAN	1996, 2006	2011 (Physiology or Medicine)
Randy SCHEKMAN	1991, 1995	2013 (Physiology or Medicine)
Thomas SÜDHOF	1995	2013 (Physiology or Medicine)
James ROTHMAN	1990, 1994, 2005	2013 (Physiology or Medicine)
Martin KARPLUS	2005	2013 (Chemistry)
Michael LEVITT	2008	2013 (Chemistry)
John O'KEEFE	1994	2014 (Physiology or Medicine)
Stefan HELL	2010	2014 (Chemistry)
Aziz SANCAR	1992	2015 (Chemistry)

The following section lists other recent awards and prizes to HFSP awardees or alumni from 2015 or earlier that have come to our attention in FY 2015¹

Name	Nationality	Current affiliation	Year of HFSP award
AMERICAN ACADEMY OF ARTS AND SCIENCES			
FELLOW			
Carlos J. BUSTAMANTE	USA	University of California, Berkeley, USA and HHMI	Program Grant 2004, 2011
Howard EICHENBAUM	USA	Boston University, USA	Research Grant 1992
Michael ELOWITZ	USA	California Institute of Technology, Pasadena, USA	Young Investigator Grant 2004, Nakasone Award 2011, Program Grant 2012
Stanley FIELDS	USA	University of Washington, Seattle, USA and HHMI	Research Grant 2000
Taekjip HA	Republic of South Korea	University of Illinois at Urbana-Champaign, USA	Young Investigator Grant 2005
Linda HSIEH-WILSON	USA	California Institute of Technology, Pasadena, USA	Young Investigator Grant 2002
David KLEINFELD	USA	University of California, San Diego, USA	Program Grant 2004
Margaret S. LIVINGSTONE	USA	Harvard Medical School, Boston, USA	Research Grant 1994
Sandra SCHMID	USA	University of Texas Southwestern Medical Center, Dallas, USA	Research Grant 1996
Gerhard WAGNER	Germany/USA	Harvard Medical School, Boston, USA	Research Grant 1999
FOREIGN HONORARY MEMBER			
David MACLENNAN	Canada	University of Toronto, Canada	Research Grant 1993
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE			
FELLOW			
Edwin ABEL	USA	University of Pennsylvania, Philadelphia, USA	Program Grant 2005
Cheryl ARROWSMITH	USA	University of Toronto, Canada	Research Grant 1992
Andrea CALIFANO	Italy	Columbia University, New York, USA	Program Grant 2010
Yury CHERNOFF	USA	Georgia Institute of Technology, Atlanta, USA	Long-Term Fellowship 1993
Mitchell KRONENBERG	USA	La Jolla Institute for Allergy and Immunology, San Diego, USA	Research Grant 2000
Michael SHADLEN	USA	Columbia University, New York, USA	Program Grant 2011
Beverly WENDLAND	USA	Johns Hopkins University, Baltimore, USA	Program Grant 2002
ACADEMY OF MEDICAL SCIENCES			
FELLOW			
Elaine DZIERZAK	USA/ Netherlands	University of Edinburgh, UK	Research Grant 1999
Seth GRANT	Australia	University of Edinburgh, UK	Research Grant 1994, Program Grant 2005
Kairbaan HODIVALA-DILKE	UK	Queen Mary University, London, UK	Long-Term Fellowship 1994
Andrew LOUDON	UK	University of Manchester, UK	Program Grant 2015
Irene TRACEY	UK	University of Oxford, UK	Program Grant 2004
AMERICAN PHILOSOPHICAL SOCIETY			
MEMBER			
Joanne CHORY	USA	The Salk Institute, La Jolla, USA and HHMI	Research Grant 2000
BREAKTHROUGH PRIZE IN LIFE SCIENCES FOUNDATION			
BREAKTHROUGH PRIZE IN LIFE SCIENCES			
Gary RUVKUN	USA	Harvard Medical School, Boston, USA	Research Grant 1991
C. David ALLIS	USA	The Rockefeller University, New York, USA	Research Grant 1997, 2000

⁽¹⁾ It should be noted that Research Grants were awarded up until 2001 when Program Grants and Young Investigator Grants were introduced. The Short-Term Fellowship program was terminated in April 2010.

Name	Nationality	Current affiliation	Year of HFSP award
CNRS			
GOLD MEDAL			
Eric KARSENTI	France	EMBL, Heidelberg, Germany	Research Grant 1990, 1994
SILVER MEDAL			
Monsef BENKIRANE	France	Institute of Human Genetics, Montpellier, France	Young Investigator 2003
Thomas LECUIT	France	Development Biology Institute of Marseille Luminy, Marseille, France	Long-Term Fellowship 1999, Program Grant 2008
BRONZE MEDAL			
Evanthia SOUTOGLOU	Greece	Institute of Genetics and Molecular and Cellular Biology, Illkirch, France	Long-Term Fellowship 2003, Career Development Award 2009
PRIX CLAUDE PAOLETTI			
Hughes NURY	France	Institute of Structural Biology, Grenoble, France	Long-Term Fellowship 2011
EMBO			
GOLD MEDAL			
Ido AMIT	Israel	Weizmann Institute of Science, Rehovot, Israel	Long-Term Fellowship 2008, Career Development Award 2011
MEMBER			
Jean-Louis BESSEREAU	France	University Claude Bernard, Lyon 1, Villeurbanne, France	Program Grant 2014
Ralph BOCK	Germany	Max-Planck Institute of Molecular Plant Physiology, Potsdam-Golm, Germany	Program Grant 2013
Ehud GAZIT	France/Israel	Tel Aviv University, Israel	Long-Term Fellowship 1998
Joost GRIBNAU	Netherlands	Erasmus University Medical Center, Rotterdam, The Netherlands	Long-Term Fellowship 2001, Career Development Award 2004
Emilio HIRSCH	Italy	University of Turin, Italy	Research Grant 2000
Kairbaan HODIVALA-DILKE	UK	Queen Mary University, London, UK	Long-Term Fellowship 1994
Casper HOOGENRAAD	Netherlands	Utrecht University, The Netherlands	Long-Term Fellowship 2003, Career Development Award 2006
Jan LOHMANN	Germany	University of Heidelberg, Germany	Long-Term Fellowship 2000, Career Development Award 2003
Eran SEGAL	Israel	Weizmann Institute of Science, Rehovot, Israel	Young Investigator Grant 2008
Ralph SOMMER	Germany	Max-Planck Institute of Developmental Biology, Tübingen, Germany	Program Grant 2001
Alexander STARK	Germany	Research Institute of Molecular Pathology, Vienna, Austria	Long-Term Fellowship 2006
Nicolas THOMÄ	Germany	Friedrich Miescher Institute for Biomedical Research, Basel, Switzerland	Long-Term Fellowship 2002
Danièle WERCK-REICHART	France	Institute of Molecular Plant Biology and University of Strasbourg	Program Grant 2005
Mihaela ZAVOLAN	Romania	University of Basel, Switzerland	Program Grant 2012
ASSOCIATE MEMBER			
Angelika AMON	Austria/USA	Massachusetts Institute of Technology, Cambridge, USA	Research Grant 2000
Sean CARROLL	USA	University of Wisconsin-Madison and HHMI, USA	Research Grant 1998
Paul RAINEY	New Zealand/ UK	Massey University, Auckland, New Zealand	Program Grant 2015
YOUNG INVESTIGATOR			
Shalev ITZKOVITZ	Israel	Weizmann Institute of Science, Rehovot, Israel	Long-Term Fellowship 2010, Career Development Award 2013
Martin JINEK	Czech Republic	University of Zurich, Switzerland	Long-Term Fellowship 2007
Robert RYAN	Ireland	University of Dundee, UK	Short-Term Fellowship 2008

