

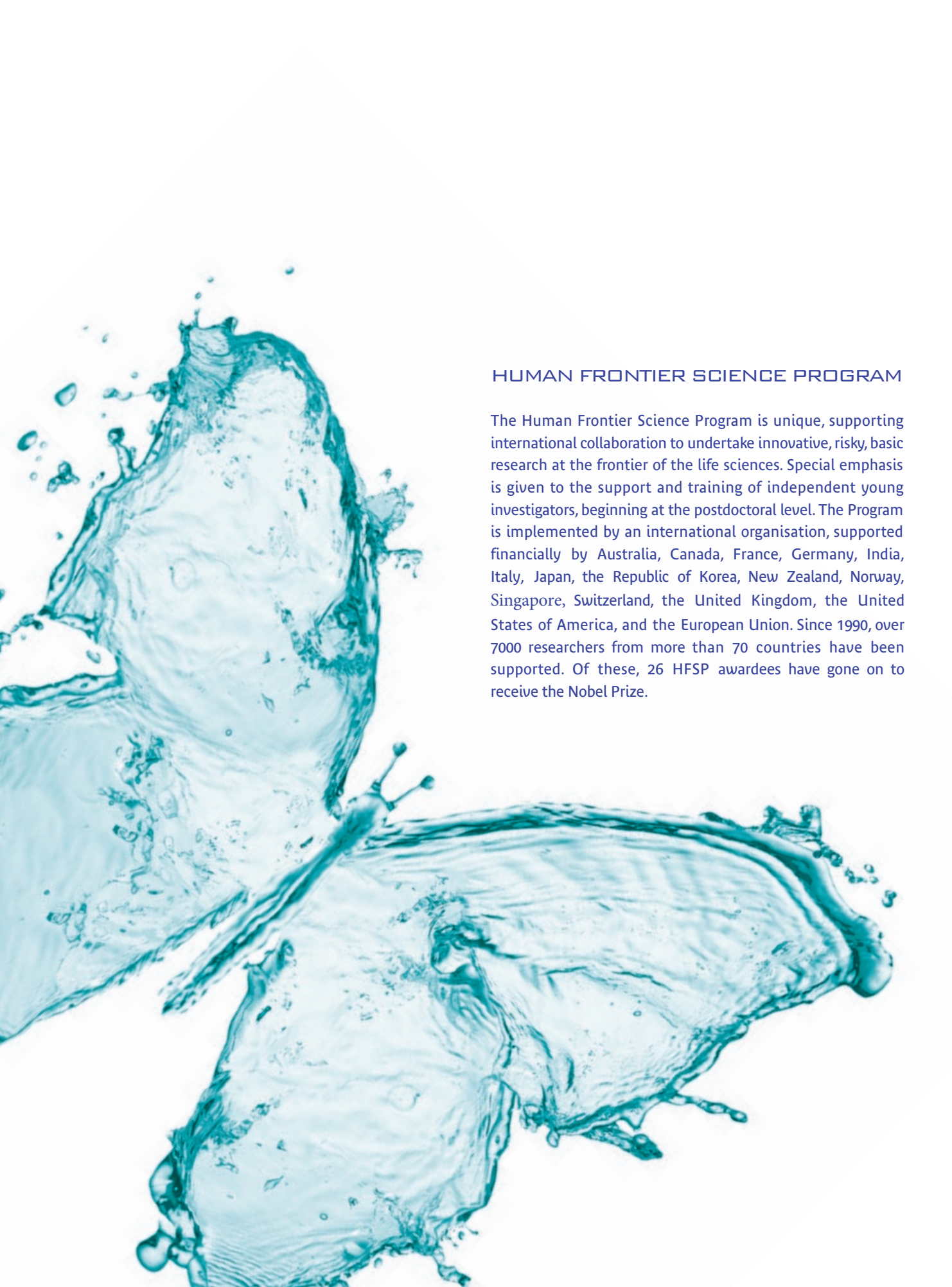


APRIL 2016 - MARCH 2017

# ANNUAL REPORT FY 2016



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 organisation, 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 researchers from more than 70 countries have been supported. Of these, 26 HFSP awardees have gone on to receive the Nobel Prize.



APRIL 2016 - MARCH 2017

# ANNUAL REPORT



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The following documents are available on the HFSP website  
**[www.hfsp.org](http://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:  
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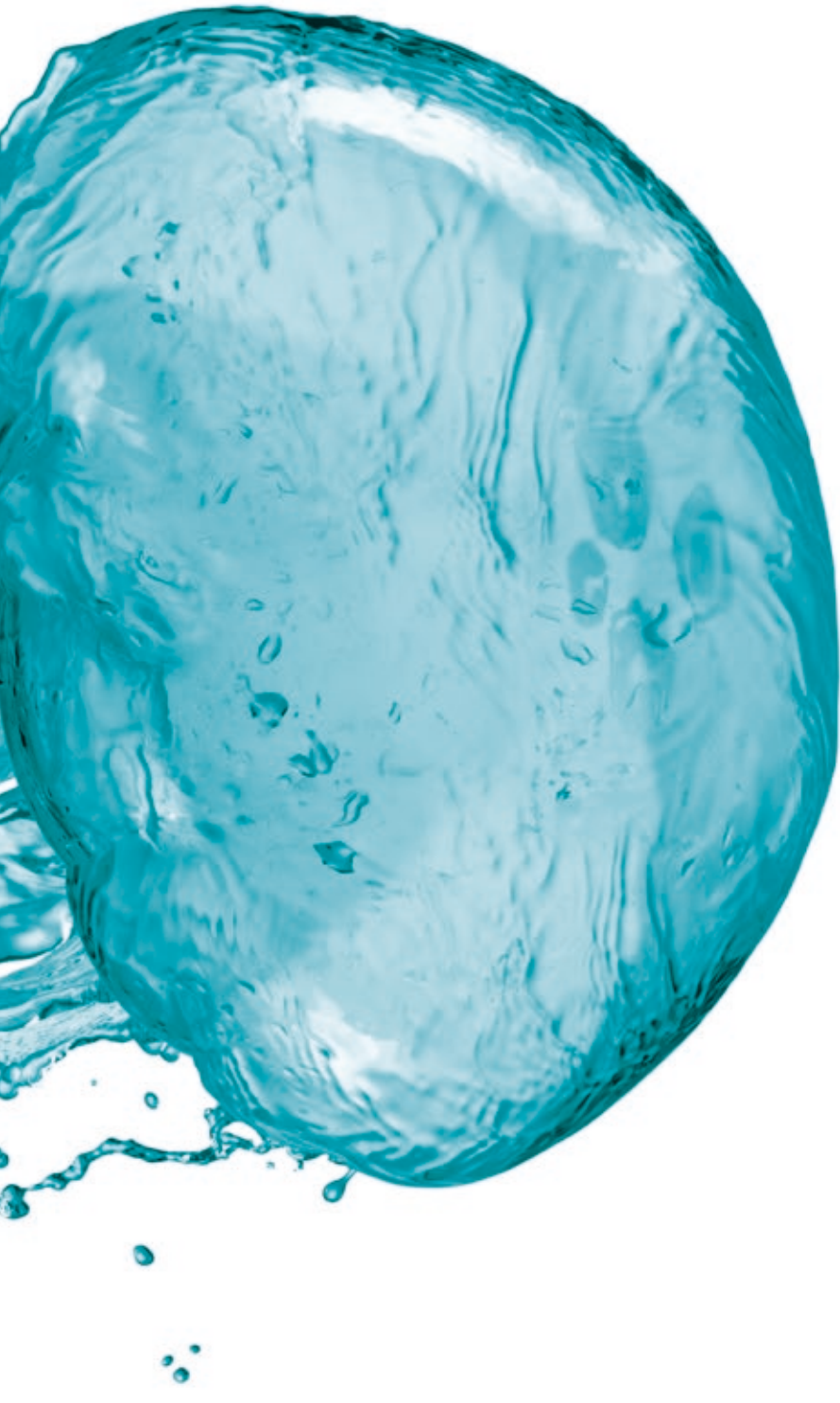
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# INTRODUCTION



## Introduction

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# 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 life scientists within three years of obtaining their Ph. D. who wish to broaden their scientific experience in a foreign laboratory.
- **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.
- **Cross-Disciplinary Fellowships** – specifically for scientists with a Ph. D. in non-biological disciplines who seek training in the life sciences.
- **Young Investigator Grants** – 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, 1059 Research Grants involving 3902 scientists have been awarded. During the same period HFSP funded 3079 Fellowships and, since 2003, 220 Career Development Awards. Researchers from more than 70 countries have received HFSP funding so far.

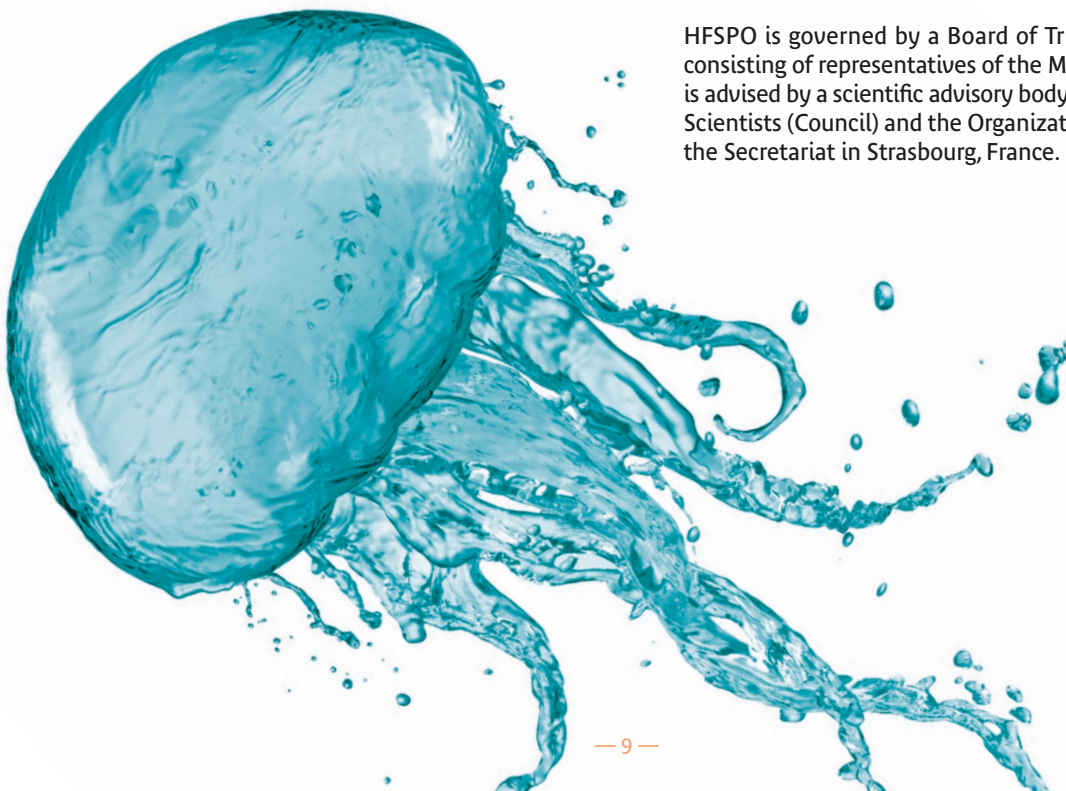
The focus of research supported by HFSP is on the complex mechanisms of living organisms, ranging from the biomolecular level to that of behaving organisms. The life sciences have emerged as a leading scientific area with a convergence of interest from other disciplines such as physics, mathematics, chemistry, computer science and engineering on solving biological questions. HFSP aims to support frontier 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 2016.

*(Note: Statutes definition of HFSP Membership undergoing revision).*

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

## Annual Report



**Warwick ANDERSON**

*Secretary General of HFSP*

The founders of the International Human Frontier Science Organization, the G7 nations, had the vision of bringing scientists together from around the world to work at the frontier of knowledge in the life sciences. In short, they created “life science without borders”.

More than 25 years later, the original seven countries – Canada, France, Germany, Italy, Japan, UK and USA, together with the EU – were joined by most of the other leading scientific countries in the world, including Australia, India, the Republic of Korea, New Zealand, Norway, Singapore and Switzerland. These all contribute to a pool of over 50 million USD per year, to fund research that extends the frontier of knowledge, that changes paradigms in the life sciences, that opens up novel approaches to problems and that develops the most outstanding and ambitious postdoctoral researchers. These are the benefits to humankind that HFSP aims to deliver.

That said, many applied benefits have flowed from the basic research that has been HFSP’s mission for 27 years. Some of these are summarised elsewhere in this Annual Report. Just to take two examples:

- HFSP supported a basic science project by Andrew McMahon, Clifford Tabin and Philip Ingham in 1993, to unravel the regulation of gene expression patterns during vertebrate brain development, particularly whether the signalling molecule hedgehog found in the fruit-fly was also important in vertebrates. The unexpected findings of that project have led to a new drug to treat common skin cancer of basal cell carcinoma.
- Duncan J. Irschick and Alfred Crosby from UMass Amherst, USA, and Walter Federle, University of Cambridge, UK, were awarded an HFSP Research Grant in 2012, to investigate which kind of adhesive mechanisms animals, such as geckos, use when climbing smooth surfaces. This team is now developing new and better adhesives based on the principles learned from this research; for example small patch-like adhesives that can hold amazing loads and stick to even smooth surfaces.

Some of the other benefits that result from HFSP funded research include new collaborations worldwide by top scientists in order to tackle visionary projects, ones where the applicants believe that if successful, major leaps forward in understanding life will be made. Our funded investigators report to us that these collaborations are usually enduring and sometimes the team establishes a new field pioneered by support of the initial HFSP grant.



HFSPo also funds around 80 new postdoctoral fellows each year. These are highly promising emerging scientists who want to extend themselves intellectually and take on big challenges by undertaking research in the top international laboratories anywhere in the world. The scheme for Cross-Disciplinary Fellows is unique; it supports postdocs from physics, chemistry, computer science or mathematics who wish to carry out research in the life sciences, bringing their skills and different approaches to bear on their projects. It takes ambitious young scientists to make this leap in the early stage of their career and HFSPo is proud of the success of this scheme.

HFSPo can also play other leadership roles in life science. For example in 2016, we hosted a meeting on the issues facing the essential data resources for basic research. A coalition of interested parties has been formed towards implementing a sustainable, global solution.

Scientific research is now and has been always a truly international endeavour. HFSPo is proud of the role it plays as the only global funder in life science. In the last decade for example, scientists from over 70 countries have been supported by HFSPo.

The founders of HFSPo and those who have joined in support of this unique body can be proud of the achievements of this organization over more than a quarter of a century. Life science research is among the most dynamic, exciting and important areas of human endeavour. HFSPo marshals life scientists across the entire world to break through current frontier barriers, for the benefit of all humankind.



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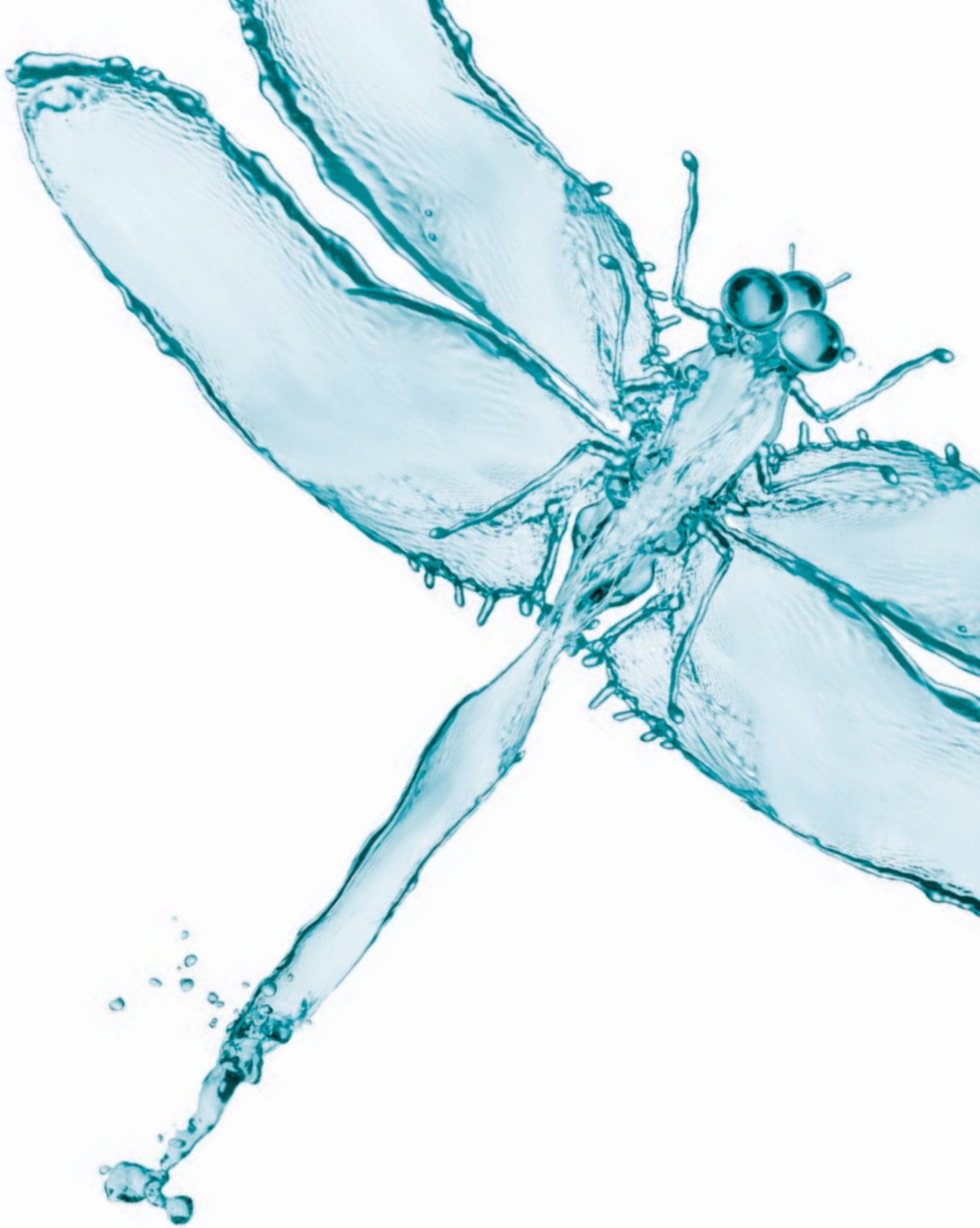
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*Left to right: Warwick ANDERSON, Jill HUSSER and Hideki MIZUMA*