Name	Nationality	Current affiliation	Year of HFSP award
EUROPEAN RESEARCH COUNCIL			
STARTING GRANT			
Nicola ACETO	Italy	University of Basel, Switzerland	Long-Term Fellowship 2013
Volker BUSSKAMP	Germany	Technical University of Dresden, Germany	Long-Term Fellowship 2012
Bert JANSSEN	Netherlands	Utrecht University, The Netherlands	Long-Term Fellowship 2009
Mounia LAGHA	Algeria	Institute of Molecular Genetics, Montpellier, France	Long-Term Fellowship 2010, Career Development Award 2015
Martin LOOSE	Germany	Institute of Science and Technology Austria, Klosterneuburg	Long-Term Fellowship 2012
Ziv SHULMAN	Israel	Weizmann Institute of Science, Rehovot, Israel	Long-Term Fellowship 2011
Eran STARK	Israel	Tel Aviv University, Israel	Long-Term Fellowship 2009
Grzegorz SUMARA	Poland	Julius-Maximilians Universität Würzburg, Germany	Long-Term Fellowship 2009
Sven VAN TEEFFELLEN	Germany	Pasteur Institute, Paris, France	Cross-Disciplinary Fellowship 2010
Albert WEIXLBAUMER	Austria	Institute of Genetics and Molecular and Cellular Biology, Illkirch, France	Long-Term Fellowship 2009
Yossi YOVEL	Israel	Tel-Aviv University, Israel	Program Grant 2013
ADVANCED GRANT			
Andrés AGUILERA	Spain	University of Seville, Spain	Research Grant 1999
Raph BOCK	Germany	Max-Planck Society, Potsdam, Germany	Program Grant 2013
Peer BORK	Germany	European Molecular Biology Laboratory, Heidelberg, Germany	Research Grant 2000
Michael BRAND	Germany	Technical University Dresden, Germany	Program Grant 2005
Nils BROSE	Germany	Max Planck Institute for Experimental Medicine, Göttingen, Germany	Research Grant 2000
Jason CHIN	UK	Medical Research Council, Cambridge, UK	Young Investigator Grant 2009
Hans CLEVERS	Netherlands	Utrecht University, The Netherlands	Research Grant 1998
Pascale COSSART	France	Pasteur Institute, Paris, France	Program Grant 2013
John DIFFLEY	USA/UK	Cancer Research UK, South Mimms, UK	Program Grant 2001
Denis DUBOULE	Switzerland	University of Geneva, Switzerland	Research Grant 1991, 1994
Martin EILERS	Germany	University of Würzburg, Germany	Research Grant 1993, 1997
Jeff ERRINGTON	UK	Newcastle University, UK	Program Grant 2003
Edith HEARD	UK	Curie Institute, Paris, France	Long-Term Fellowship 1990, Program Grant 2003
Fritjof HELMCHEN	Germany	University of Zurich, Switzerland	Long-Term Fellowship 1998, Program Grant 2004
Frank HOLSTEGE	Netherlands	University Medical Center Utrecht, The Netherlands	Long-Term Fellowship 1997
Jonathan JONES	UK	The Sainsbury Laboratory, Norwich, UK	Program Grant 2007
Antonio LANZAVECCHIA	Italy	Institute for Research in Biomedicine, Bellinzona, Switzerland	Program Grant 2007
Zachary MAINEN	USA	Champalimaud Centre for the Unknown, Lisbon, Portugal	Program Grant 2010
Maria Antonietta De MATTEIS	Italy	Telethon Institute of Genetics and Medicine, Naples, Italy	Research Grant 1999
Tobias MOSER	Germany	University of Göttingen, Germany	Young Investigator Grant 2004
Andrea MUSACCHIO	Italy	Max-Planck Institute of Molecular Physiology, Dortmund, Germany	Long-Term Fellowship 1995, Program Grant 2003, Program Grant 2009
Stefano PICCOLO	Italy	University of Padova, Italy	Program Grant 2011
Bert POOLMAN	Netherlands	University of Groningen, Netherlands	Research Grant 1992
Botond ROSKA	Hungary	Friedrich Miescher Institute for Biomedical Research, Basel, Switzerland	Short-Term Fellowship 2000, Young Investigator Grant 2003
James ROTHMAN	USA	University College London, UK	Research Grant 1990, 1994, Program Grant 2005

Name	Nationality	Current affiliation	Year of HFSP award
ADVANCED GRANT			
Manuel SERRANO	Spain	Spanish National Cancer Research Center, Madrid, Spain	Research Grant 1999
James SHARPE	UK	Centre for Genomic Regulation, Barcelona, Spain	Research Grant 2004
Nicolas THOMÄ	Germany	Friedrich Miescher Institute for Biomedical Research, Basel, Switzerland	Long-Term Fellowship 2002
Frank UHLMANN	Germany	Cancer Research UK, London, UK	Young Investigator Grant 2005
Juan VALCARCEL	Spain	Centre for Genomic Regulation, Barcelona, Spain	Research Grant 2000
Albert VAN DEN BERG	Netherlands	University of Twente, Enschede, The Netherlands	Research Grant 1996, 2000
Stephen WEST	UK	Cancer Research UK, South Mimms, UK	Research Grant 1997
Magdalena ZERNICKA-GOETZ	UK/Poland	University of Cambridge, UK	Research Grant 2000
FEBS/EMBO			
WOMEN IN SCIENCE AWARD			
Caroline DEAN	UK	John Innes Centre, Norwich, UK	Research Grant 1997
GAIRDNER FOUNDATION			
CANADA GAIRDNER INTERNATIONAL AWARDS			
Janet ROSSANT	Canada/UK	Hospital for Sick Children, Toronto, Canada	Research Grant 2000
GERMAN RESEARCH COUNCIL			
LEIBNIZ AWARD 2015			
Tobias MOSER	Germany	University of Göttingen, Germany	Young Investigator Grant 2004
HOWARD HUGHES MEDICAL INSTITUTE			
HHMI INVESTIGATORS			
Job DEKKER	The Netherlands	University of Massachusetts Medical School, Worcester, USA	Program Grant 2011
Michael LAUB	USA	Massachusetts Institute of Technology, Cambridge, USA	Program Grant 2013
Tobias WALTHER	Germany	Harvard University, Cambridge, USA	Long-Term Fellowship 2003, Career Development Award 2007
GRETE LUNDBECK EUROPEAN BRAIN RESEARCH FOUNDATION			
BRAIN PRIZE			
Karel SVOBODA	USA	Janelia Farm Research Campus, HHMI, Ashburn, USA	Research Grant 1998
Winfried DENK	Germany	Max Planck Institute for Medical Research, Heidelberg, Germany	Program Grant 2004
Arthur KONNERTH	Germany	Technical University of Munich, Germany	Research Grant 1991,1997
NATIONAL ACADEMY OF SCIENCES			
MEMBER			
Marianne BRONNER	USA	California Institute of Technology, Pasadena, USA	Research Grant 2000
Alfred L. GOLDBERG	USA	Harvard Medical School, Boston, USA	Research Grant 1995
Taekjip HA	Republic of South Korea	University of Illinois at Urbana-Champaign, USA	Young Investigator Grant 2005
Alan HINNEBUSCH	USA	NICHD, National Institutes of Health, Bethesda, USA	Program Grant 2009
Maria JASIN	USA	Memorial Sloane-Kettering Cancer Center, New York, USA	Research Grant 1997
Eva NOGALES	USA	University of California, Berkeley, USA and HHMI	Program Grant 2008
Rodney ROTHSTEIN	USA	Columbia University Medical Center, New York, USA	Program Grant 2001
Julian SCHROEDER	USA	University of California, San Diego, La Jolla, USA	Program Grant 2006
Karel SVOBODA	USA	Janelia Farm Research Campus, HHMI, Ashburn, USA	Research Grant 1998

Name	Nationality	Current affiliation	Year of HFSP award
FOREIGN ASSOCIATE			
Jonathan JONES	UK	The Sainsbury Laboratory, Norwich, UK	Program Grant 2007
Satyajit MAYOR	India	National Centre for Biological Sciences, Bangalore, India	Research Grant 1996, Program Grant 2005, 2012
Nahum SONENBERG	Canada	McGill University, Montreal, Canada	Research Grant 1995, 1998, Program Grant 2005

NATIONAL ACADEMY OF MEDICINE

MEMBER			
Dennis DISCHER	USA	University of Pennsylvania, Philadelphia, USA	Program Grant 2009
Michael GREEN	USA	University of Massachusetts Medical School, Worcester, USA	Research Grant 2000
Kenneth KINZLER	USA	Johns Hopkins University, Baltimore, USA	Research Grant 1998
David MCCORMICK	USA	Yale School of Medicine, New Haven, USA	Research Grant 1996, 2000
INTERNATIONAL MEMBER			
Nahum SONENBERG	Canada	McGill University, Montreal, Canada	Research Grant 1995, 1998, Program Grant 2005

NATIONAL INSTITUTES OF HEALTH

PIONEER AWARD			
Zemer GITAI	USA	Princeton University, USA	Young Investigator Grant 2008, 2013
Jonathon HOWARD	USA/Australia	Yale University, New Haven, USA	Research Grant 1994, 1999, Program Grant 2004
Ryohei YASUDA	Japan	Max Planck Florida Institute of Neuroscience, Jupiter, USA	Program Grant 2011

PEW CHARITABLE TRUSTS

PEW SCHOLAR IN THE BIOMEDICAL SCIENCES			
Nicola ALLEN	UK	The Salk Institute, La Jolla, USA	Long-Term Fellowship 2005

ROYAL SOCIETY

FELLOW			
Stephen CUSACK	UK	European Molecular Biology Laboratory, Grenoble Outstation, France	Program Grant 2001
Anne CUTLER	Australia	Max Planck Institute for Psycholinguistics, Nijmegen, The Netherlands	Research Grant 1990, 1995
Michael HÄUSSER	Canada/ Germany	University College London, UK	Long-Term Fellowship 1995, Research Grant 2000
Gero MIESENBÖCK	Austria	University of Oxford, UK	Program Grant 2007
Nathalie STRYNADKA	Canada	University of British Columbia, Vancouver, Canada	Research Grant 2000
Bryan TURNER	UK	University of Birmingham, UK	Research Grant 1997
Frank UHLMANN	Germany	Cancer Research UK London Research Institute, UK	Young Investigator Grant 2005

FOREIGN MEMBER			
Linda BUCK	USA	Fred Hutchinson Cancer Research Center, Seattle, USA	Research Grant 1995
Susan LINDQUIST	USA	Whitehead Institute for Biomedical Research, Cambridge, USA	Research Grant 1992



CHAPTER



Budget and Finance



Left to right: **Takashi Arai**, **Jennifer Sayol**, **Sarah Naett**
and **Isabelle Heidt-Coquard**

- 4.1 Guidelines for HFSP0 funding
- 4.2 Key financial figures for FY 2015
- 4.3 Geographical distribution
- 4.4 Payment of awards
- 4.5 FY 2015 financial summary
- 4.6 Notes on FY 2015 accounts
- 4.7 Financial outlook for FY 2016