# CHAPTER



## Fellowship Program



Left to right: Carine SCHMITT, Barbara PAULY,  
Marie-Claude PERDIGUES

- 1.1 Fellowship Awards in 2017
- 1.2 The 2017 Fellowship Review Committee
- 1.3 Long-Term and Cross-Disciplinary  
Fellowships awarded in March 2016
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- 1.5 The 2017 CDA Review Committee
- 1.6 Career Development Awards  
in March 2016

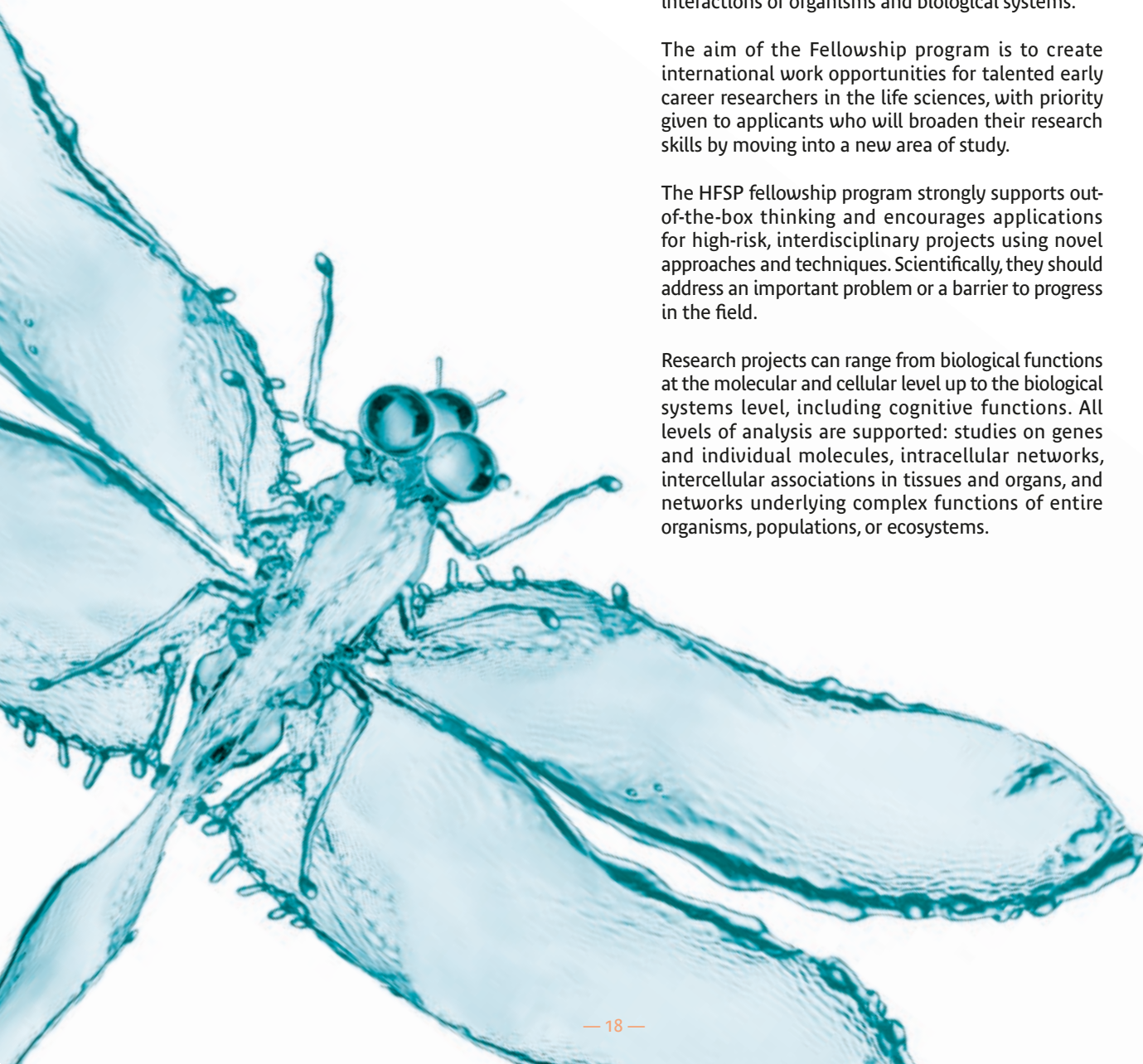
# LONG-TERM FELLOWSHIPS

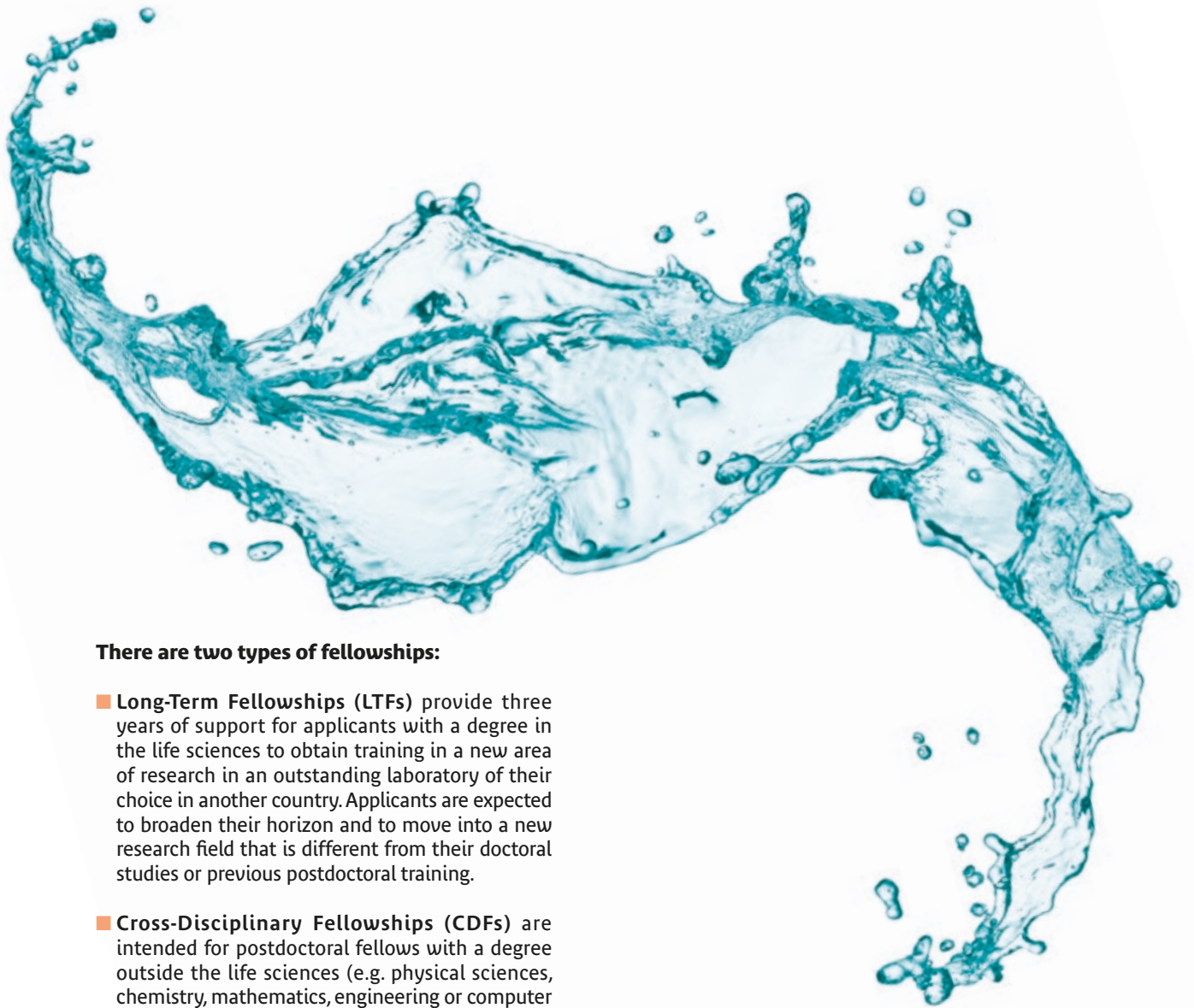
In recent years and with advanced technologies, biological research has become increasingly complex and quantitative. It is clear that complex problems can no longer be solved by one approach or one discipline alone. Instead, collaborations of biologists, (bio)physicists, chemists, computer scientists, engineers, and mathematicians are needed. Such collaborations have led to new approaches for understanding the complex structures and regulatory networks that characterize the evolution and interactions of organisms and biological systems.

The aim of the Fellowship program is to create international work opportunities for talented early career researchers in the life sciences, with priority given to applicants who will broaden their research skills by moving into a new area of study.

The HFSP fellowship program strongly supports out-of-the-box thinking and encourages applications for high-risk, interdisciplinary projects using novel approaches and techniques. Scientifically, they should address an important problem or a barrier to progress in the field.

Research projects can range from biological functions at the molecular and cellular level up to the biological systems level, including cognitive functions. All levels of analysis are supported: studies on genes and individual molecules, intracellular networks, intercellular associations in tissues and organs, and networks underlying complex functions of entire organisms, populations, or ecosystems.

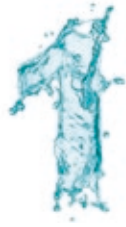




**There are two types of fellowships:**

- **Long-Term Fellowships (LTFs)** provide three years of support for applicants with a degree in the life sciences to obtain training in a new area of research in an outstanding laboratory of their choice in another country. Applicants are expected to broaden their horizon and to move into a new research field that is different from their doctoral studies or previous postdoctoral training.
- **Cross-Disciplinary Fellowships (CDFs)** are intended for postdoctoral fellows with a degree outside the life sciences (e.g. physical sciences, chemistry, mathematics, engineering or computer sciences) who wish to receive training in biology. As for the LTF, CDF awardees receive three years of support to obtain training in a laboratory of their choice in another country. Applicants for this fellowship are expected to move into a new research field through a significant change in discipline.

The fellowships provide an annual living allowance as well as a research and travel allowance. Both types of fellowships are flexible; for example, awardees can defer the third year of their fellowship for up to two years and can also use the third year in a different country or in their home country. At the end of the fellowship, the awardees can request a 6-month no-cost extension to spend any remaining funds in their host lab. At HFSP we believe that such flexibility is crucial for allowing fellows to make the most of their postdoctoral training. Fellows with children qualify for a child allowance and fellows who have a child during the fellowship can take up to three months of paid parental leave.



# 1

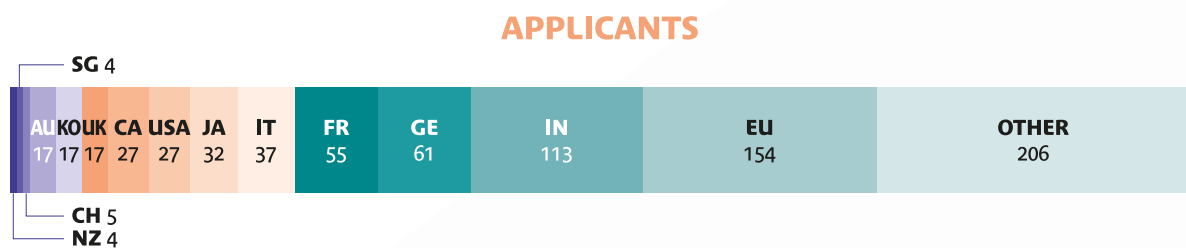
## FELLOWSHIP AWARDS IN 2017

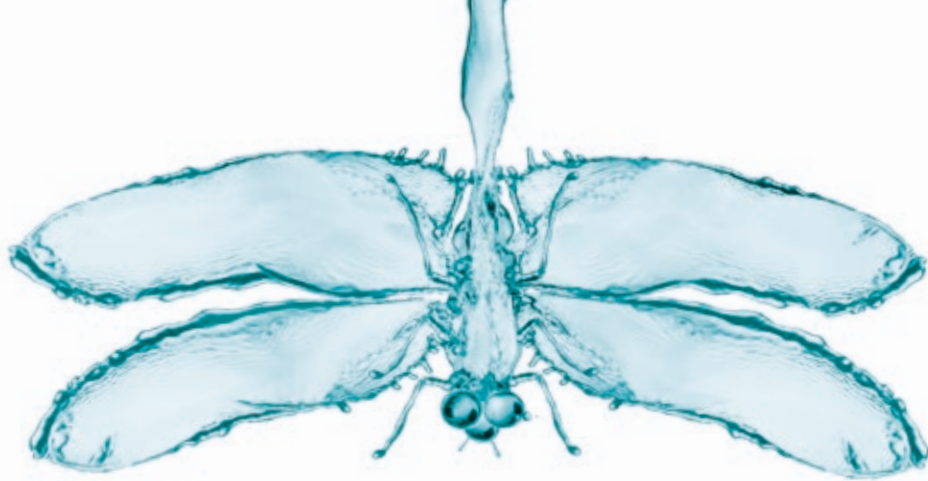
The HFSP Fellowship program is distinct from similar programs supporting postdoctoral researchers during an international exchange.

The competition in FY 2017 was dominated by applicants from non member countries (Figure 1.1) followed by candidates from Europe, India, Germany

and France. In total there were 928 applications submitted for the most recent fellowship competition.

> Figure 1.1  
Nationality of fellowship applicants in 2017





In March 2017, HFSP announced the next cohort of HFSP Fellowship awards. There were applications from 61 nationalities, and fellowships were awarded to scientists of 27 different nationalities (see Table 1.1).

In the category for the Long-Term Fellowships, 74 young researchers were awarded the precious funding and 11 new awards will support Cross-Disciplinary Fellows.

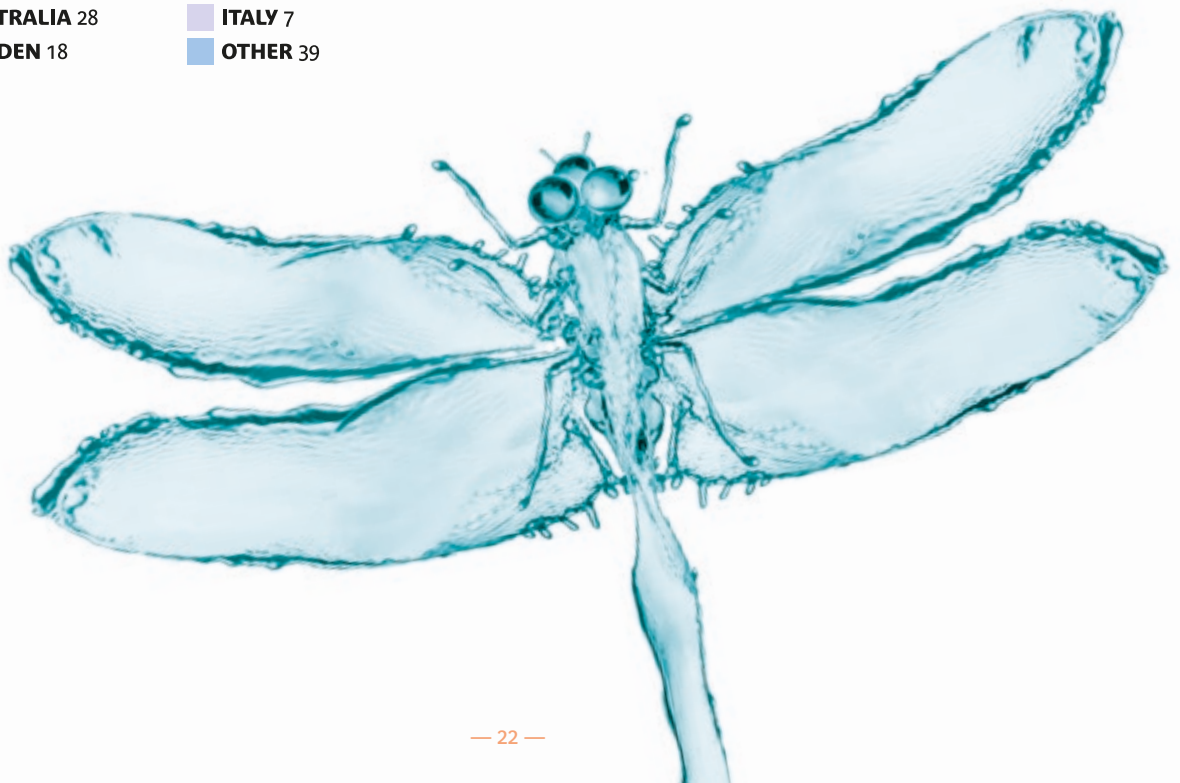
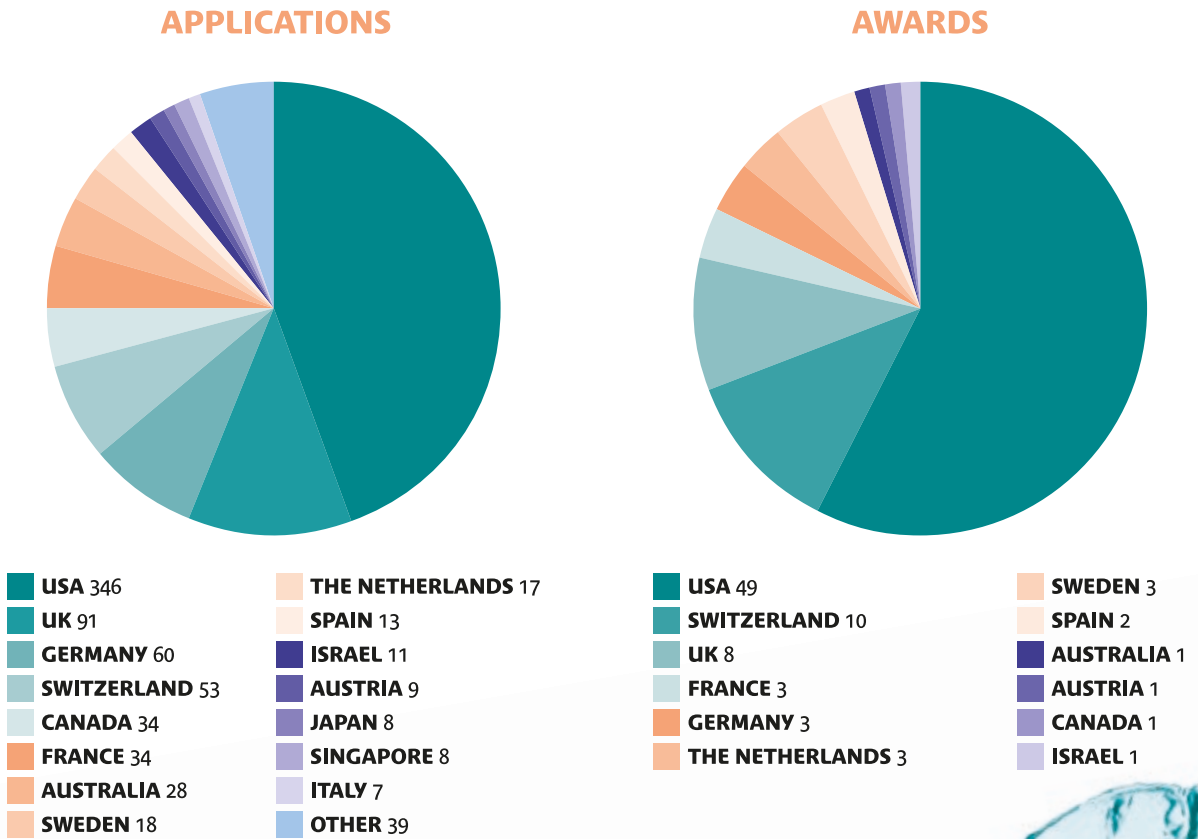
> **Table 1.1**  
Nationalities of Long-Term (LTF) and Cross-Disciplinary (CDF) applicants and awardees for FY 2017