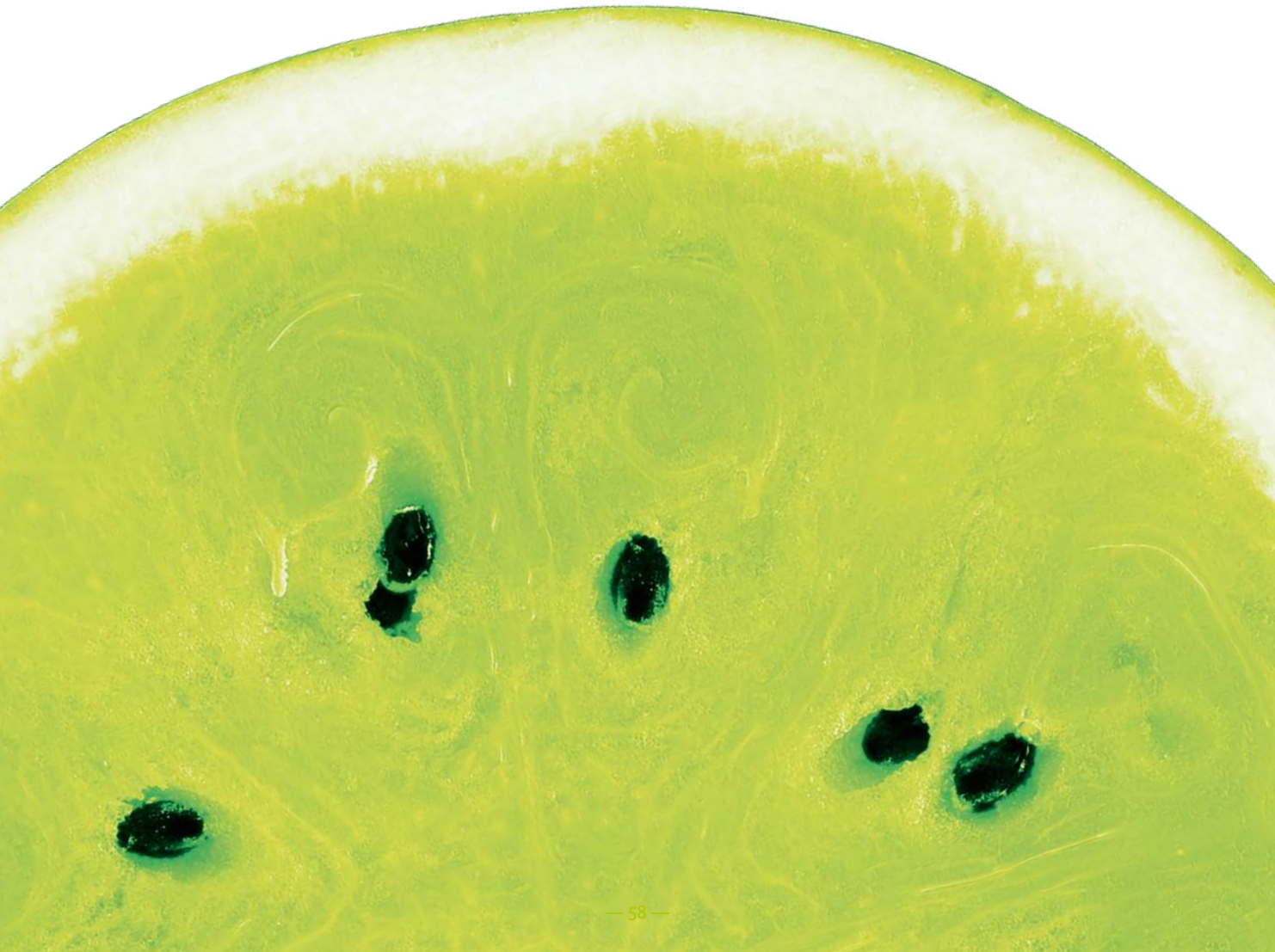
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GUIDELINES FOR HFSP0 FUNDING

HFSP0 is supported by voluntary contributions from its 15 Management Supporting Parties (MSPs): Australia, Canada, France, Germany, India, Italy, Japan, Republic of Korea, New Zealand, Norway, Singapore, Switzerland, the United Kingdom, the United States of America and the European Union.

MSPs hold regular Intergovernmental Conferences (IGCs) at which the intended level of contribution for the next three-year budgetary period is established as a guideline for the Board of Trustees. For FY 2015 the agreement signed in Brussels in 2013 is the relevant basis. The most recent IGC agreement was signed in London in July 2016.

The Brussels agreement was for a 4 % annual increase of MSPs' contributions for Australia, Canada, Germany, New Zealand, Switzerland and the United Kingdom and a 2 % annual increase for European Union, France, India, Italy, Republic of Korea, Norway and the United States of America. Japan maintained the same level of contribution throughout the period.





2

KEY FINANCIAL FIGURES FOR FY 2015

Contributions received from MSPs during FY 2015 (Table 4-1) show actual payments made in the agreed currencies in the first column. The second column gives the converted amounts in USD exchanged at the daily accounting rate. Total contributions amounted to 93.9 % of the Brussels goal of 57.019 mUSD shown in the third column:

> Table 4-1

Contributions received by HFSP Management Supporting Parties in FY 2015 (1 April 2015 to 31 March 2016)

Program Grants	Payments		BRUSSELS Joint Communiqué for 2015 in USD
	Actual payment LC (Local Currency)	Actual payment in USD (at accounting rate)	
Australia	728 000 USD	728 000	728 000
Canada	1 884 147 CAD	1 503 694	1 682 000
EU	4 861 000 EUR	5 348 047	6 076 000
France	2 275 000 EUR	2 518 482	2 844 000
Germany	4 440 000 EUR	4 923 175	5 550 000
India	1 029 000 USD	1 029 000	1 029 000
Italy	940 000 EUR	1 059 848	1 149 000
Japan	21 039 885 USD	21 039 885	22 200 000
Korea	813 000 USD	813 000	813 000
New Zealand	138 000 USD	138 000	138 000
Norway	633 000 USD	633 000	633 000
Singapore	520 000 USD	520 000	520 000
Switzerland	885 000 CHF	921 005	952 000
UK	1 472 000 GBP	2 252 648	2 374 000
USA	10 129 000 USD	10 129 000	10 331 000
TOTAL		53 556 783	57 019 000