Nationality	LTF applicants	LTF awardees	CDF applicants	CDF awardees	Total awardees
Australia	16	2	1	-	2
Canada	27	4	-	-	4
EU	144	11	10	4	15
France	50	3	5	1	4
Germany	56	9	5	-	9
India	100	5	13	1	6
Italy	33	3	4	-	3
Japan	32	4	-	-	4
Korea	17	2	-	-	2
New Zealand	3	-	1	-	-
Singapore	4	1	-	-	1
Switzerland	4	-	1	1	1
UK	16	2	1	-	2
USA	25	1	2	-	1
Other*	192	27	14	4	31
<b>TOTAL</b>	<b>719</b>	<b>74</b>	<b>57</b>	<b>11</b>	<b>85</b>

\*Other: non-HFSP countries

HFSP fellows chose host labs in a wide range of countries. Since 1990, HFSP fellows have been hosted in 22 countries. This year 28 host countries were proposed and awards were recommended in 12 countries with more than half going to labs in the USA (Figure 1.2).

> **Figure 1.2**  
Host country of Long-Term and Cross-Disciplinary Fellowship applicants and awardees in FY 2017





Anjon AUDHYA

*Chair of the Fellowship  
Review Committee*



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Medical Research, Melbourne, Australia



## LONG-TERM AND CROSS-DISCIPLINARY FELLOWSHIPS AWARDED IN MARCH 2016

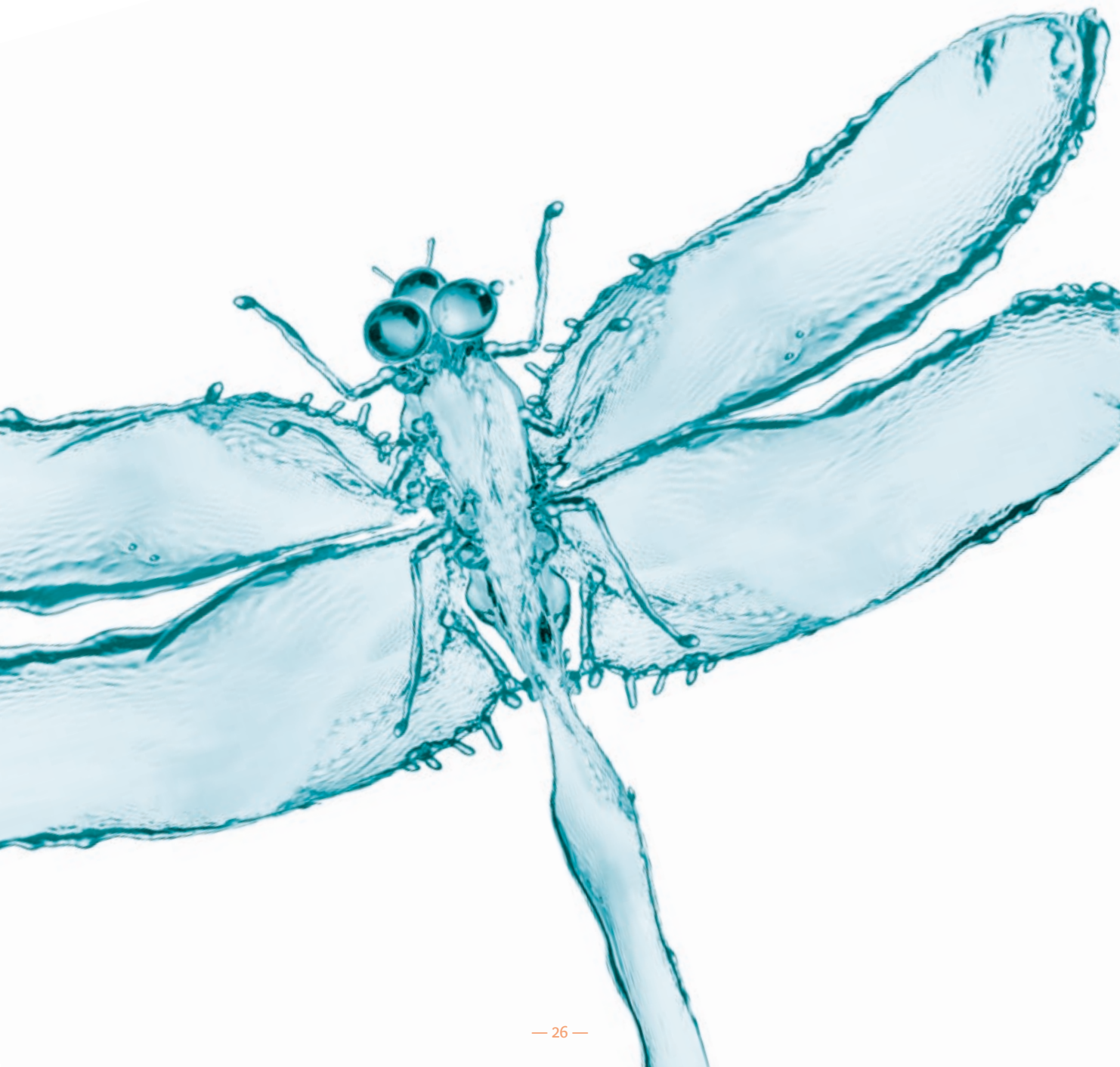
### 1. Long-Term Fellowships

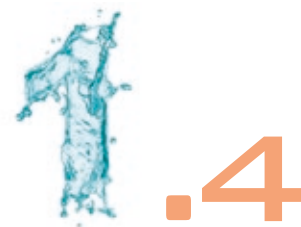
Name	Nationality	Host institute	Host country
AHLQVIST Kati	FINLAND	University of Texas Southwestern Medical Center, Dallas	USA
AVINER Ranen	ISRAEL	Stanford University	USA
BAHL Armin	GERMANY	Harvard University, Cambridge	USA
BARANOVA Natalia	UKRAINE	IST Austria, Klosterneuburg	AUSTRIA
BAUER Benedikt	GERMANY	IMP, Vienna	AUSTRIA
BLOOM-ACKERMANN Zohar	ISRAEL/USA	Broad Institute of MIT and Harvard, Cambridge	USA
BOTELHO Joao Francisco	BRAZIL	Yale University, New Haven	USA
CHABAUD Melanie	FRANCE	University of New South Wales, Sydney	AUSTRALIA
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HASLINGER Kristina	GERMANY	MIT, Cambridge	USA
HOVESTADT Volker	GERMANY	Harvard Medical School, Boston	USA
HSU Fosheng	TAIWAN/USA	MPI of Molecular Cell Biology and Genetics, Dresden	GERMANY
HUSTEDT Nicole	GERMANY	Mount Sinai Hospital, Toronto	CANADA
HWANG Ara	KOREA/USA	UC San Francisco	USA
KARASOV Talia	USA	MPI for Developmental Biology, Tübingen	GERMANY
KARIGO Tomomi	JAPAN	Caltech, Pasadena	USA
KEPTEN Eldad	ISRAEL	Institut Curie, Paris	FRANCE

<b>Name</b>	<b>Nationality</b>	<b>Host institute</b>	<b>Host country</b>
KÖBERLIN Marielle	GERMANY	Stanford University	USA
KUZUOGLU OZTURK Duygu	TURKEY	UC San Francisco	USA
LAUMER Christopher	USA	EMBL / European Bioinformatics Institute, Hinxton	UK
LEVENTHAL Gabriel	SWITZERLAND/USA	MIT, Cambridge	USA
LEVO Michal	ISRAEL	Princeton University	USA
LU Li	CHINA	Baylor College of Medicine, Houston	USA
LUO Jinhong	CHINA	Johns Hopkins University, Baltimore	USA
MACULINS Timurs	LATVIA/UK	Goethe University, Frankfurt	GERMANY
MILOVANOVIC Dragomir	SERBIA	Yale University, New Haven	USA
MOK Sachel	SINGAPORE	Columbia University, New York	USA
MUNJAL Akankshi	INDIA	Harvard Medical School, Boston	USA
MUNZ Martin	GERMANY	FMI, Basel	SWITZERLAND
NAGANATHAN Sundar	INDIA	UCL and The Francis Crick Institute, London	UK
OBATA Yuuki	JAPAN	The Francis Crick Institute, London	UK
OKUDA Satohiro	JAPAN	University of Geneva	SWITZERLAND
PARDI Maria Belen	ARGENTINA/ITALY	MPI for Brain Research, Frankfurt	GERMANY
PARTHASARATHY Srinivas	INDIA	Stanford University School of Medicine	USA
PETERS Andrew	USA	University College London	UK
PLESA Calin	CANADA/ROMANIA	UC Los Angeles	USA
POPOVIC Doris	CROATIA	University of Zurich	SWITZERLAND
SAAVEDRA Pedro	PORTUGAL	Harvard Medical School, Boston	USA
SAKA Sinem	TURKEY	Harvard Medical School, Boston	USA
SCHUBERT Olga	SWITZERLAND	UC Los Angeles	USA
SCOTT Niv	ISRAEL	Salk Institute for Biological Studies, San Diego	USA
SERRA MARQUES Andrea	PORTUGAL	UC San Francisco	USA
SIDDLE Katherine	UK	Harvard University, Cambridge	USA
SRIVATSA Swathi	INDIA	Harvard Medical School, Boston	USA
SYMMONS Orsolya	HUNGARY/UK	University of Pennsylvania, Philadelphia	USA
THACKER Vivek	INDIA	EPFL, Lausanne	SWITZERLAND
TODA Satoshi	JAPAN	UC San Francisco	USA
TSUTSUMI Naotaka	JAPAN	Stanford University	USA
VOGT Merly	GERMANY	Columbia University, New York	USA
WAGENBLAST Elvin	GERMANY	University Health Network, Toronto	CANADA
WEICK Eva-Maria	GERMANY	Memorial Sloan Kettering Cancer Center, New York	USA
WUESEKE Oliver	GERMANY	IMBA, Vienna	AUSTRIA
XU Chengchao	CHINA	MIT, Boston	USA
XU Fang	CHINA	Cold Spring Harbor Laboratory	USA
XUE Jian	CHINA	MIT, Boston	USA
YEE Callista	CANADA	Stanford University	USA
ZHAO Hongtu	CHINA	Rockefeller University, New York	USA

## 2. Cross-Disciplinary Fellowships

<b>Name</b>	<b>Nationality</b>	<b>Host institute</b>	<b>Host country</b>
GOKHALE Shreyas	INDIA	MIT, Cambridge	USA
JUFFMANN Thomas	AUSTRIA	Université Pierre et Marie Curie, Paris	FRANCE
MARESCA David	FRANCE	Caltech, Pasadena	USA
SAPERS Haley	CANADA	California Institute of Technology, Pasadena	USA
SCHWARTZ Osip	ISRAEL/RUSSIA	UC Berkeley	USA
TAYLOR Michael	NEW ZEALAND	IMP, Vienna	AUSTRIA





## CAREER DEVELOPMENT AWARDS IN 2017

The Career Development Award (CDA) program strengthens the global network of frontier-style researchers and complements the postdoctoral fellowship. It provides former HFSP fellows (Long-Term and Cross-Disciplinary Fellowship holders) with start-up money to establish and operate their first independent laboratory. The three-year award provides 300 000 USD in support during a critical period of early career development, in which the awardees change from a mentored to an independent position. It is usual for the host institution to provide further support to these outstanding scientists.

The funds made available through the CDA program are flexible and the CDA holder is able to use the funds to achieve the best outcomes for their particular research. Typically, they are used for a mix of coverage of the costs of research associated with the laboratory of the applicant (e.g., salaries of students and postdocs, equipment and reagents, conferences, etc.).

The CDA program was launched in 2003. Since then 766 applications have been submitted, proposing to hold the award in 33 different countries. There have been 220 award recipients.

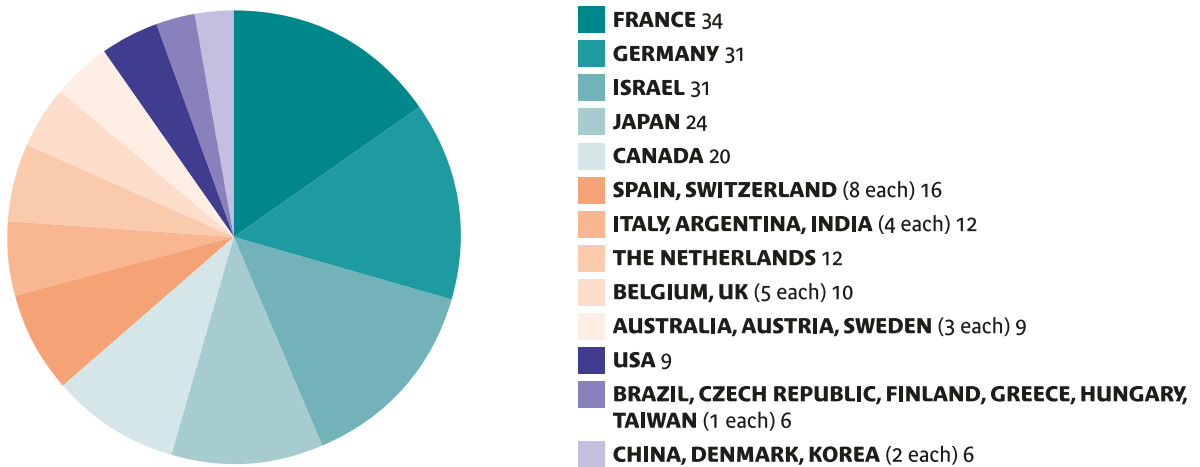
> Table 1.4.1  
The number of applicants, awardees and the success rates for the HFSP Career Development Award since 2003

Award year	Number of applications	Number of awards	Success rate (%)	Female awardees (%)
2003	22	8	37	0
2004	41	17	42	29
2005	47	18	38	11
2006	51	29	57	21
2007	48	24	50	25
2008	57	20	35	25
2009	49	24	49	8
2010	47	16	34	13
2011	40	9	23	11
2012	55	8	15	25
2013	66	8	12	13
2014	62	13	21	31
2015	63	8	13	25
2016	57	8	14	25
2017	61	10	16	30
<b>TOTAL</b>	766	220	29	20

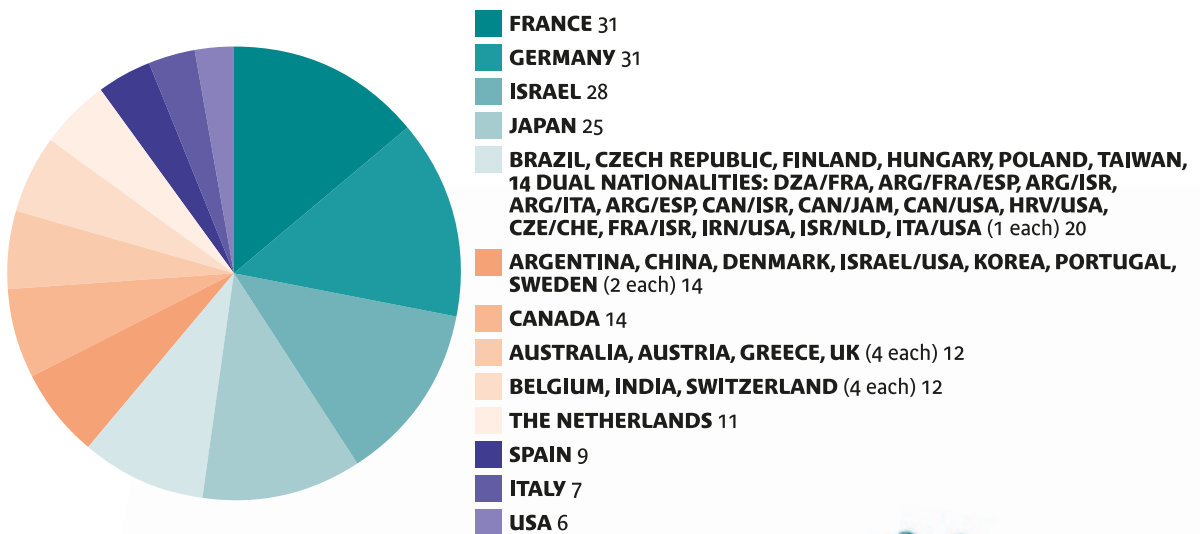
In 2017, out of the 61 submitted applications, a total of 10 were selected for funding and their laboratories are located in Argentina, France Germany, India, Japan, the Netherlands, Sweden, the UK and the

USA (the complete list of awards is available at [www.hfsp.org](http://www.hfsp.org)). HFSP has seeded new faculty in many different countries since the inception of this program (see Figure 1.4.1)

> **Figure 1.4.1**  
Host countries for Career Development Awards from 2003-2017

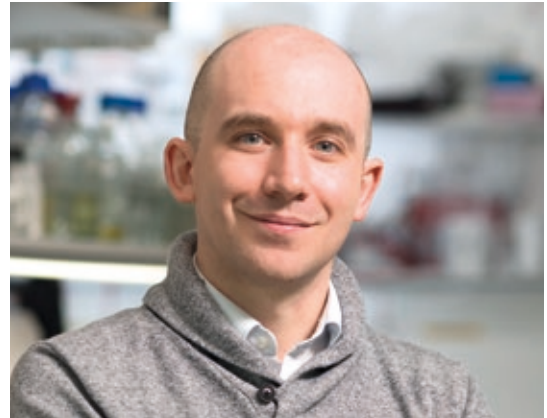


> **Figure 1.4.2**  
Nationalities of the applicants for Career Development Awards from 2003-2017

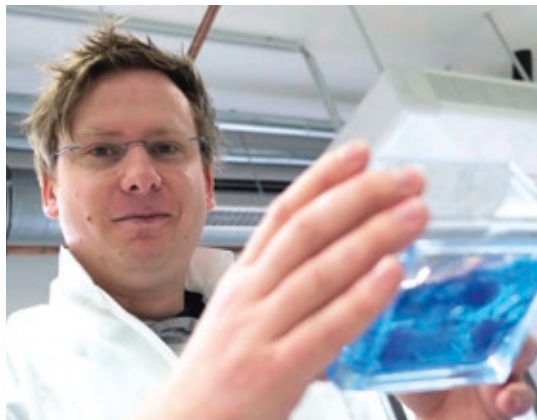


Below, some of the 2017 awardees describe their research, reflecting the breath of the research funded by the CDA program.