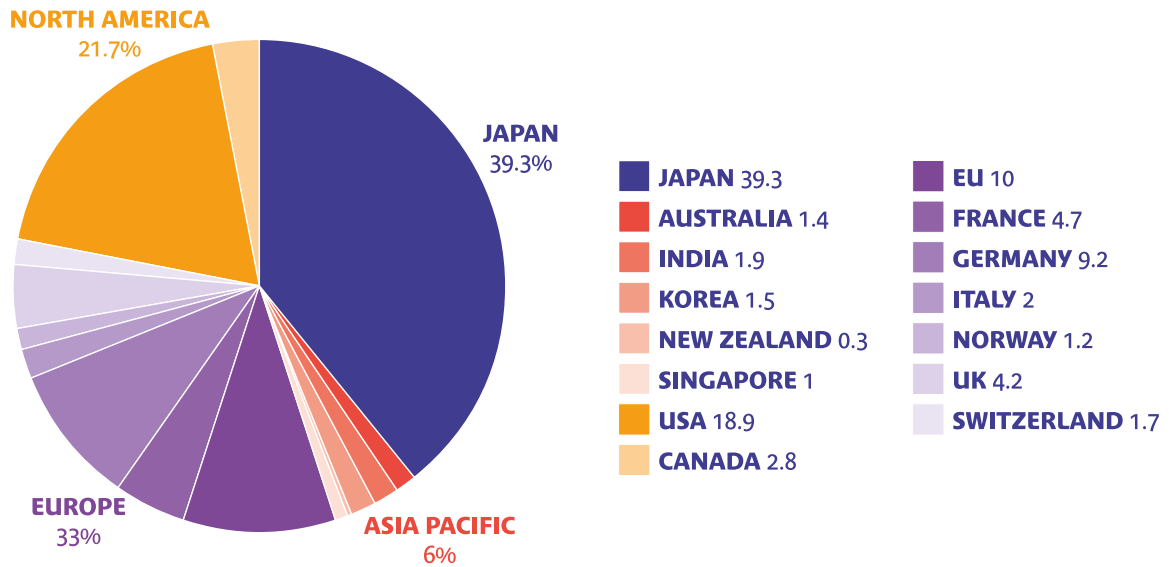


3

GEOGRAPHICAL DISTRIBUTION

At the end of FY 2015, the total amount contributed by the MSPs since the beginning of the Program reached 1.316 billion USD. During FY 2015, the Asia Pacific region, which includes Japan, remained the main source of funding, contributing 45.3 % of the total, followed by Europe contributing 33 % and North America contributing 21.7 %.

> Figure 4-1
2015 Geographical distribution of received contributions per countries (MSPs)





4

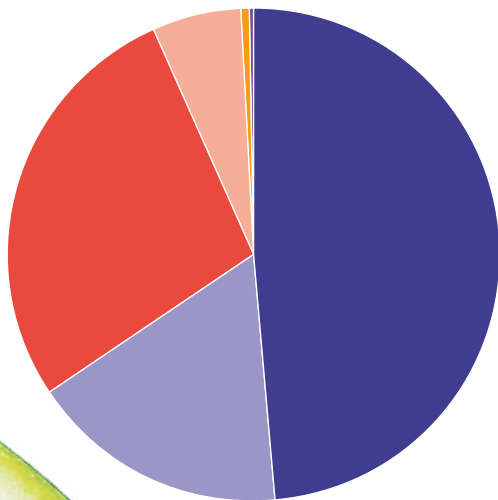
PAYMENT OF AWARDS

HFSPo paid 51.958 million USD to its awardees during FY 2015

Payments by program activities:

- > Research Grant payments amounted to 34.45 million USD (25.35 million USD for Program Grants and 9.1 million USD for Young Investigator Grants). This constitutes 66 % of payments made in FY 2015.
- > Payments to Long-Term and Cross-Disciplinary Fellows amounted to 14.376 million USD and correspond to 28 % of payments.
- > Payments to CDA holders amounted to 2.9 million USD and constitute 6 % of FY 2015 payments.
- > Resources allocated to other program activities included the Awardees Meeting in San Diego, USA (July 2015) and outreach activities, including Program meetings and the Nakasone Award, amounted to approximately 232 thousand USD.

> **Figure 4-2**
Payments of program activities made during FY2015



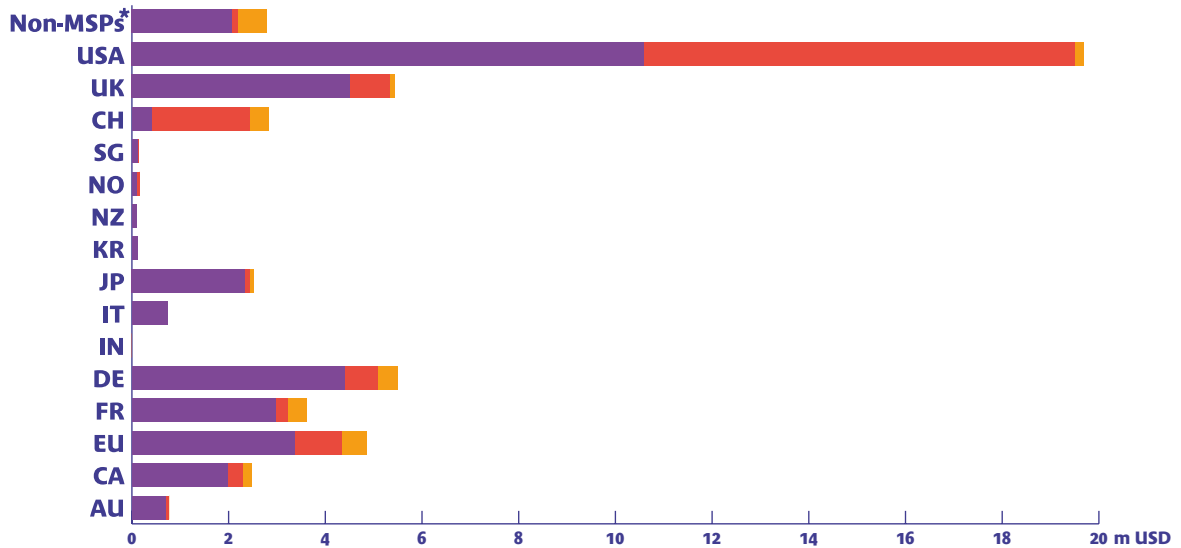
- PROGRAM GRANTS** 49 %
- YOUNG INVESTIGATOR GRANTS** 17 %
- LONG-TERM AND CROSS-DISCIPLINARY FELLOWSHIPS** 28 %
- CAREER DEVELOPMENT AWARDS** 6 %
- AWARDEES MEETING** 0.43 %
- OTHER PROGRAM ACTIVITIES** 0.23 %

The geographical distribution of award payments

In FY 2015, 44.7 % of the total amount of awards was paid to support HFSP awardees in Europe, 42.9 % was allocated to awardees in North America, 7 % went to awardees in the Asia-Pacific region and 5.4 % to non MSPs.

> Figure 4-3

Geographical distribution of total awards over all programs paid by HFSP in FY2015



in m USD	Non-MSPs*	USA	UK	CH	SG	NO	NZ	KR	JP	IT	IN	DE	FR	EU	CA	AU
Research Grants	2.07	10.59	4.51	0.41	0.11	0.1	0.09	0.11	2.34	0.74	0	4.4	2.97	3.36	1.97	0.69
Fellowships	0.11	8.9	0.82	2.02	0.03	0.06	0	0	0.09	0	0	0.69	0.25	0.99	0.32	0.08
Career Development Awards	0.6	0.2	0.1	0.4	0	0	0	0	0.1	0	0	0.4	0.4	0.5	0.2	0
TOTAL	2.78	19.69	5.42	2.83	0.14	0.17	0.09	0.11	2.53	0.74	-	5.49	3.62	4.86	2.49	0.77

*Non-MSPs: Israel, China, Taiwan, Argentina, Brazil, Panama, Mexico



.5

FY 2015 FINANCIAL SUMMARY

As regards the FY 2015 budget, all MSPs paid the expected contribution, except for the USA. The total amount received from all MSPs was 2.38 million USD less than expected, due to the impact of the exchange rate between the Euro and the US Dollar. HFSP0 limits currency exchange as far as possible,

The accounting summary (Table 4-2) provides an overview of income and expenditures. Together, these result in the cash net financial position. Contributions paid in currencies other than USD are consolidated at the exchange rate of the date of payment.

using contributions in one currency for the payment of awardees in the same currency. Overall the financial income was higher than expected due to the performance of several long-term investments. The annual balance between income and expenditures is positive by more than one million.