The group of Emmanuel DERIVERY aims at reconstituting asymmetric cell division in non-polarized, symmetrically dividing cells. Strategically, this project capitalizes on the physical understanding of the system coupled to novel assays to reshape the cytoskeleton in space and time during division. The output of this project will challenge our current view of asymmetric cell division and may pave the way towards restoring asymmetric cell fate in situations where it has been lost, such as tumorigenesis or ageing. <http://www2.mrc-lmb.cam.ac.uk/group-leaders/a-to-g/emmanuel-derivery/>



Emmanuel DERIVERY



Peter BIELING

Using a reconstitution approach, HFSP fellow Peter BIELING wants to learn more about the molecular mechanisms that control cellular shape and movement through the actin cytoskeleton and the underlying polarization of the signaling molecules that regulate its assembly. This work has the potential to advance our understanding of the mechanistic basis of cell polarity and morphogenesis at the systems biochemistry level.

<http://www.mpi-dortmund.mpg.de/research-groups/bieling>

By identifying the genes that drive cells to change their cell division program HFSP fellow Matilde GALLI and her team investigate how cells are programmed to become polyploid in the nematode *Caenorhabditis elegans*. In addition, the work will study the physiological importance of polyploidization and the functional differences between endomitosis and endoreplication, two cell cycle variations that give rise to polyploid cells.



Matilde GALLI



**Marja TIMMERMANS**

*Chair of the Career Development Award Review Committee*

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**Delegate from the Council of Scientists**

**Allan HERBISON,**  
University of Otago, Dunedin, New Zealand





## CAREER DEVELOPMENT AWARDS IN MARCH 2016

<b>Name</b>	<b>Nationality</b>	<b>Institute of CDA</b>	<b>Country of CDA</b>
BIENKO Marzena Magda	POLAND	Karolinska Institute, Stockholm	SWEDEN
DASGUPTA Shamik	INDIA	Tata Institute of Fundamental Research, Mumbai	INDIA
FAKHRI Nikta	IRAN/USA	Massachusetts Institute of Technology, Cambridge	USA
JACOBS Frank	THE NETHERLANDS	University of Amsterdam	THE NETHERLANDS
JOSHUA Mati	ISRAEL/USA	The Hebrew University, Jerusalem	ISRAEL
PAPENFORT Kai	GERMANY	Ludwig-Maximilians University, Munich	GERMANY
RINKEVICH Yuval	ISRAEL	Helmholtz Zentrum, Munich	GERMANY
SHULMAN Ziv	ISRAEL	The Weizmann Institute of Science, Rehovot	ISRAEL





# CHAPTER



# Research Grant Program



Left to right: **Geoffrey RICHARDS**, **Armelle KOUKOU**  
and **Carole ASNAGHI**

- 2.1 Funding frontier research
- 2.2 Frontier projects in award year 2017
- 2.3 Further observations  
from the 2017 review cycle
- 2.4 Media snippets following the release of  
the 2017 HFSP Research Grants
- 2.5 The 2017 Review Committee  
for Research Grants
- 2.6 Research Grants awarded in 2016



## 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.

Teams are expected to propose projects involving, through their collaboration, innovative combinations of expertise. 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 (microscopy, protein labelling, transgenic models, computational programs etc.) which soon becomes widely available after its first appearance in the HFSP competition. Recent examples would be CRISPR technology or super-resolution microscopy in living cells which is an element in an increasing number of projects. A project considered frontier one year, because of a novel combination of expertise, may be considered routine a couple of years later. Indeed in the absence of technological breakthroughs, research fields may stagnate for a year or two while teams concentrate on exploiting the last wave of innovation. Projects from such teams may well be high quality science destined for major journals, but will be considered standard in HFSP terms.

Out of the total of 1073 letters of intent submitted in March 2016 (Tab. 2.1.), the HFSP Board of Trustees approved 30 awards of which 9 went to Young Investigator teams and 21 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 and awards approved for the 2017 HFSP Research Grants for the two program categories of Program Grants and Young Investigator Grants.

	Program Grants	Young Investigators	Total
<b>Number of letters of intent</b>	858*	215	1073*
<b>Number of full applications</b>	60	16	76
<b>Number of awards</b>	21	9	30
<b>% of awarded grants, based on letters of intent</b>	2.4	4.2	2.8
<b>% of awarded grants, based on full applications</b>	35	56.2	39.5

\* 2 ineligible



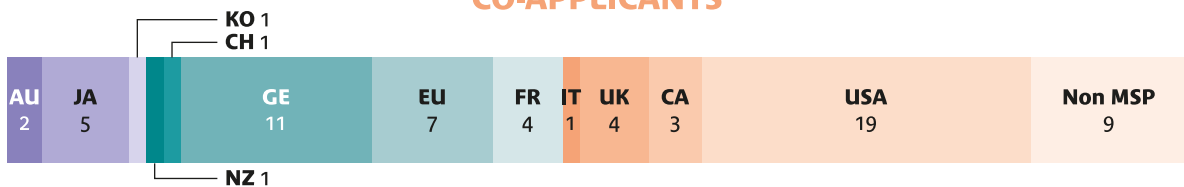
> Figure 2.1

Countries in which awardees are working. EU Awarded (Denmark 1, The Netherlands 3, Austria 1, Poland 1, Spain 4, and Sweden 2). Non MSP Awarded (Brazil 1, China, Hong Kong 1, Israel 5, Mexico 1, South Africa 1).

### PRINCIPAL APPLICANTS



### CO-APPLICANTS





## FRONTIER PROJECTS IN AWARD YEAR 2017

The top 5 research grants dealt with a broad range of topics ranging from the evolution of cooperation in mammalian societies, high-resolution imaging of biological molecules, rebuilding a ribo-organism, developmental studies on proteostasis and adaptive immunity to viruses.

### ■ Phenotypic transitions in cooperative societies: an evolutionary and molecular approach

The aim is to leverage cutting-edge genomic and shape analysis methods to study the evolution of mammalian cooperative societies, using the meerkat as a model system. Current approaches to studying vertebrate cooperative behavior work in the classical, but mechanism-free, frameworks of behavioral ecology and life history theory. Thus, while the evolution of cooperation is of long-standing interest, we know little about how animals that occupy distinct roles in cooperative societies differ at the molecular level. The methods required for these analyses either do not exist or will need to be generalized to field studies for the first time. The study requires collaboration across behavioral ecology, genomics, immunology, and computational image analysis.

### ■ Novel method for high-resolution imaging of single biological molecules

The X-ray free-electron laser (XFEL) promises the study of systems that cannot be crystallized and the ability to follow the evolution of structures undergoing reactions or other dynamic processes, overcoming limitations of crystallography and cryo-electron microscopy both of which are fundamentally constrained by the problem of radiation damage, which sets a limit to the exposure that can be tolerated by the sample. XFEL breaks this limit with very intense and brief X-ray pulses that are shorter than the time atoms can move on the atomic scale. We will develop radically new methods to image single uncrystallized biological molecules at atomic resolution by XFEL diffraction of nano-engineered samples. By attaching DNA origami structures to the sample we obtain a stronger signal. Our general-purpose technique will be applied to obtain atomic resolution imaging of biological molecules that do not readily crystallize.

### ■ Rebuilding and reimagining the last common ancestor, a ribo-organism

The aim is to recreate an ancient living system, an organism that uses RNA catalysts, ribozymes, as part of its translation apparatus. We will achieve this by progressively reintroducing ribozymes into cellular metabolism, ultimately replacing protein enzymes. One team member will develop novel ribozymes (Flexizymes) that can charge tRNAs with amino acids. These will be adapted for use in cells to replace cognate aminoacyl-tRNA synthetases. Their charging will be adapted to an orthogonal ribosome that can specifically utilize these ribozymes. Organisms with these modifications will be used for high-throughput evolutionary adaptation and optimization to create an organism that serves as a doppelganger for ancient living systems in transition from an RNA to a protein world. This ribo-organism will be unique in that it will have two translation apparatuses operating side-by-side, one of which has the normal complement of cellular machinery, and one of which has Flexizymes, orthogonal tRNAs, an orthogonal ribosome, and a new genetic code. The team is notable for its broad interdisciplinary flavor uniting a chemist, a biochemist, a bioengineer and an evolutionary biologist.



### ■ Defining the capacity of cells to keep the proteome folded over space and time

For a cell to maintain protein homeostasis (proteostasis) extensive networks of components are needed to safeguard and rapidly correct unwanted proteomic changes. The performance of these networks may be reduced under stress and during aging, which results in misfolding of proteins, their aggregation and/or loss of functionality. Such instability manifests in age-dependent neurodegenerative diseases such as Alzheimer's and Parkinson's diseases.

Currently there are difficulties in measuring how well the networks operate. This project aims to build a new biosensor system that can quantitatively measure how efficiently proteostasis is managed in space and over time using an animal model (the nematode) that is ideal for the study of age-dependent changes in proteostasis. The biosensor will enable us to measure the latent buffering capacity of the quality control networks under normal and stressed conditions and to gain insight into how cells respond dynamically to stresses, how resilient cells are to such stresses, and how quality control systems become degraded or overwhelmed in disease contexts and upon ageing. The project combines four elements: experience in biosensor design and molecular biology, a temperature jump microscope, which will be employed to extract in-cell kinetic and thermodynamic folding information about the biosensor, computational expertise in protein-chaperone interactions to build coarse-grained models of proteostasis and experience in nematode biology to implement the biosensors *in vivo*.

### ■ Exploring the concept of adaptive immunity to viruses in mosquitoes

The PIWI-interacting RNA (piRNA) pathway, a silencing mechanism of transposable elements in *Drosophila melanogaster*, shows striking conceptual similarities to the prokaryotic CRISPR / Cas system. Both are sequence-based mechanisms that provide resistance against foreign nucleic acids of which they form an "archive" in the genome. Recent findings suggest that in mosquito species that transmit epidemic arboviruses such as Dengue and Zika, this pathway has antiviral activity in somatic tissues, in addition to its canonical function of preserving genome integrity. We hypothesize that arbovirus infection of *Ae. aegypti* results in integration of sequences of invading viruses into piRNA-producing loci of mosquito genomes and suggest that this may lead to sequence-specific, adaptive immunity to subsequent infections with cognate viruses. We will test this by sampling wild-mosquitoes and using next-generation sequencing, bioinformatics, molecular virology, genetic manipulation of mosquitoes and viral infections of mosquitoes. This project will enhance our understanding of mosquito immunity, explore a novel concept of adaptive immunity to viruses in arthropod vectors, and may lead to new strategies for control of arboviral transmission.



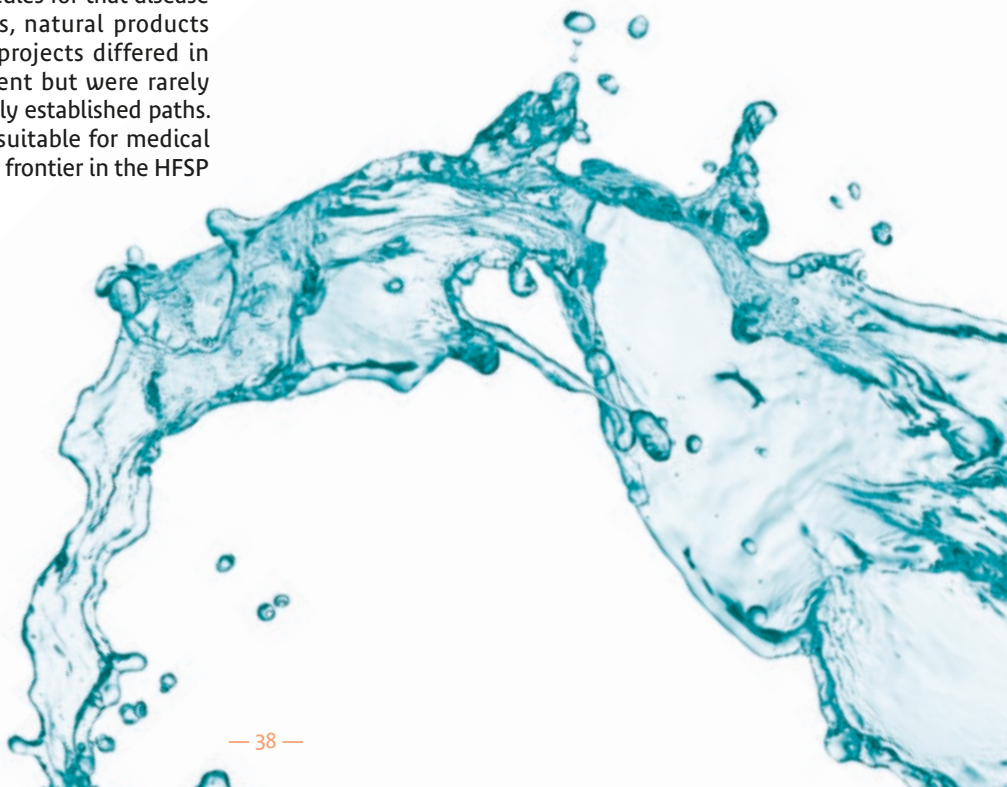
# 2.3

## FURTHER OBSERVATIONS FROM THE 2017 REVIEW CYCLE

The review cycle suffered an unfortunate incident caused by a company who sent erroneous mailings to their subscribers, describing HFSP as a biomedical agency with a good success rate. Although many of the applicants they attracted to the program failed to complete their project, others twisted it to 'fit' HFSP rules and we ended up with the highest ever number of applications. This increase consisted essentially of routine science with little or no innovation and they were screened out early in the review process.

Amongst the better projects, there were many proposals incorporating 'organ on a chip' systems for basic research or drug screening. In fact this was an aspect of this year's 'generic' application: i. Establish a test system for a disease, particularly cancers (organoids, *in vivo* or *in vitro* models), ii. Investigate a pathway to establish a 'mechanism' to conform to the general theme of HFSP funding, iii. Develop diagnostic or therapeutic molecules for that disease state (this included aptamers, natural products and immunotherapy). These projects differed in the extent of their development but were rarely innovative, but followed recently established paths. As such they were eminently suitable for medical research agencies but no longer frontier in the HFSP sense of the term.

Other noticeable trends included a very large number of projects involved CRISPR technology, which for the stronger projects simply represented the system of choice in their studies. For others it brought genetic manipulation into their system for the first time, but didn't necessarily make their project 'frontier'. Cryo-EM also continued its penetration in structural studies which are moving to larger complexes. In general quantitative biology continues to spread accompanied by mathematical modeling. The stronger applications gave details on the approach they intended to follow and hand waving statements such as "and then we will make a model from the results" have become a rarity. There was an overwhelming presence of 'omics' but the methods for handling the big data sets were rarely explicit.





## MEDIA SNIPPETS FOLLOWING THE RELEASE OF THE 2017 HFSP RESEARCH GRANTS

### International award for Münster university biophysicist

The biophysicist Prof. Tim Betz from the Institute of Cell Biology at the University of Münster has received the prestigious “Program Grant” team award from the international “Human Frontier Science Program” (HFSP). This program – the only one of its kind worldwide – provides funding for first-rate researchers who work together on innovative research questions across the borders of both countries and disciplines. The selection process is rigorous, and Timo Betz is a member of one of only 30 teams of researchers who were able to win through against more than 1,000 applications. Together with team leader Penney Gilbert from the University of Toronto in Canada and Xavier Darzacq from the University of Berkeley in California in the USA, he receives funding amounting to around one million euros for three years. Physicist Timo Betz specializes in research into the mechanical properties of cells in order to understand how they travel around the body. In their project, he and his colleagues want to undertake research into how muscle stem cells wake up out of a deep sleep to regenerate muscle fibres. In doing so, they are pursuing a new theory that mechanical forces stretch the cells and thus “wake them up”. These mechanical forces therefore have a decisive influence on muscle regeneration.

<https://www.uni-muenster.de/news/view.php?cmdid=8821>

### A cellular cytoskeleton within the next three years

This grant emphasizes the value of the most risky and innovative projects. Led by the CiQUS’s PI Javier Montenegro, it will be developed in collaboration with two researchers from America and Japan: Neal Devaraj (University of California) and Toshihide Takeuchi (University of Osaka). This is a high-risk approach, which will try to fabricate a key cellular organelle: the cytoskeleton. As the human skeleton gives form to the human body, the cytoskeleton shapes and structures cells, allowing them to perform complex functions such as moving, dividing or transporting substances. The emergence of the cytoskeleton - an intricate network of fibers growing inside the cells - was a key step in the evolution of primitive cells to evolve. Now, the project coordinated from the University of Santiago de Compostela will use Synthetic Chemistry to investigate this biological phenomenon. Therefore, this artificial cytoskeleton will be constructed using synthetic and robust building blocks. The team will design and synthesize in the laboratory an artificial cytoskeleton with the aim of reproducing the natural processes of formation and destruction of this network of fibers. This controlled and artificial simple model will help to get a better understanding of the fibers growing/collapsing behavior in confined spaces. The CiQUS team will be involved in the preparation of the nanotubes that make up the cytoskeleton, while its partners, based in San Diego and Osaka, will prepare the membranes that contain the fibers and proteins which will act as the catalysts carriers for the formation or destruction of this network. As explains Dr. Montenegro, “fibers, membranes and proteins: by coupling these three components we hope to obtain a minimal cells that allow us to get a better understanding about how the cytoskeleton works.” Dr. Montenegro notices the potential scope of this research: “the creation of hybrid synthetic cells will broaden our understanding of how and why complex living cells evolved on our planet, which is a major scientific challenge,” he says.

<http://www.usc.es/ciqus/en/news/hfspmontenegro>



### Big grant for dung beetle research

Emily Baird, researcher at Lund Vision Group at Lund University in Sweden, has been awarded a three year long research grant from The Human Frontier Science Program Organization, HFSP. In Swedish currency Emily Baird's grant is approximately one million Swedish krona per year for three years. She receives the grant for her work with dung beetles and their ability to navigate using very limited resources.

Emily Baird leads the interdisciplinary research team where she works together with Stanislav N Gorb and Poramate Manoonpong, based in Germany and Denmark respectively. The team is awarded 350000 US dollars per year for three years. "It is fantastic! This gives me and my group the opportunity to start a new project," Emily Baird says. Only three percent of the applicants have been awarded HFSP research grant 2017. According to the organization this year sets a new record when it comes to letters of interest from research teams all over the world. In total the organization received 1073 letters of interest from teams in 60 different countries. 30 teams have been selected for research grants, among them the team led by Emily Baird at the Department of Biology in Lund.

<http://www.biology.lu.se/article/big-grant-for-dung-beetle-research>

### New study to resurrect enzymes billions of years old

One of the two HFSP grants to Sweden is to Uppsala University, for a project aimed at boosting our understanding of evolution at molecular level. One purpose of the grants is to enable awardees to expand their horizons in collaboration with their international colleagues. Lynn Kamerlin of the Department of Cell and Molecular Biology, Uppsala University, says: "I'm one of two Swedes to be awarded a Program Grant, which is absolutely great. The project is international and I'll be working with José Manuel Sanchez Ruiz at the University of Granada, Eric Gaucher at Georgia Tech and Burkhard Seelig at the University of Minnesota." Dr. Kamerlin's project addresses the biochemical properties of enzymes. "Enzymes are proteins that behave like catalysts, speeding up biochemical reactions. Without these proteins life would be impossible, since they regulate every life function. You can also use enzymes outside the cell, as catalysts for a whole range of industrial processes, from designing new drugs to creating biofuels," she relates. "In this project, our aim is to resurrect ancient enzymes - some are billions of years old - to study their biochemical properties. Then we'll manipulate them and teach them to catalyse completely new reactions. The studies will deepen our understanding of how evolution works at molecular level and how to make brand-new enzymes for industrial purposes."

<http://www.publicnow.com/view/6816283F510E7332D9C1A88E32FBD28EF393A7?2017-03-27-11:01:14+01:00-xxx795>



### Schlau-Cohen awarded a Human Frontier Science Program (HFSP) Young Investigator Grant

A team led by Professor Gabriela Schlau-Cohen has been selected as a winner of a Human Frontier Science Program (HFSP) Young Investigator Grant. Professor Schlau-Cohen's team consists of herself, Akihito Ishizaki (Institute for Molecular Science, National Institutes of Natural Science, Okazaki, Japan), and Matthew Johnson (Department of Molecular Biology and Biotechnology, University of Sheffield, United Kingdom). Their project "Regulation of photosynthetic light harvesting: how does protein conformation control photophysics?" was one of the 9 Young Investigator Grants and 21 Program Grants given this year. Winning laboratories in Brazil, Mexico and South Africa confirm that "HFSP is in a unique position to continue its global leadership role in promoting frontier research," said Warwick Anderson, Secretary General of the HFSP. The 2017 Research Grants are remarkable in that there is a doubling of award winning laboratories belonging to some of the best engineering schools. All HFSP team members are expected to broaden the character of their research compared to their ongoing research programs and interact with teams bringing expertise that is very different from their own so as to create novel approaches to problems in fundamental biology. Research in the Schlau-Cohen group uses single-molecule and ultrafast spectroscopies to explore the energetic and structural dynamics of biological systems. There are two major research thrusts. The first is developing new methodology to measure dynamics on single proteins, which will be a tool to connect sub-nanosecond and second dynamics. The second is merging optical spectroscopy with model membrane systems to provide a novel probe of how biological processes extend beyond the nanometer scale of individual proteins. These approaches are used to explore the underlying mechanisms of photosynthetic light harvesting.

<http://chemistry.mit.edu/schlau-cohen-awarded-human-frontier-science-program-hfsp-young-investigator-grant>



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University of Waikato, New Zealand

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ASTAR Institute of Medical Biology, Singapore

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**Merlin CROSSLEY**,  
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**Elizabeth HARTLAND**,  
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Simon Fraser University, Burnaby

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**Vickery ARCUS**

*Chair of the Research Grant Review Committee*

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Seoul National University

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University of California at San Diego, La Jolla

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Pohang University of Science and Technology, Hyoja  
Dong, Republic of Korea



## RESEARCH GRANTS AWARDED IN 2016<sup>1</sup>

### 1-YOUNG INVESTIGATORS

#### **Dissecting cytoskeletal dynamics across the malaria parasite lifecycle – RENEWAL APP**

BAUM Jake, UK  
FRISCHKNECHT Friedrich, Germany  
HOUDUSSE Anne, France  
KOVAR David, USA

#### **Examining the causal role of spindle oscillations in memory consolidation**

BENDOR Daniel, (USA), UK  
HALASSA Michael, USA

#### **Neuroanatomy of fat discerned with whole body optoacoustic and fluorescence imaging**

DOMINGOS Ana, Portugal  
COHEN Paul, USA  
RAZANSKY Daniel, (Israel), Germany

#### **Building from scratch: How nanomaterials can help resolve membrane scaffold geometry and function**

LAU K. H. Aaron, UK  
MIM Carsten, (Germany), Sweden  
YAMEEN Basit, (Pakistan), USA

#### **Impact of horizontal gene transfer on natural ecosystems**

MIYAZAKI Ryo, Japan  
ENGEL Philipp, (Germany), Switzerland  
SANCHEZ Alvaro, (Spain), USA

#### **Beyond the genome: impact of microbial communities and epigenetic regulations for adaptation**

REITZEL Adam, USA  
FORET Sylvain, Australia (*since deceased*)  
FRAUNE Sebastian, Germany

#### **Reconstitution of cell polarity and axis determination in a cell-free system**

TELLEY Ivo A., (Switzerland), Portugal  
LOOSE Martin, (Germany), Austria  
MAURER Sebastian, (Germany), Spain  
SAUNDERS Timothy, (UK), Singapore

### 2-PROGRAM GRANTS

#### **Control of cell migration and polarity by a mechanosensory complex linking adhesion and microtubules**

AKHMANOVA Anna, The Netherlands  
GOULT Benjamin, UK  
TANENTZAPF Guy, Canada  
YAN Jie, (China), Singapore

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

AVEROF Michalis, (Greece), France  
LEE Je H., USA  
TELFORD Maximilian J, UK

#### **Green life in the dark**

BABIN Marcel, Canada  
BOWLER Chris, (UK), France

#### **Physical, computational and biological approaches of filopodia formation mechanism**

BASSEREAU Patricia, France  
LAPPALAINEN Pekka, Finland  
VOTH Gregory, USA

#### **Development, functions, and evolution of transparency in butterflies: an interdisciplinary approach**

ELIAS Marianne, France  
BERTHIER Serge, France  
PATEL Nipam, USA

#### **Single cell-resolution imaging and optogenetics in the amygdala fear circuits in behaving animals**

EMILIANI Valentina, (Italy), France  
BOYDEN Ed, USA  
KATZ Ori, Israel  
LI Bo, (Canada), USA

#### **Understanding curiosity: a combined behavioral, biological and computational theory**

GOTTLIEB Jacqueline, USA  
KIDD Celeste, USA  
OUDEYER Pierre-Yves, France

**Multi-scale analysis of membrane neurotransmitter cross-talk in the physiopathological brain**

GROC Laurent, France  
IKEGAYA Yuji, Japan  
LIU Fang, Canada

**Interactions among marine microbes as they grow and die: linking experiments and genome-scale models**

GROSSART Hans-Peter, Germany  
SEGRE' Daniel, (Italy), USA  
SHER Daniel, Israel  
VOSS Maren, Germany

**Nuclear actin assembly in chromatin structure and dynamics for cell cycle control and reprogramming**

GROSSE Robert, Germany  
KAIDI Abderrahmane, UK  
MIYAMOTO Kei, Japan

**Mouse lemur: a novel neuroscience model system to study cortical circuits**

HUBER Daniel, Switzerland  
KIM Jinhyun, Korea  
PIFFERI Fabien, France

**A comprehensive approach towards the chemistry & biology of polyphosphate: the forgotten biopolymer**

JESSEN Henning, Germany  
BHANDARI Rashna, India  
WENDER Paul, USA

**Real-time tracking and imaging of neuronal dynamics in freely moving vertebrates**

JUDKEWITZ Benjamin, Germany  
PORTUGUES Ruben, (Spain), Germany  
SMITH Spencer, USA

**Telling time with a noisy clock: mechanism of cell-intrinsic temporal regulation of gene expression**

KORSWAGEN Hendrik, The Netherlands  
FELIX Marie-Anne, France  
MUGLER Andrew, USA

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

LUDEWIG Burkhard, Switzerland  
KOH Gou Young, Korea  
YUN Seok-Hyun, (Korea), USA

**Architecture/force relationship and migration mechanics of macrophage podosomes**

MARIDONNEAU-PARINI Isabelle, France  
BAUMEISTER Wolfgang, Germany  
CHEN Christopher S., USA  
COX Susan, UK

**Neural mechanisms underlying the visual analysis of intent**

MARTINEZ Aleix, USA  
GIESE Martin, Germany  
TSAO Doris, USA

**Completing the cycle: lighting up the central dogma for a predictive understanding of genetic clocks**

OATES Andrew, (Australia), UK  
CHICA Roberto, Canada  
GARCIA Hernan, (Argentina), USA

**"Seeing" voices: the role of multimodal cues in vocal learning**

RIEBEL Katharina, (Germany), The Netherlands  
HALFWERK Wouter, (The Netherlands), Panama  
SCHARFF Constance, Germany

**Imaging cellular function noninvasively with genetically engineered reporters for hyperpolarized MRI**

SHAPIRO Mikhail, USA  
SCHRÖDER Leif, Germany

**The physics of social behavior in the 3-dimensional shoaling of zebrafish, *Danio rerio***

STEPHENS Greg, (USA), The Netherlands  
MASAI Ichiro, Japan  
SHAEVITZ Joshua, USA

**Analog computations underlying language mechanisms**

TREVES Alessandro, Italy  
FRIEDMANN Naama, Israel  
MONASSON Remi, France

**The first mammalian model for vocal learning: a molecular, neural and comparative approach in bats.**

VERNES Sonja, The Netherlands  
FIRZLAFF Uwe, Germany  
WIEGREBE Lutz, Germany  
YARTSEV Michael, (Israel), USA

**Mechanisms of dynamic GPCR transmembrane signaling**

WAGNER Gerhard, (Germany), USA  
PLÜCKTHUN Andreas, (Germany), Switzerland

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

WELCH Kenneth, Canada  
TIMP Winston, USA  
VALLE Mikel, Spain  
WONG G. William, USA

<sup>1</sup> Note that nationality is given in brackets if different from country of laboratory.



# CHAPTER

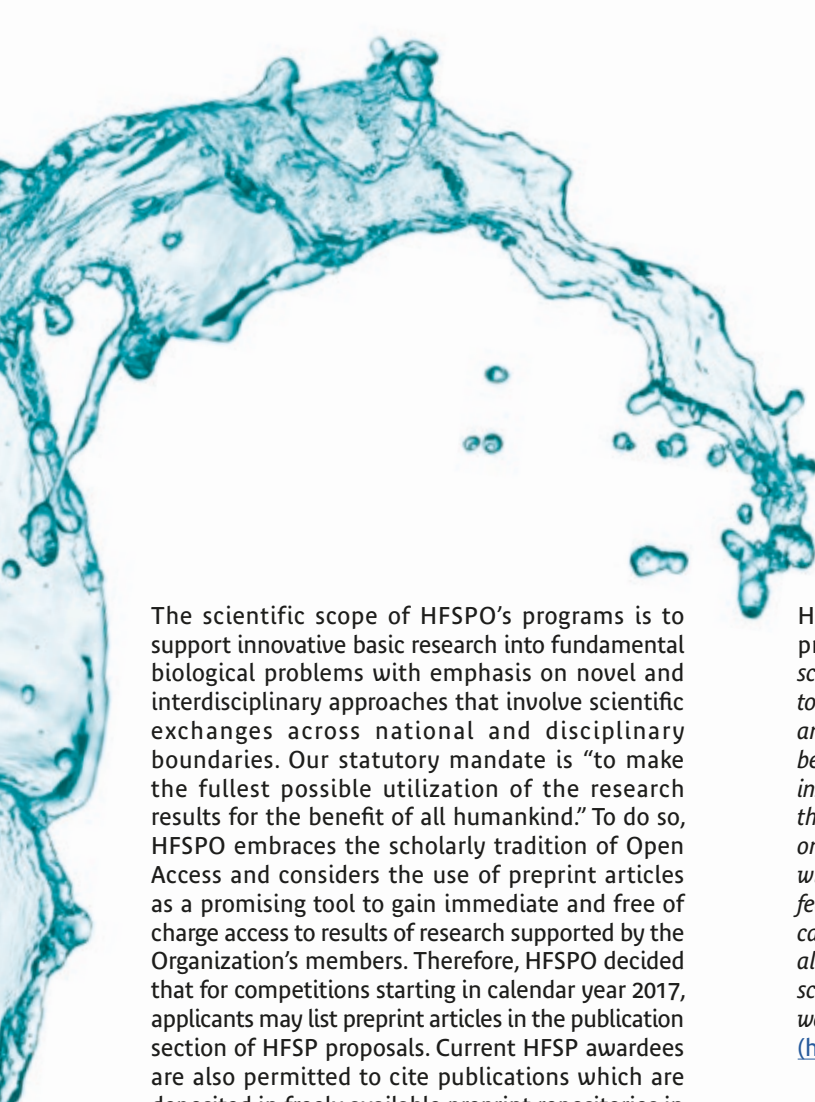


## The science of HFSP



Right to left: **Guntram BAUER**, **Rosalyn HUIE** (Communications) and **Xavier SCHNEIDER** (IT manager and webmaster)

- 3.1 HFSP accepts preprint articles
- 3.2 An effort for the global scientific community
- 3.3 The 2017 HFSP Nakasone Award
- 3.4 The Sixteenth HFSP Awardees Meeting, Singapore, 10-13 July 2016
- 3.5 Inspiring science
- 3.6 Great minds at work
- 3.7 Honours and prizes



# 3.1

## HFSPo ACCEPTS PREPRINT ARTICLES

The scientific scope of HFSPo's programs is to support innovative basic research into fundamental biological problems with emphasis on novel and interdisciplinary approaches that involve scientific exchanges across national and disciplinary boundaries. Our statutory mandate is "to make the fullest possible utilization of the research results for the benefit of all humankind." To do so, HFSPo embraces the scholarly tradition of Open Access and considers the use of preprint articles as a promising tool to gain immediate and free of charge access to results of research supported by the Organization's members. Therefore, HFSPo decided that for competitions starting in calendar year 2017, applicants may list preprint articles in the publication section of HFSP proposals. Current HFSP awardees are also permitted to cite publications which are deposited in freely available preprint repositories in interim and final reports to the Organization.

HFSPo applies the definition of ASAPbio for preprint publications: *"a preprint is a complete scientific manuscript that is uploaded by the authors to a public server. The preprint contains complete data and methodologies; it is often the same manuscript being submitted to a journal. After a brief quality-control inspection to ensure that the work is scientific in nature, the author's manuscript is posted within a day or so on the Web without peer review and can be viewed without charge by anyone in the world. Based upon feedback and/or new data, new versions of your preprint can be submitted; however, prior preprint versions are also retained and cannot be removed. Preprints allow scientists to directly control the dissemination of their work to the world-wide scientific community."*

[\(http://asapbio.org/\)](http://asapbio.org/)



## AN EFFORT FOR THE GLOBAL SCIENTIFIC COMMUNITY

Research resources are central to life science research and large databases are amongst the most important of these. Many data resources have arisen *ad hoc* and their models of financial support and governance structures vary widely. They are the results of tireless work by individuals or groups of scientists who have supported the growth and functionality of these resources over many years.