> Table 4-2

INCOME / CURRENT COMMITMENTS	Budget 2015 In m USD	Report FY 2015 In m USD (actual rate)	EXPENDITURES / NEW COMMITMENTS	Budget 2015 In m USD	Report FY 2015 In m USD
1. CONTRIBUTIONS	55.859	53.556	1. ADMINISTRATIVE EXPENSES	4.176	3.650
Australia	0.728	0.728	2. PROGRAM ACTIVITIES	55.393	51.958
Canada	1.682	1.504	Program Grants	25.350	25.350
European Union	6.076	5.348	Young Investigators	9.100	9.100
France	2.844	2.518	Fellowships	17.161	14.376
Germany	5.550	4.923	Career Development Awards	3.000	2.900
India	1.029	1.029	Meetings and outreach activities	0.782	0.232
Italy	1.149	1.060	3. COMMITTED FUNDS BEYOND FY (in USD)	56.792	55.426
Japan	21.040	21.040	Committed funds from previous year	2.593	
Korea	0.813	0.813	Program Grants	25.050	25.150
New Zealand	0.138	0.138	Young Investigators	8.750	8.750
Norway	0.633	0.633	Fellowships	17.499	18.526
Singapore	0.520	0.520	Career Development Awards	2.900	3.000
Switzerland	0.952	0.921			
United Kingdom	2.374	2.252			
United States of America	10.331	10.129			
2. INTERESTS AND CAPITAL GAIN	0.250	0.932			
3. MISCELLANEOUS REIMBURSEMENTS		0.146			
4. TREASURY	58.599	57.012			
EMTN ⁽¹⁾	45.500	42.000			
UCITS ⁽²⁾ in USD	6.892	10.467			
UCITS in EUR	3.606	3.542			
Current bank accounts	2.601	1.003			
	02/2015	31/03/2016			
TOTAL INCOME	114.708	111.646	TOTAL EXPENSES	116.361	111.034
To be received from previous FY	2.206	0.560			
ANNUAL BALANCE (NEGATIVE)		0	ANNUAL BALANCE (POSITIVE)	0.554	1.172
GRAND TOTAL	116.914	112.206	GRAND TOTAL	116.914	112.206

⁽¹⁾EMTN: Euro Medium Term Notes
⁽²⁾UCITS: Undertaking for Collective Investments in Transferable Securities



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NOTES ON FY 2015 ACCOUNTS

Accounts for FY 2015, consolidated in EUR, were prepared by the chartered accountants MAZARS, and they were audited and certified by Price Waterhouse Coopers. HFSP's legal accounts are reported on an accrual basis and follow the French regulations applicable to not-for-profit organizations (GAAP). Legal accounts are consolidated and stated in Euro. The currency of consolidation used for HFSP's internal reporting, including this annual report, is the US Dollar.



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FINANCIAL OUTLOOK FOR FY 2016

Planning for the FY 2016 budget (Table 4-3) was based on MSPs' contributions as confirmed at the 50th Board meeting (March 2016). This amounted to 53.849 million USD.

The Program Activity Plan was adopted by the Board on 19 March 2016. Within the limits of the projected budget, it decided to make the following awards:

- 25 Program Grants;
- 7 Young Investigator Grants;
- 75 Long-Term and Cross-Disciplinary Fellowships;
- 8 Career Development Awards.

Program activities in FY 2016 will cost 53.541 million USD and include the 16th HFSP Awardees Meeting in Singapore, the 2016 Nakasone Award, attendance at scientific meetings and travel for Council and Review Committee members.

HFSP continues to operate on a sound financial basis. For Program activities in FY 2016 and beyond, and for operational costs, it has committed 112.94 million USD. HFSP expects to receive 53.85 million USD in MSPs' contributions for FY 2016. Together with resources from past contributions, interest and income from investments, the total amount available for FY 2016 and beyond will be over 112.94 million USD. The anticipated balance between income and expenditure should be positive and amounts to about 0.7 million USD.

> Table 4-3

Overview of HFSP0 budget for FY 2016 including all commitments for future years

INCOME		Budget 2016 m LC	Brussels IGC-USD m USD	Budget 2016 m USD <i>At budget rate</i>	EXPENDITURES		Budget 2016 m LC EUR	Budget 2016 m USD USD
1. CONTRIBUTIONS		N.A.	55.7	53.85	1. HFSP OPERATION		3.35	3.72
Australia	USD	0.76	0.76	0.76	2. PROGRAM ACTIVITIES		-	53.54
Canada	CAD	1.96	1.51	1.51	Program Grants	25	-	25.50
European Union	EUR	4.96	5.51	5.51	Young Investigators	7	-	8.50
France	EUR	2.32	2.58	2.58	Long Term Fellowships	75	-	15.95
Germany	EUR	4.62	5.13	5.13	Career Development Awards	8	-	2.90
India (not confirmed)	USD	1.05	1.05	1.05	Awardees meetings		0.25	0.28
Italy	EUR	0.94	1.04	1.04	Program meetings (RC, COS, SEL)		0.32	0.36
Japan	USD	20.71	22.20	20.71	Outreach activities - Alumni network		0.03	0.03
Korea (not confirmed)	USD	0.83	0.83	0.83	Nakasone Award		0.03	0.03
New Zealand	USD	0.14	0.14	0.14	3. NOT YET PAID AS OF 17/02/2016		-	2.92
Norway	USD	0.65	0.65	0.65	CDA		-	0.80
Singapore	USD	0.54	0.54	0.54	LT		-	0.78
Switzerland	CHF	0.92	0.92	0.92	Office costs to go for FY2015		-	1.34
United Kingdom	GBP	1.53	2.36	2.36	4. COMMITTED FUNDS BEYOND FY		-	52.04
United States of America	USD	10.54	10.54	10.13	Program Grants		-	25.50
2. INTERESTS AND CAPITAL GAIN	USD	-	-	0.25	Young Investigators		-	7.90
3. TREASURY AS OF 17/02/2106	USD	-	-	55.34	Long Term Fellowships		-	16.24
EMTN ⁽¹⁾		-	-	42.00	Career Development Awards		-	2.40
UCITS ⁽²⁾	USD	-	-	10.47	5. NEGATIVE BALANCE FROM PREVIOUS FY		-	-
Saving accounts	EUR	-	-	0.16				
Current bank accounts		-	-	2.71				
PREVIOUS FY (FR - DE - IN - KR) AS OF 17/02/16	USD	-	-	3.50				
TOTAL INCOME + ASSETS	USD	-	-	112.94				
BALANCE (NEGATIVE)	USD	-	-	0.000				
GRAND TOTAL	USD	-	-	112.94				
					TOTAL EXPENSES + COMMITTED FUNDS	-	-	112.22
					BALANCE (POSITIVE)	-	-	0.72
					GRAND TOTAL	-	-	112.94