The sustainability of these crucial resources and the challenges they face were summarized in an article in NATURE by Philip E. Bourne, Jon R. Lorsch and Eric D. Green (*Sustaining the big-data ecosystem; Organizing and accessing biomedical big data will require quite different business models*, Nature, 5 November 2015, Vol. 527).

The HFSP Secretariat was the venue for an in-depth discussion on these challenges and convened an international workshop in Strasbourg, on November 18<sup>th</sup> and 19<sup>th</sup> 2016, chaired by Dr. Paul Lasko, Scientific Director of the Institute for Genetics of the Canadian Institutes of Health Research at McGill University. The workshop brought together some 30 representatives from the most widely used data resources and scientific organizations. The program which links to the workshop presentations can be accessed at <http://www.hfsp.org/frontier-science/data-resources-life-sciences-workshop/programme>

The goal of the workshop was to discuss the development of a roadmap for the future growth and accessibility of these resources. Speakers explored the complexity of the problems from very different perspectives with the aim to propose the next steps in a plan to maintain future support of the data resources in the life sciences. The outcome of the workshop has been published in two articles that are freely available:

The Global Life Sciences Data Resources Working Group. A global coalition to sustain core data. NATURE 2017; 543, 179; <http://dx.doi.org/10.1038/543179a>

Anderson W, Apweiler R, Bateman A et al. Towards coordinated international support of core data resources for the life sciences. bioRxiv 110825; <https://doi.org/10.1101/110825>



# .3

## THE 2017 HFSP NAKASONE AWARD

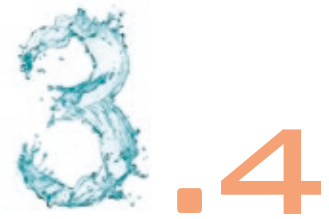
David Julius of the Department of Physiology at the University of California San Francisco was awarded the 2017 HFSP Nakasone Award for his 'discovery of the molecular mechanism of thermal sensing in animals' because it has defined a field of sensory reception. His discovery of molecular mechanisms explains how we perceive pain and temperature. David Julius has identified members of the Transient Receptor Potential (TRP) ion channel family; these proteins are at the heart of responses to diverse sensory stimuli, including temperature, pain, osmolarity, pheromones, and taste. TRP channels also play important roles in calcium absorption and tissue development.

For decades, fundamental mechanistic questions about how pain and other somatosensory stimuli were detected and decoded went unresolved until David Julius resolved the mystery by his landmark finding when he identified the VR1 (TRPV1) channel.

In this work Julius showed that VR1 is a calcium-permeable, non-selective cation channel that is activated directly by capsaicin, the pungent natural ingredient in hot chili peppers, or by heat. He and his colleagues showed that the thermal activation threshold matched that of sensory nerve fibers. Importantly, this discovery of TRPV1 as a thermal sensor did not make use of the prior cloning of TRP channels by others, but instead relied on a functional expression cloning strategy based on capsaicin sensitivity. The expression library was made from mouse sensory neurons known to respond to thermal and chemical stimuli. The transfected cells were exposed to capsaicin and a single clone conferring sensitivity to capsaicin was identified. This discovery provided the first definitive molecular basis for the selective nature of capsaicin action, while validating the 'specificity theory' of nociception first suggested by Sherrington more than 100 years ago. The full version of David Julius's Nakasone Award laudation is available at <http://www.hfsp.org/awardees/hfsp-nakasone-award/2017-award>



David JULIUS



## THE SIXTEENTH HFSP AWARDEES MEETING, SINGAPORE, 10-13 JULY 2016

The 16<sup>th</sup> Awardees Meeting took place at the Biopolis in Singapore. 159 participants including HFSP Long-Term and Cross-Disciplinary Fellows, Young Investigator and Program Grant holders, Career Development Awardees and local HFSP alumni attended. In addition, about 33 scientists from Singapore based institutes were present. This year there were 29 oral presentations and 27 three-minute 'poster teaser' talks which preceded the poster sessions. 80 posters were presented during the three poster sessions on Monday, Tuesday and Wednesday. We are very grateful to A\*Star Institute of Molecular and Cell Biology, Nanyang Technical University, the National University of Singapore and the National Research Foundation for their support and generosity. Participants enjoyed an excellent social program, including a cruise on the Singapore River and the welcome reception at the National Gallery of Singapore.

**“ An exciting meeting with a wide range of topics in a rather intimate setting. Great group of international scientists! Expectations fulfilled!**

The Singapore Awardees Meeting will remain memorable because of the unique series of keynote lectures that were started by the 2016 winners of the HFSP Nakasone Award, Emmanuelle Charpentier and Jennifer Doudna. In their double feature, the two awardees offered an amazing look at one of the most intensely discussed scientific discoveries of the 21<sup>st</sup> century. Then followed an inspiring lecture by Michael Sheetz that provided first hand insights into what is now widely known as “Mechanobiology” – a field in which HFSP funding has left its mark.

**“ This is a fantastic meeting. A breath of fresh air to hear people talking about exciting scientific questions without having to “cure cancer”. It also helps that the maturity and intellectual level of the attendees is really above average.**

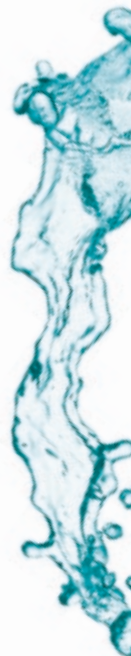
Participants of the Singapore meeting were then in for real treat when the final lecture was presented by His Excellency Vivian Balakrishnan, Minister for Foreign Affairs of Singapore. Minister Balakrishnan gave an inside account of science policy in Singapore, which was very inspiring for the audience. As a former scientist himself, Minister Balakrishnan spent some time in the poster exhibit showing great interest in posters that were close to his own scientific interests of vision research.

**“ Great impression: The level of enthusiasm of the HFSP committee members for what the organization stands for was very inspiring!**



# .5

## INSPIRING SCIENCE



The HFSP website reaches a very international audience of which more than 65% of the users and site visitors are located in the USA, UK, France, Germany, India, Canada, Japan, Australia, Italy and Spain. If broken down by region/city it is not surprising that HFSP's website is most often consulted in cities where major academic research centers are located. However, it is noteworthy that we do get quite a lot of visitors from South America and Africa.

The announcement of the HFSP grant, fellowship and CDA awards in March 2016, once again, created a lot of excitement and thanks to our social media channels, there was immediate and rewarding feedback. All awards were published on our website and via corresponding press releases. It is noteworthy that press releases published by host institutions about their scientists' success in the 2016 competition are becoming more frequent. They can be found at <http://www.hfsp.org/about-us/press-and-media-centre/news-items/2016-hfsp-awards-news>

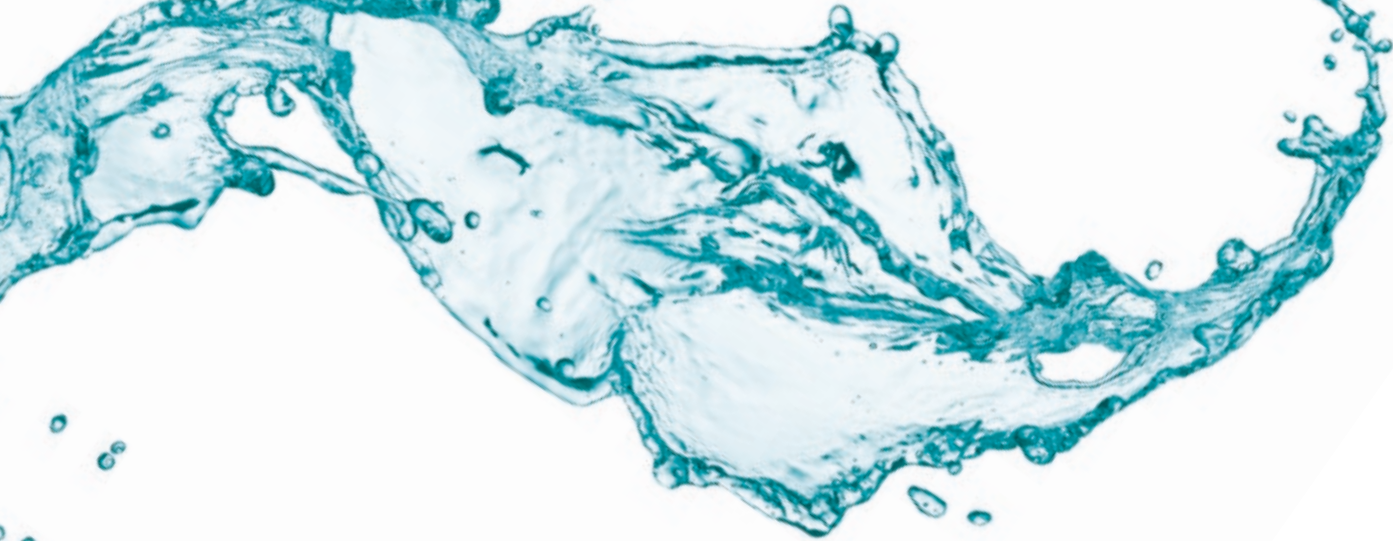
HFSP is all about funding frontier research on the complex mechanisms of living organisms. Our programs support projects at all levels of biological complexity from biomolecules to the interactions between organisms. Key elements of HFSP's mission are:

- 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 based on these priorities have produced very innovative results in 2016 such as...

**....Individuality and cliques in bacterial communities.** HFSP Career Development Awardee Knut Drescher reports that many bacteria primarily exist in nature as biofilms, which are held together by a self-produced extracellular matrix. Although desirable in waste-water treatment applications, biofilms primarily cause undesirable effects such as chronic infections or clogging of industrial flow systems. Biofilm formation is a highly regulated and dynamic process, and growth of planktonic cells into biofilm communities critically depends on the production of extracellular matrix. Cellular differentiation within a biofilm is a commonly accepted concept, but it remains largely unclear when, where and how exactly such differentiation arises. In their study the authors quantitatively analyzed spatio-temporal changes in expression of several key groups of *E. coli* genes, including matrix-production genes, during the formation of biofilms. <http://www.hfsp.org/frontier-science/awardees-articles/individuality-and-cliques-bacterial-communities>

**....Leukaemia cell movement gives clues to tackling treatment-resistant disease.** HFSP Program Grant awardee Cristina Lo Celso has successfully completed a research project that is shedding new light on how leukemia cells can survive cancer treatment, suggesting new possibilities for stopping them in their tracks. Intravital microscopy reveals that leukemia cells are highly mobile and do not associate with specific cellular structures of the bone marrow. The team's investigation into leukemia cells' behavior also revealed that they actively attack bone cells, which are known to support healthy blood production. The researchers believe this insight could help to develop treatments to safeguard production of healthy blood cells in leukemia patients. <http://www.hfsp.org/frontier-science/awardees-articles/leukaemia-cell-movement-gives-clues-tackling-treatment-resistant->



**... How hummingbirds control flight.** HFSP Program Grant awardee Doug Altshuler and his colleagues present a new study that shows how Hummingbirds are able to cruise through trees at high speed, stop on a dime to feed at a flower, and catch a flying insect in the air, all with precision accuracy. Previous studies of other bird species had suggested that flight control might be based on a strategy of balancing the translational motion of images on the left and right eye – an approach that has also been observed in flying insects. The results revealed that the birds would steer up or down to compensate for vertical image motion; however, they did not use the same strategy as insects of steering to balance image motion on the left and right side. Instead, the hummingbirds' lateral steering was based on the vertical height of features: the birds would steer away from larger features even in the absence of image motion. <http://www.hfsp.org/frontier-science/awardees-articles/how-hummingbirds-control-flight-video>

**... Self-replication of protein fibrils involved in neurodegenerative diseases.** HFSP Cross-Disciplinary Fellow Anđela Saric revealed new insights into pathological amyloid fibrils that are involved in several neurodegenerative disorders and that manage to self-replicate without any additional assistance. Replication of biological molecules is the foundation of life, and it usually requires complex cellular machinery. However, a number of disease-related processes involve self-replication of protein assemblies without any additional assistance. A striking example is the self-replication of amyloid fibrils that are implicated in a number of neurodegenerative disorders, including Alzheimer's and Parkinson's diseases. The study suggests that by controlling the build-up of healthy proteins onto the surface of fibrils, the spread of the pathological protein aggregates could be slowed down. The results of this work could also be of great interest for biotechnology, where one of the unfulfilled goals is achieving self-replication in manufacturing of biomaterials. Learning the design rules from the fibrils that self-replicate naturally may help achieve this goal. <http://www.hfsp.org/frontier-science/awardees-articles/self-replication-protein-fibrils-video>



## GREAT MINDS AT WORK

HFSP funds several hundreds of outstanding scientists each year, many of whom are recognized for their brilliant research and receive highly prestigious prizes and awards. We cannot but list the most highly honored in 2016 below and on the following pages:

- *Breakthrough Prize in Life Sciences* – Karl Deisseroth & Edward S. Boyden
- *Brain Prize* – Graham L. Collingridge, Richard Morris & Timothy Bliss
- *Leibniz Prize* – Frank Bradke, Emmanuelle Charpentier & Marina Rodnina
- *Louis-Jeantet Prize for Medicine* – John Diffley
- *Kavli Prize in Neuroscience* – Eve Marder
- *Japan Academy Prize* – Eisuke Nishida





## 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 KORNBERG	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 additional recent awards and prizes to HFSP awardees or alumni from 2016 or earlier that have come to our attention in FY 2016

Name	Nationality	Current affiliation	Year of HFSP award
<b>BREAKTHROUGH PRIZE FOUNDATION</b>			
<b>BREAKTHROUGH PRIZE IN LIFE SCIENCES</b>			
Edward S. BOYDEN	USA	Massachusetts Institute of Technology, Cambridge, USA	Program Grant 2010
Karl DIESSEROTH	USA	Stanford University, USA	Nakasone Award 2010
<b>CNRS</b>			
<b>SILVER MEDAL</b>			
Arezki BOUDAOU	France/Algeria	Ecole Normale Supérieure, Lyon, France	Program Grant 2013
<b>BRONZE MEDAL</b>			
Allison BARDIN	USA	Institut Curie, Paris, France	Long-Term Fellowship 2003
Thierry MORA	France	Ecole Normale Supérieure, Paris, France	Cross-Disciplinary Fellowship 2008
<b>DAIWA ANGLO-JAPANESE FOUNDATION</b>			
<b>DAIWA ADRIAN PRIZE</b>			
William C. EARNSHAW	UK/USA	University of Edinburgh, UK	Research Grant 1991
<b>EMBO</b>			
<b>GOLD MEDAL</b>			
Richard BENTON	UK	University of Lausanne, Switzerland	Young Investigator Grant 2011
<b>ERNST SCHERING FOUNDATION</b>			
<b>ERNST SCHERING PRIZE</b>			
Franz-Ulrich HARTL	Germany	Max-Planck-Institute for Biochemistry, Martinsried, Germany	Program Grant 2011
<b>FONDATION L'ORÉAL ET L'UNESCO</b>			
<b>PRIX L'ORÉAL ET L'UNESCO POUR LES FEMMES ET LA SCIENCE</b>			
Emmanuelle CHARPENTIER	France	Max Planck Institute for Infection Biology, Berlin, Germany	Nakasone Award 2016
Jennifer DOUDNA	USA	University of California at Berkeley, USA	Nakasone Award 2016
<b>GAIRDNER FOUNDATION</b>			
<b>GAIRDNER INTERNATIONAL AWARD</b>			
Emmanuelle CHARPENTIER	France	Max Planck Institute for Infection Biology, Berlin, Germany	Nakasone Award 2016
Jennifer DOUDNA	USA	University of California at Berkeley, USA	Nakasone Award 2016

Name	Nationality	Current affiliation	Year of HFSP award
<b>GERMAN RESEARCH COUNCIL</b>			
<b>LEIBNIZ PRIZE</b>			
Frank BRADKE	Germany	Deutsches Zentrum für Neurodegenerative Erkrankungen (DZNE), Bonn, Germany	Long-Term Fellowship 2000, Career Development Award 2003
Emmanuelle CHARPENTIER	France	Max Planck Institute for Infection Biology, Berlin, Germany	Nakasone Award 2016
Marina RODNINA	Germany	Max Planck Institute of Biophysical Chemistry, Göttingen, Germany	Program Grant 2010
<b>GERMAN SOCIETY FOR BIOCHEMISTRY AND MOLECULAR BIOLOGY</b>			
<b>OTTO WARBURG MEDAL</b>			
Emmanuelle CHARPENTIER	France	Max Planck Institute for Infection Biology, Berlin, Germany	Nakasone Award 2016
<b>GRETE LUNDBECK EUROPEAN BRAIN RESEARCH FOUNDATION</b>			
<b>BRAIN PRIZE</b>			
Timothy BLISS	UK	The Francis Crick Institute, London, UK	Research Grant 1990, 1994, 1998, Program Grant 2002
Graham L. COLLINGRIDGE	UK	University of Bristol, UK	Research Grant 1990
Richard MORRIS	UK	University of Edinburgh, UK	Research Grant 1990, 1994, Program Grant 2001, 2006
<b>GRUBER FOUNDATION</b>			
<b>NEUROSCIENCE PRIZE</b>			
Mu-Ming POO	USA	The Chinese Academy of Sciences, Shanghai, China	Program Grant 2001
<b>INAMORI FOUNDATION</b>			
<b>KYOTO PRIZE</b>			
Tasuku HONJO	Japan	Kyoto University, Japan	Research Grant 1990
<b>JAPAN ACADEMY</b>			
<b>JAPAN ACADEMY PRIZE</b>			
Eisuke NISHIDA	Japan	Kyoto University, Japan	Research Grant 1996
<b>JAPAN ACADEMY MEDAL</b>			
Osamu TAKEUCHI	Japan	Kyoto University, Japan	Long-Term Fellowship 2002
<b>KEIO UNIVERSITY MEDICAL SCIENCE FUND</b>			
<b>KEIO MEDICAL SCIENCE PRIZE</b>			
Tasuku HONJO	Japan	Kyoto University, Japan	Research Grant 1990
<b>KOERBER FOUNDATION</b>			
<b>EUROPEAN SCIENCE PRIZE</b>			
Hans CLEVERS	Netherlands	Hubrecht Institute, Utrecht, Netherlands	Research Grant 1998