⁽¹⁾EMTN: Euro Medium Term Notes - ⁽²⁾UCITS: Undertaking for Collective Investments in Transferable Securitie



APPENDIX

Program Highlights

- A . 1 Joint Communiqué of
the Intergovernmental Conference on
the International Human Frontier Science
Program Organization,
London, 10 June 2016

- A . 2 Summary of decisions
of the Board of Trustees in FY 2016



JOINT COMMUNIQUÉ OF THE INTERGOVERNMENTAL CONFERENCE ON THE INTERNATIONAL HUMAN FRONTIER SCIENCE PROGRAM ORGANIZATION, LONDON, 10 JUNE 2016

Representatives of the Management Supporting Parties (MSPs) of Australia, Canada, France, Germany, Italy, India, Japan, the Republic of Korea, New Zealand, Norway, Singapore, Switzerland, the United Kingdom of Great Britain and Northern Ireland, the United States of America and of the European Union met at an Intergovernmental Conference (IGC) on 10 June 2016 in London (UK) to review the progress made and discuss the future of the International Human Frontier Science Program Organization (HFSP/O).

1. Mission and added value of the Human Frontier Science Program (HFSP)

Representatives recognise that the ever-growing complexity and diversity of science makes international collaboration more imperative than ever.

Independent reviews acknowledge that HFSP/O has an impressive track record in stimulating world-class excellence in high-risk/high-impact science and career development which, because of HFSP's particular niche (small-scale, bottom-up, high-risk, interdisciplinary, intercontinental), has significant added value.

Representatives recognize that as a result of the investment made up to now, HFSP/O is uniquely positioned as a global cooperation in supporting frontier life-sciences research. Representatives acknowledge the role of Japan as the initiator of HFSP/O, its largest contributor and the cornerstone of its hitherto success and sustainability.

2. Continuation of the Human Frontier Science Program

Representatives renew their commitment to HFSP/O.

Representatives confirm the mission given to HFSP/O to promote research into the complex mechanisms of living organisms for the benefit of humankind.

Representatives confirm their aim to maintain the uniqueness of HFSP/O in supporting innovative, frontier research in the life sciences, encouraging high risk research and promoting international collaboration in the spirit of science without borders.

Representatives note the range of programs within the HFSP/O portfolio (Annex 1) and request the Board of Trustees to continue to reflect upon and consider these to ensure they continue to serve HFSP/O's mission.

Representatives acknowledge the need to ensure a sustained budget to maintain the attractiveness of HFSP, improve awarding capacity and be inclusive of fields as they emerge on the frontiers of the life sciences.

3. Finances

While representatives acknowledge and commend the leading role of Japan in supporting HFSPo for over 25 years, they also acknowledge that the time has come for greater burden-sharing to ensure that HFSP continues to make profound contributions in extending the frontiers.

Representatives accept a financial framework for their indicative contributions to HFSPo for the period 2017-2019 (Table A1-1).

Representatives recognise the urgent need to move towards the development and application of new principles for calculating financial contributions in the long-term, taking into account quantitative and/or qualitative indicators and the impact of currency issues for MSPs' contributions and income to HFSPo. Representatives encourage the Board of Trustees to seek additional resources from non MSP sources.

4. New members

Representatives are pleased to welcome Singapore, which joined the Program in 2014.

Representatives encourage the Board to promote membership in HFSPo and reconfirm its view that HFSPo is open to new members, which enable the Program to better fulfil its mission. New members are a source of scientific enrichment and an indicator of the health and excellence of the Organization.

> Table A1-1

Indicative Management Supporting Party Contributions 2017 – 2019 (In K Local Currencies)

Member supporting party	Currency of contribution	Contribution FY 2017	Contribution FY 2018	Contribution FY 2019
Japan	USD	21,043	21,043	21,043
Australia	USD	772	788	803
Canada	CAD	1,999	2,039	2,080
European Union ¹	Euro	5,057	5,158	5,261
France	Euro	2,367	2,415	2,463
Germany	Euro	4,710	4,805	4,901
India	USD	1,071	1,092	1,114
Italy	Euro	956	975	995
Korea	USD	846	863	880
New Zealand	USD	147	150	153
Norway ²	USD	658	671	685
Singapore	USD	552	563	574
Switzerland	CHF	938	957	976
United Kingdom	GBP	1,562	1,593	1,625
United States of America	USD	10,749	10,964	11,183

Notes:

The contributions from 2017 are calculated by increasing the amount in the final year (2016) of the Brussels IGC agreement (2013) and increasing this by 2% yearly. Using reference rates of 1 USD = 0.90 Euro, 1.3 CAD, 1 CHF and 0.65 GBP, this would provide HFSPo with totals of USD 55,261, 55,947 and 56,644 in 2017, 2018 and 2019 respectively. The actual total amount will vary with changes in exchange rates of these currencies against the USD.

Japan's proportional support will fall from 38% to 37% (dependent on exchange rate changes).

Financial contribution of Japan is subject to change, depending on exchange-rate fluctuations due to the yen based contributions.

¹ Financial contribution of the EU is subject to adoption of the future relevant Work Programmes under Horizon 2020 (the EU Framework Programme for Research and Innovation 2014-2020)

² Subject to confirmation by the Research Council of Norway

ANNEX 1: ACTIVITIES OF HFSP

The Board of Trustees of the International Human Frontier Science Program Organization have identified the following Programs for support for the period 2017-19.

Research Grants

Program Grants support innovative 3 year research projects involving extensive collaboration amongst small (2 to 4 member) teams of independent scientists (group leaders), working in different countries and in different disciplines. They are for investigator driven frontier research in the life sciences.

Young Investigator Grants. The same general conditions apply but these grants are reserved for teams where all team members are within 5 years of starting their first independent position (and within 10 years of receiving a Ph.D.)

Fellowships

Long-Term Fellowships. The aim of the Fellowship program is to promote the international exchange of talented early career scientists for research training in the life sciences, with priority given to applicants who will broaden their research skills by moving into a new area of study. Applicants for Long-Term Fellowships have a Ph.D. in a biological discipline.

Cross-Disciplinary Fellowships. Applicants for a Cross-Disciplinary Fellowship have a Ph.D. from outside the life sciences (e.g. in physics, chemistry, mathematics, engineering, computer sciences, etc.)

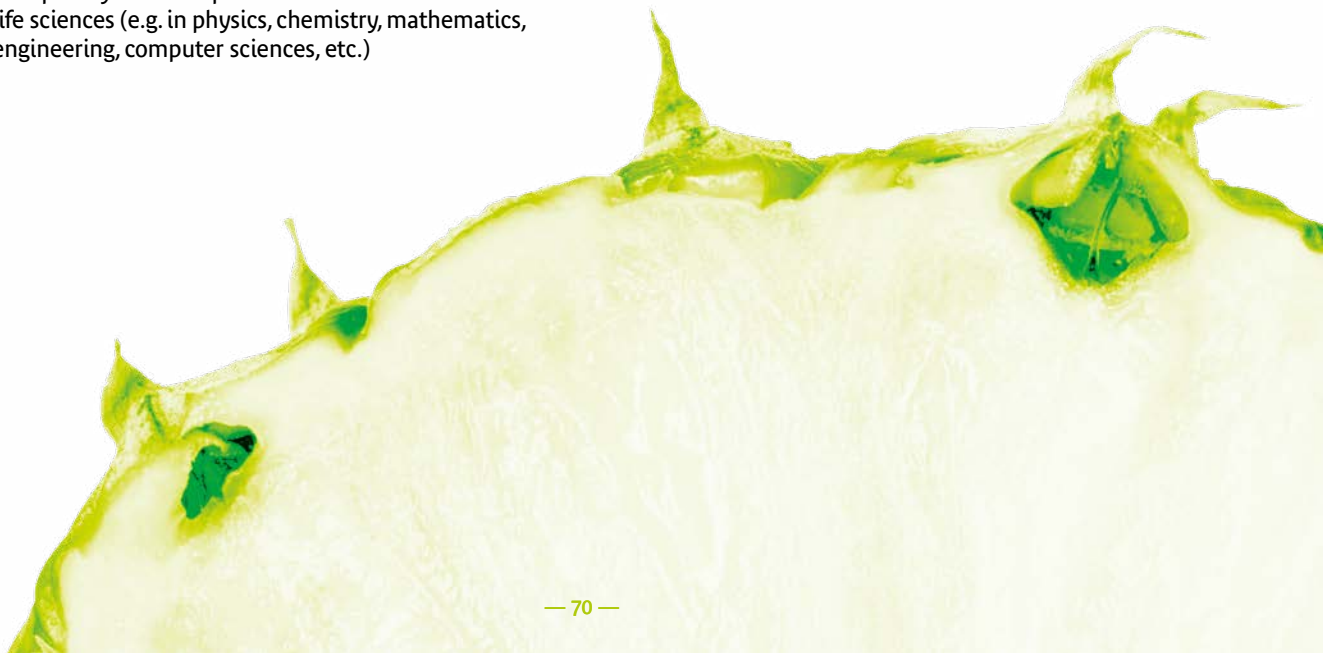
Career Development Awards

The CDA program was designed to be a tool to facilitate repatriation of HFSP postdoctoral fellows and help them set up their first independent laboratory at a vulnerable career stage. The award can be held either in the fellow's home country, their spouse's home country or in any HFSP member country. The value of the award is 300,000 USD over three years. The Career Development Award is under review by the Board of Trustees.

Nakasone Award

The Nakasone Award is made to scientists who have undertaken frontier-moving research in biology, encompassing conceptual, experimental or technological breakthroughs. The Award recognises the vision of former Prime Minister Nakasone of Japan in the creation of HFSP.

Based on current policies and assumptions, the Board of Trustees estimated that these contributions will be able to support 32 Research Grants, 75 Long Term Fellowships, and 8 Career Development Awards. In 2016, the Board supported 32, 75 and 8 awards respectively.





SUMMARY OF DECISIONS OF THE BOARD OF TRUSTEES IN FY 2015

50th Board meeting (March 2016)

- The Board unanimously approved the following awards for FY2016:
 - 32 Research Grants (25 Program Grants and 7 Young Investigator Grants, with 1 additional Program Grant, if funds permit).
 - 75 Fellowships (69 Long-Term Fellowships, with a reserve list of 15, and 6 Cross-Disciplinary Fellowships, with a reserve list of 2).
 - 8 Career Development Awards, with a reserve list of 3.
- The Board approved the continuation of the CDA Review Committee as the body responsible for the review of applications on an ongoing basis.
- The Board unanimously agreed to discuss proposed changes to the HFSP O Statutes and Bylaws and to finalise changes where necessary at a Board meeting in October 2016.
- The Board unanimously agreed to require the Secretariat to finalise a risk management framework as soon as possible for the Board's consideration and approval.
- The Board unanimously agreed to develop a triennial Strategic Plan for the period 2017-2019, providing feedback on the outline at the October 2016 meeting.
- The Board agreed to further consider the question of the participation of non MSPs in HFSP programs and to actively seek new members with strong scientific capacity.
- The accounts for FY 2014, as presented by the external auditor, were unanimously approved.
- The Board discussed and unanimously approved the budget and Program activity plan for 2016.
- The Board approved the updating of the Prudential Rules.
- The Board provided advice to the Secretary General on the issues presented aimed at restraining and reducing administrative costs.
- The Board approved the revised conditions and call for nominations of the HFSP Nakasone Award.
- The Board unanimously elected Jane Silverthorne as Vice President.





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France
Strasbourg Eurométropole
Ministère de l'Enseignement Supérieur et de la Recherche (MESR)
Région Alsace



Germany
Federal Ministry of Education and Research (BMBF)



India
Ministry of Science and Technology, Government of India



Italy
Ministry of Education, University and Research



Japan
Ministry of Economy, Trade and Industry (METI)
Ministry of Education, Culture, Sports, Science and Technology (MEXT)



Republic of Korea
Ministry of Science, ICT and Future Planning (MSIP)



New Zealand
Health Research Council of New Zealand (HRC)



Norway
Research Council of Norway (RCN)



Singapore
National Research Foundation of Singapore (NRF)



Switzerland
State Secretariat for Education, Research and Innovation (SERI)



United Kingdom
Biotechnology and Biological Sciences Research Council (BBSRC)
Medical Research Council (MRC)



United States of America
National Institutes of Health (NIH)
National Science Foundation (NSF)



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