Name	Nationality	Current affiliation	Year of HFSP award
<b>LOUIS-JEANTET FOUNDATION</b>			
<b>LOUIS-JEANTET PRIZE FOR MEDICINE</b>			
John DIFFLEY	USA/UK	Cancer Research UK London Research Institute / Francis Crick, South Mimms, UK	Program Grant 2001
<b>MARCEL BENOIST FOUNDATION</b>			
<b>MARCEL BENOIST PRIZE</b>			
Johan AUWERX	Belgium	Ecole Polytechnique Federale de Lausanne (EPFL), Switzerland	Research Grant 1999
<b>NORWEGIAN ACADEMY OF SCIENCE AND LETTERS</b>			
<b>KAVLI PRIZE IN NEUROSCIENCE</b>			
Eve MARDER	USA	Brandeis University, Waltham, USA	Research Grant 1991, 1994
<b>PAUL EHRLICH FOUNDATION</b>			
<b>PAUL EHRLICH UND LUDWIG DARMSTÄDTER PREIS</b>			
Jennifer DOUDNA	USA	University of California at Berkeley, USA	Nakasone Award 2016
<b>ROBERT KOCH STIFTUNG</b>			
<b>ROBERT KOCH PRIZE</b>			
Michel NUSSENZWEIG	USA/Brazil	Rockefeller University, New York, USA	Research Grant 1996
<b>ROYAL NETHERLANDS ACADEMY OF ARTS AND SCIENCES (KNAW)</b>			
<b>HEINEKEN PRIZE</b>			
Jennifer DOUDNA	USA	University of California at Berkeley, USA	Nakasone Award 2016
<b>SHAW PRIZE FOUNDATION</b>			
<b>SHAW PRIZE</b>			
Adrian BIRD	UK	University of Edinburgh, UK	Research Grant 1995
<b>WARREN ALPERT FOUNDATION</b>			
<b>WARREN ALPERT FOUNDATION PRIZE</b>			
Jennifer DOUDNA	USA	University of California at Berkeley, USA	Nakasone Award 2016
Emmanuelle CHARPENTIER	France	Max Planck Institute for Infection Biology, Berlin, Germany	Nakasone Award 2016
<b>WOLF FOUNDATION</b>			
<b>WOLF PRIZE IN CHEMISTRY</b>			
Kyriacos C. NICOLAOU	USA/UK	Rice University, Houston, USA	Research Grant 1992
<b>KRILL PRIZE</b>			
Dana REICHMANN	Israel	The Hebrew University of Jerusalem, Israel	Long-Term Fellowship 2009, Career Development Award 2014
Yossi YOVEL	Israel	Tel-Aviv University, Israel	Program Grant 2013





# CHAPTER

# 4

## Budget and Finance

- 4.1 Guidelines for HFSP0 funding
- 4.2 Contributions for FY 2016
- 4.3 Geographical distribution of contributions
- 4.4 Payments of awards
- 4.5 FY 2016 financial summary
- 4.6 Financial outlook for FY 2017
- 4.7 Overview of HFSP0 budget for FY 2017



Left to right: Sarah NAETT, Akira ARAI, Jennifer SAYOL  
and Isabelle HEIDT-COQUARD

# 4.1

## GUIDELINES FOR HFSP0 FUNDING

HFSP0 has been 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 a three-year budgetary period is established as a guideline for the Board of Trustees. The most recent agreement was signed in London in June 2016 for FY2017 to FY2019.

The Brussels agreement (FY2014 to FY2016) 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 maintains the same level of contribution throughout the period.



# 4.2

## CONTRIBUTIONS FOR FY 2016

Contributions received from MSPs during FY 2016 (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 92.9 % of the Brussels goal of 55 745 mUSD shown in the third column:

> Table 4-1

Contributions received by HFSP0 Management Supporting Parties in FY 2016 (1 April 2016 to 31 March 2017)

MSPs	Payments		BRUSSELS Joint Communiqué for 2016 in USD
	Actual payment LC (Local Currency)	Actual payment in USD (at accounting rate)	
Australia	757 000 USD	757 000	757 000
Canada	1 959 512 CAD	1 503 058	1 508 000
EU	4 958 000 EUR	5 456 747	5 509 000
France	2 321 000 EUR	2 592 790	2 579 000
Germany	4 617 000 EUR	5 045 323	5 130 000
India	– USD	–	1 050 000
Italy	– EUR	–	1 041 000
Japan	21 042 639 USD	21 042 639	22 200 000
Korea	829 000 USD	829 000	829 000
New Zealand	144 000 USD	144 000	144 000
Norway	645 000 USD	645 000	645 000
Singapore	540 800 USD	540 000	540 000
Switzerland	920 000 CHF	933 364	920 000
UK	1 531 000 GBP	2 151 314	2 355 000
USA	10 129 000 USD	10 129 000	10 538 000
<b>TOTAL</b>		<b>51 770 035</b>	<b>55 745 000</b>

# 4.3

## GEOGRAPHICAL DISTRIBUTION OF CONTRIBUTIONS

At the end of FY 2016, the total amount contributed by the MSPs since the beginning of the Program reached 1.369 billion USD.

> Table 4.2

Actual contributions from MSPs per fiscal year at current exchange rate (million USD)

	Australia	Canada	E.U.	France	Germany	India	Italy	Japan	Korea	New Zealand	Norway	Singapore	Switzerland	UK	USA	TOTAL	% y to y
FY1989	-	-	-	0,5	-	-	0,0	9,9	-	-	-	-	-	-	-	<b>10,42</b>	
FY1990	-	0,200	-	1,650	0,290	-	0,330	28,950	-	-	-	-	-	-	-	<b>31,42</b>	201,54%
FY1991	-	-	0,150	1,620	0,910	-	0,440	28,440	-	-	-	-	0,400	-	0,040	<b>32,00</b>	1,85%
FY1992	-	0,400	0,180	1,320	0,770	-	0,190	29,570	-	-	-	-	0,400	0,510	0,040	<b>33,38</b>	4,31%
FY1993	-	0,330	0,910	1,250	0,810	-	0,180	31,300	-	-	-	-	0,400	0,540	3,500	<b>39,22</b>	17,50%
FY1994	-	0,540	1,110	1,560	0,990	-	0,180	34,010	-	-	-	-	0,400	0,590	3,500	<b>42,88</b>	9,33%
FY1995	-	0,530	1,000	1,740	1,220	-	0,190	35,650	-	-	-	-	0,590	0,580	3,500	<b>45,00</b>	4,94%
FY1996	-	0,260	0,920	1,370	1,170	-	0,180	36,730	-	-	-	-	0,510	0,630	4,000	<b>45,77</b>	1,71%
FY1997	-	0,250	0,870	1,470	1,020	-	0,170	37,380	-	-	-	-	0,530	0,760	4,000	<b>46,45</b>	1,49%
FY1998	-	0,450	1,110	1,700	1,250	-	0,290	35,840	-	-	-	-	0,580	0,760	4,500	<b>46,48</b>	0,06%
FY1999	-	0,440	1,680	1,750	1,600	-	0,290	35,770	-	-	-	-	0,610	0,750	5,000	<b>47,89</b>	3,03%
FY2000	-	0,450	1,520	1,580	2,150	-	0,260	37,380	-	-	-	-	0,550	0,750	5,500	<b>50,14</b>	4,70%
FY2001	-	0,510	0,870	1,160	2,360	-	0,680	37,050	-	-	-	-	0,520	0,800	7,390	<b>51,34</b>	2,39%
FY2002	-	0,830	2,380	1,400	2,672	-	-	31,250	-	-	-	-	0,530	1,550	8,600	<b>49,21</b>	-4,14%
FY2003	-	0,810	4,720	1,910	2,889	-	-	31,250	-	-	-	-	0,630	1,470	10,400	<b>54,08</b>	9,89%
FY2004	-	0,850	4,080	2,070	3,435	-	2,120	31,250	-	-	-	-	0,690	1,630	9,500	<b>55,63</b>	2,86%
FY2005	0,466	0,870	4,510	2,170	3,391	-	0,840	31,248	0,550	-	-	-	0,690	1,720	9,000	<b>55,46</b>	-0,31%
FY2006	0,485	1,063	4,690	2,545	3,913	-	0,916	31,248	0,568	0,095	-	-	0,697	1,878	9,000	<b>57,10</b>	2,96%
FY2007	0,504	1,286	5,500	2,951	4,174	0,780	1,561	31,248	0,591	0,099	-	-	0,698	2,146	9,000	<b>60,54</b>	6,02%
FY2008	0,534	1,240	5,570	3,039	4,393	0,812	0,909	31,248	0,624	0,103	0,500	-	0,780	2,240	9,364	<b>61,36</b>	1,35%
FY2009	0,566	1,331	5,762	2,439	5,266	0,844	-	31,248	0,658	0,108	0,520	-	0,862	1,915	9,832	<b>61,35</b>	-0,01%
FY2010	0,598	1,441	5,334	2,000	5,037	0,879	1,092	29,523	0,694	0,113	0,541	-	0,818	1,816	9,930	<b>59,82</b>	-2,50%
FY2011	0,622	1,614	6,254	2,701	5,037	0,914	1,073	24,773	0,722	0,118	0,563	-	0,923	2,010	9,930	<b>57,25</b>	-4,28%
FY2012	0,647	1,680	5,590	2,736	5,115	0,837	1,102	23,545	0,751	0,123	0,585	-	0,849	2,047	9,930	<b>55,54</b>	-3,00%
FY2013	0,673	1,662	6,103	2,936	5,451	0,989	1,199	22,457	0,781	0,128	0,608	-	0,867	2,036	9,930	<b>55,82</b>	0,51%
FY2014	0,700	1,637	6,483	2,972	5,064	1,009	0,916	21,619	0,797	0,133	0,620	0,5	0,951	2,349	10,129	<b>55,88</b>	0,10%
FY2015	0,728	1,504	5,348	2,518	4,923	1,029	1,060	21,040	0,813	0,138	0,633	0,520	0,921	2,253	10,129	<b>53,56</b>	-4,16%
FY2016	0,757	1,503	5,457	2,593	5,045	1,050*	1,041*	21,043	0,829	0,144	0,645	0,541	0,933	2,151	10,129	<b>53,861</b>	0,57%
<b>TOTAL</b>	<b>7,28</b>	<b>23,68</b>	<b>88,10</b>	<b>55,61</b>	<b>80,35</b>	<b>9,14</b>	<b>17,23</b>	<b>832,00</b>	<b>8,38</b>	<b>1,30</b>	<b>5,22</b>	<b>1,56</b>	<b>17,33</b>	<b>35,88</b>	<b>185,77</b>	<b>1 368,83</b>	
	0,5%	1,7%	6,4%	4,1%	5,9%	0,7%	1,3%	60,8%	0,6%	0,1%	0,4%	0,1%	1,3%	2,6%	13,6%	1 368,83	

\*In 2016, India and Italy outstanding contributions

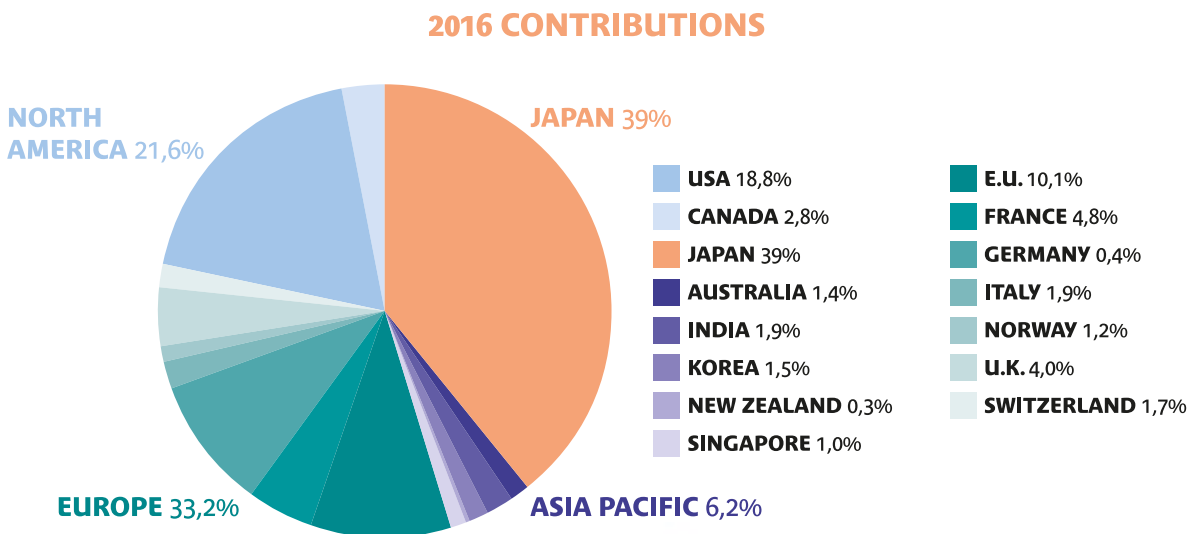
During fiscal year 2016, the Asia Pacific region, which includes Japan, remained the main source of funding, contributing 45 % of the total. After the Asia Pacific region, Europe contributed 33 % and North America contributed 22 %.

> Figure 4-1  
Geographical distribution of received contributions

	Japan		Asian Pacific				Europe					North America			
FY 2016	Japan	Australia	India*	Korea	New Zealand	Singapore	E.U.	France	Germany	Italy*	Norway	UK	Switzerland	USA	Canada
million USD	21,043	0,757	1,050	0,829	0,144	0,541	5,457	2,593	5,045	1,041	0,645	2,151	0,933	10,129	1,503
% total	39,07%	1,41%	1,95%	1,54%	0,27%	1,00%	10,13%	4,81%	9,37%	1,93%	1,20%	3,99%	1,73%	18,81%	2,79%
<b>FY 2016</b>	<b>39%</b>		<b>6,2%</b>				<b>33,2%</b>					<b>21,6%</b>			

\*In 2016, India and Italy outstanding contributions

> Figure 4-2  
Geographical distribution of received contributions per country (MSPs)



# 4.4

## PAYMENT OF AWARDS

HFSP0 paid 51.186 million USD to its awardees during FY 2016.

Figure 4-3 shows the breakdown of the amount by program.

- Research Grant payments amounted to 33.951 million USD (25.451 million USD for Program Grants and 8.5 million USD for Young Investigator Grants). This constitutes 66 % of payments made in FY 2016.
- Payments to Long-Term and Cross-Disciplinary Fellows amounted to 13.835 million USD and correspond to 27 % of payments.
- Payments to CDA holders amounted to 2.9 million USD and constitute 6 % of FY 2016 payments.
- Resources allocated to the Awardees Meeting in Singapore (July 2016), and other Program activities, including Program meetings and the Nakasone Award, amounted to approximately 500 thousand USD.

> Figure 4-3  
Payments made in FY 2016 by type of award

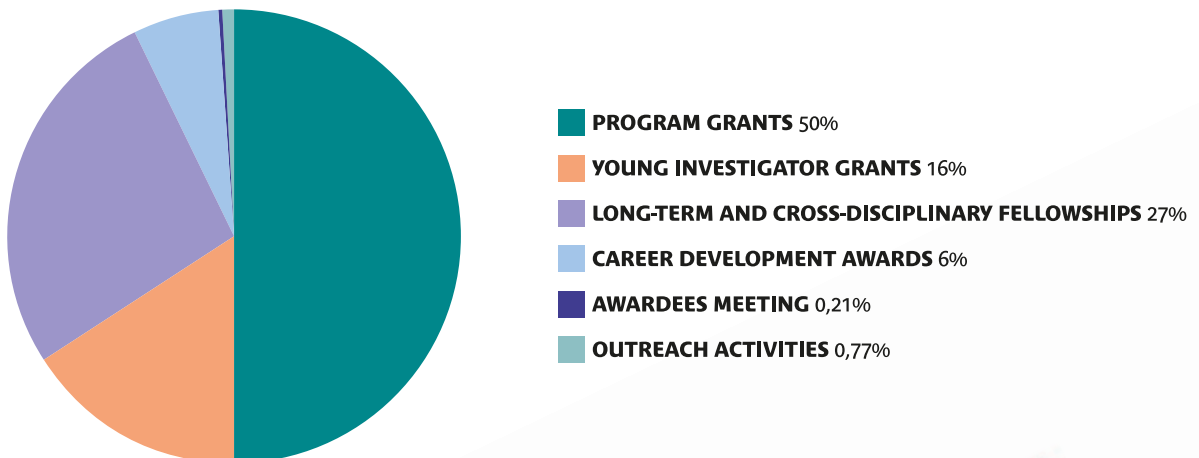
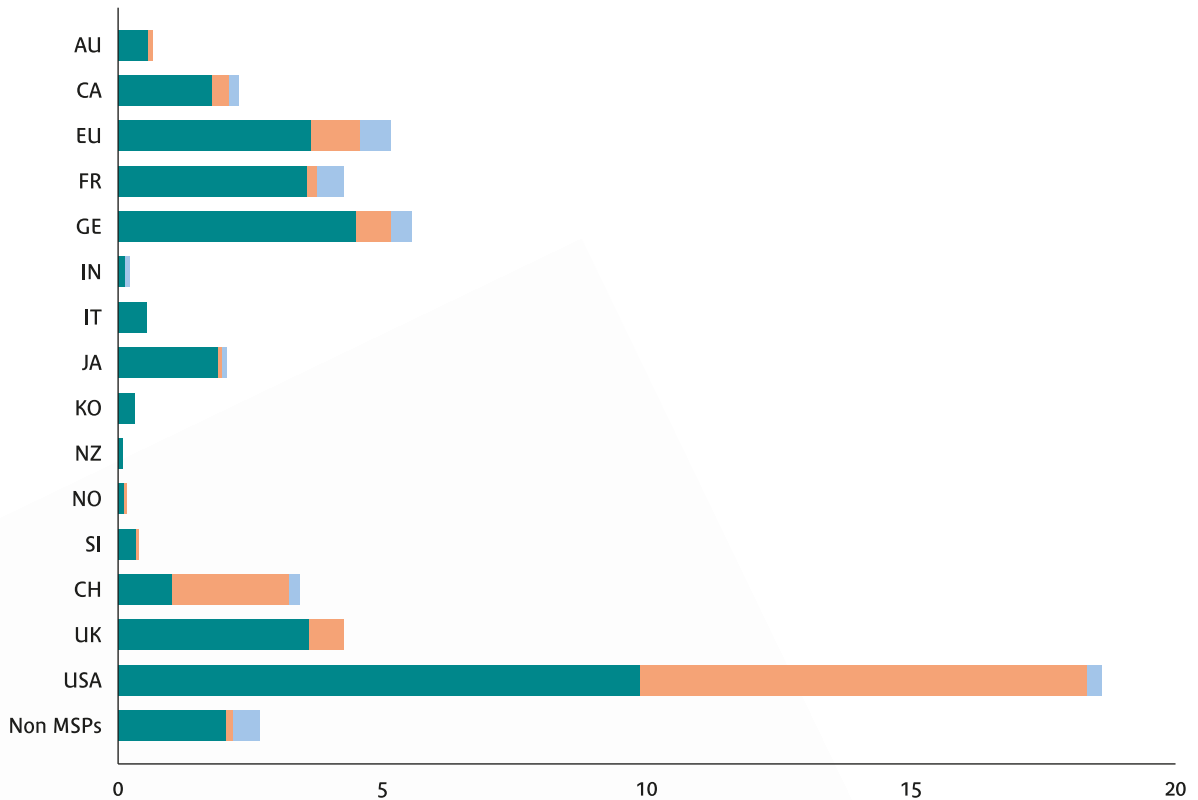


Figure 4-4 shows the geographical distribution of award payments between the MSPs.

In FY2016, 46,14 % of the total amount of awards was paid to support HFSP awardees in Europe, 41,23 % was allocated to awardees in North America, 7,33 % went to awardees in the Asia-Pacific region and 5,29 % to non MSPs. These figures are relatively stable from one year to another.

> Figure 4-4  
Geographical distribution of total awards over all programs paid by HFSP in FY2016

### GEOGRAPHICAL DISTRIBUTION OF TOTAL AWARDS IN FY 2016 IN M USD



	Non MSPs	USA	UK	CH	SI	NO	NZ	KO	JA	IT	IN	GE	FR	EU	CA	AU	
■ Research Grants	2,03	9,87	3,60	1,01	0,34	0,10	0,09	0,32	1,89	0,54	0,12	4,50	3,57	3,65	1,77	0,56	
■ Long-Term + Cross Disc. Fellowships	0,15	8,44	0,68	2,22	0,05	0,07			0,07			0,66	0,19	0,91	0,32	0,09	
■ Career Development Awards	0,50	0,30		0,20					0,10		0,10	0,40	0,50	0,60	0,20		
<b>Total</b>	<b>2,684</b>	<b>18,61</b>	<b>4,279</b>	<b>3,430</b>	<b>0,391</b>	<b>0,166</b>	<b>0,092</b>	<b>0,315</b>	<b>2,058</b>	<b>0,543</b>	<b>0,217</b>	<b>5,560</b>	<b>4,258</b>	<b>5,152</b>	<b>2,287</b>	<b>0,643</b>	
Distribution of Awards	%	5,29	36,72	8,44	6,77	0,77	0,33	0,18	0,62	4,06	1,07	0,43	10,97	8,40	10,16	4,51	1,27

Non-MSPs: Israel, China, Argentina, Taiwan, Brasil, Panama, Mexico

# 4.5

## FY 2016 FINANCIAL SUMMARY

As regards the FY 2016 budget, all MSPs paid the expected contribution during the fiscal year, except for India and Italy. All MSPs met the Brussels IGC target except for the US. The total amount received from all MSPs was 2.08 million USD less than expected, due to outstanding contributions.

The accounting summary (Table 4-3) provides an overview of income and expenditures. Together, these result in the cash net financial position. Contributions paid in currencies other than the USD are consolidated at the exchange rate of the date of payment.

HFSPo limits currency exchange as far as possible, using contributions in one currency for the payment of awardees in the same currency.

Overall 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 two million.

### > Table 4-3

HFSPo accounting summary FY 2016 (budget and actual rates) – income

INCOME / CURRENT COMMITMENTS	Budget 2016 In m USD	Report FY 2016 In m USD (actual rate)	EXPENDITURES/ NEW COMMITMENTS	Budget 2016 In m USD	Report FY 2016 In m USD
<b>1. CONTRIBUTIONS</b>	<b>53,850</b>	<b>51,725</b>	<b>1. ADMINISTRATIVE EXPENSES</b>	<b>3,723</b>	<b>3,757</b>
Australia	0,757	0,757	<b>2. PROGRAM ACTIVITIES</b>	<b>53,541</b>	<b>51,105</b>
Canada	1,508	1,503	Program Grants	25,500	25,450
European Union	5,509	5,457	Young Investigators	8,500	8,500
France	2,579	2,548	Fellowships	15,946	13,755
Germany	5,130	5,045	Career Development Awards	2,900	2,900
India	1,050	0,000	Meetings and outreach activities	0,695	0,500
Italy	1,041	0,000	<b>3. COMMITTED FUNDS BEYOND FY (in USD)</b>	<b>54,957</b>	<b>52,040</b>
Japan	20,713	21,043	Committed funds from previous year	2,922	
Korea	0,829	0,829	Program Grants	25,500	25,400
New Zealand	0,144	0,144	Young Investigators	7,900	7,900
Norway	0,645	0,645	Fellowships	16,235	16,240
Singapore	0,541	0,541	Career Development Awards	2,400	2,500
Switzerland	0,920	0,933			
UK	2,355	2,151			
USA	10,129	10,129			
<b>2. INTERESTS AND CAPITAL GAIN</b>	<b>0,250</b>	<b>0,590</b>			
<b>3. MISCELLANEOUS REIMBURSEMENTS</b>		<b>0,055</b>			
<b>4. TREASURY</b>	<b>55,341</b>	<b>54,727</b>			
EMTN	42,000	45,000			
UCITS in USD	10,467	7,953			
SAVING ACCOUNTS in EUR	0,163	1,350			
CURRENT BANK ACCOUNTS	2,711	0,424			
	(02/2016)	(31/03/17)			
<b>TOTAL INCOME</b>	<b>109,441</b>	<b>107,097</b>	<b>TOTAL EXPENSES</b>	<b>112,221</b>	<b>106,902</b>
To be received from previous FY (IN-IT)	3,499	2,158	<b>ANNUAL BALANCE (POSITIVE)</b>	<b>0,719</b>	<b>2,354</b>
<b>ANNUAL BALANCE (NEGATIVE)</b>		<b>0</b>	<b>GRAND TOTAL</b>	<b>112,940</b>	<b>109,256</b>
<b>GRAND TOTAL</b>	<b>112,940</b>	<b>109,256</b>			

\*EMTN: Euro Medium Term Notes  
\*UCITS: Undertaking for  
Collective Investments in  
Transferable Securities

#### Notes on FY 2016 accounts

Accounts for FY 2016, consolidated in EUR, were prepared by the chartered accountants MAZARS. Price Waterhouse Coopers audited and certified these accounts. HFSPo's legal accounts are reported on an accrual basis. They follow the French regulations (GAAP) applicable to not-for-profit organizations. Legal accounts are consolidated and stated in EUR. The currency of consolidation used for HFSPo's internal reporting, including this annual report, is the USD.

# 4.6

## FINANCIAL OUTLOOK FOR FY 2017

### Contributions

Planning for the FY 2017 budget was based on MSPs' contributions as confirmed at the 52nd Board meeting (March 2017). This amounted to 55.261 million USD.

> Table 4-4

Overview of HFSP0 budget for FY 2017 including all commitments for future years as presented in March 2017.

INCOME		Budget 2017 m lc	London IGC m USD	Budget 2017 m USD <i>At budget rate</i>	EXPENDITURES	Budget 2017 m lc EUR	Budget 2017 m USD USD
<b>1. CONTRIBUTIONS</b>		<b>N.A.</b>	<b>55,3</b>	<b>55,261</b>	<b>1. HFSP OPERATION</b>	<b>3,38</b>	<b>3,75</b>
Australia	USD	0,77	0,77	0,77	<b>2. PROGRAM ACTIVITIES</b>	<b>USD</b>	<b>51,06</b>
Canada	CAD	2,00	1,54	1,54	Program Grants	21	24,55
European Commission	EUR	5,06	5,62	5,62	Young Investigators	9	8,55
France	EUR	2,37	2,63	2,63	Long Term Fellowships	85	14,51
Germany	EUR	4,71	5,23	5,23	Career Development Awards	10	2,70
India	USD	1,07	1,07	1,07	Awardees meetings	0,25	0,28
Italy	EUR	0,96	1,06	1,06	Program meetings (RC, COS, SEL)	0,32	0,36
Japan (budget as of 22/12/2016)	USD	21,04	21,04	21,04	Outreach activities - Alumni network	0,07	0,08
New Zealand	USD	0,15	0,15	0,15	Nakasone Award	0,03	0,04
Norway	USD	0,66	0,66	0,66	<b>3. NOT YET PAID A OF 1/2/17</b>		<b>3,46</b>
Norway	USD	0,66	0,66	0,66	CDA		1,00
Korea	USD	0,85	0,85	0,85	LT		0,99
Switzerland	CHF	0,94	0,94	0,94	RG		0,00
UK	GBP	1,56	2,40	2,40	Office costs to go for FY2016		1,47
USA	USD	10,75	10,75	10,75	<b>4. COMMITTED FUNDS BEYOND FY</b>		<b>51,67</b>
Singapore	USD	0,55	0,55	0,55	Program Grants		24,10
<b>2. INTERESTS AND CAPITAL GAIN</b>	<b>USD</b>			<b>0,25</b>	Young Investigators		8,95
				0,25	Long Term Fellowships		15,82
<b>3. TREASURY AS OF 1/2/17</b>	<b>0,0</b>			<b>54,61</b>	Career Development Awards		2,80
EMTN				45,00	<b>5. NEGATIVE BALANCE FROM PREVIOUS FY</b>		
UCITS in USD				7,95	<b>TOTAL EXPENSES + COMMITTED FUNDS</b>		<b>109,94</b>
Saving accounts in EUR				0,23	<b>BALANCE (positive)</b>		<b>5,098</b>
Current bank accounts				1,43	<b>GRAND TOTAL</b>		<b>115,03</b>
<b>4. CONTRIBUTO RECEIVE FROM PREVIOUS FY (FR-GE-IN-KO-IT) AS OF 1/02/17</b>	<b>USD</b>			<b>4,916</b>			
<b>TOTAL INCOME + ASSETS (incl. 60kUSD in kind)</b>	<b>USD</b>			<b>115,03</b>			
<b>BALANCE (negative)</b>	<b>USD</b>			<b>0,000</b>			
<b>GRAND TOTAL</b>	<b>USD</b>			<b>115,03</b>			

\*EMTN: Euro Medium Term Notes - \*UCITS: Undertaking for Collective Investments in Transferable Securities

### Program activities

The Program Activity Plan was adopted by the Board on 17 March 2017. Within the limits of the projected budget, it decided to make the following awards:

- 21 Program Grants;
- 9 Young Investigator Grants;
- 85 Long-Term and Cross-Disciplinary Fellowships, with no reserve list;
- 10 Career Development Awards with no reserve list.

Program activities in FY 2017 will cost 51.06 million USD and include the 17<sup>th</sup> HFSP Awardees meeting in Lisbon, Portugal, the Nakasone Award 2017, attendance at scientific meetings and travel for Council and Review Committee members.

# 4.7

## OVERVIEW OF HFSP0 BUDGET FOR FY 2017

HFSP0 continues to operate on a sound financial basis. For Program activities in FY 2017 and beyond, and for operational costs, it has committed 115.03 million USD. HFSP0 expects to receive 55.261 million USD in MSPs' contributions for FY 2017.

Together with resources from past contributions, interest and income from investments, the total amount available for FY 2017 and beyond will be over 115.03 million USD. The anticipated balance between income and expenditure should be positive and amounts to about 5.098 million USD. The Board of Trustees agreed to retain the balance of 5 million USD as a buffer against unexpected events in the current international environment in the knowledge that this amount will be available for subsequent annual awarding rounds.





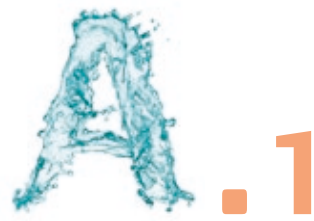




# A PPENDIX

## 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 HFSP 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 HFSP 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 HFSP.

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 HFSP and reconfirm its view that HFSP 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 <sup>1</sup>	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 <sup>2</sup>	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 HFSP 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.

<sup>1</sup> As of 25 October 2016, the EU confirmed the figures above, following adoption of Horizon 2020 (the EU Framework Programme for Research and innovation 2014-2020).

<sup>2</sup> As of 14 November 2016, Norway confirmed the figures above.

# 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.)

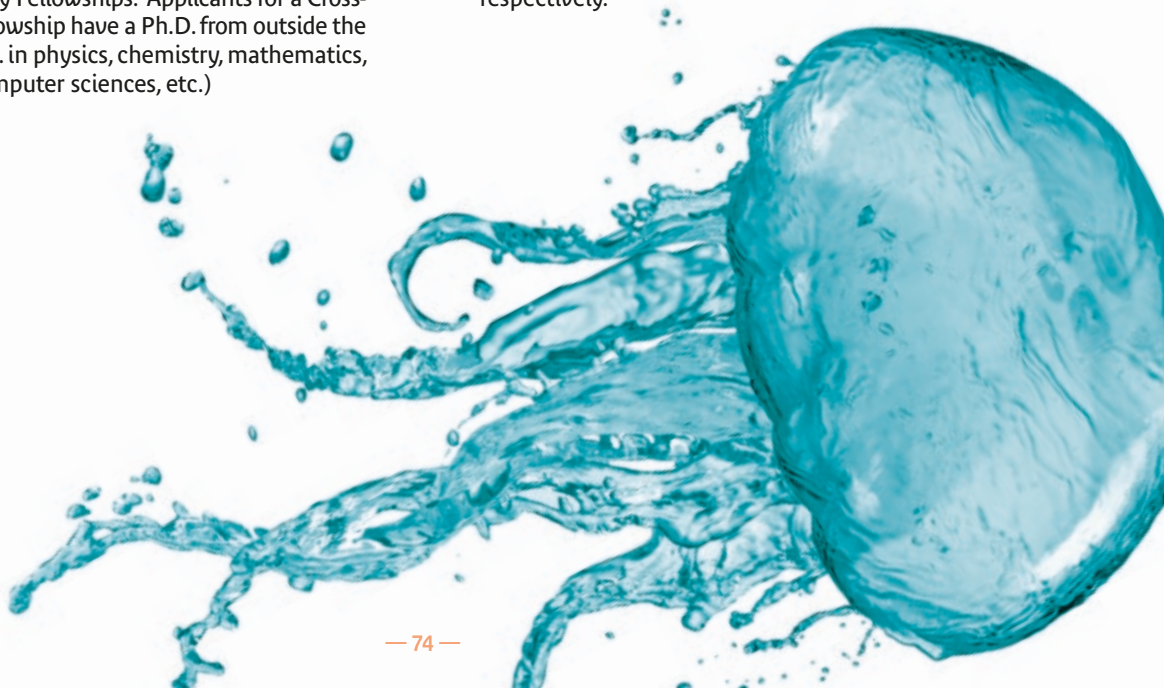
## Career Development Awards

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.



# JOINT COMMUNIQUÉ OF THE IGC ON HFSP0 (LONDON, 10 JUNE 2016)

AUSTRALIA

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JAPAN

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CANADA

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NEW ZEALAND

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EUROPEAN UNION

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NORWAY

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FRANCE

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REPUBLIC OF KOREA

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GERMANY

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SINGAPORE

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INDIA

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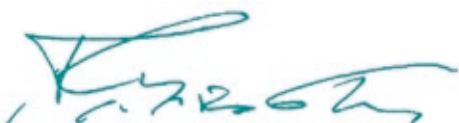
SWITZERLAND

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ITALY

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UNITED KINGDOM

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UNITED STATES OF AMERICA

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# A.2

## BOARD DECISIONS FY 2016

### 51<sup>st</sup> Board meeting, 24-25 October 2016

1. *Nakasone Award*: The Board unanimously approved the Council recommendation that the 2017 Nakasone Award be given to Dr. David Julius, University of California, San Francisco, USA.
2. *Independent Scientific Review*: The Board supported the proposal of the Secretary General to carry out an independent scientific review of the Program.
3. *Statutory Auditors' Report*: This was unanimously approved without comment as were the accounts for 2015.
4. *Appointment of Statutory Auditors*: The Board unanimously approved the recommendation of the Secretariat to appoint PriceWaterhouseCoopers as Statutory Auditors to HFSP0 for a period of six years from 2017.
5. *Appointment of Internal Auditors*: The Board unanimously approved the appointment of Mr. Tony Krizan (NHMRC, Australia), Mr. François Matisse (ANR, France), Mr. David Peckham (CIHR, Canada) as Internal Auditors under the current Statutes for a term of one year.

The Board approved the appointment of Mr. Toru Nakahara (JST, Japan) as Special Senior Advisor to the Internal Auditors in the light of his experience of government and of HFSP0.

### 52<sup>nd</sup> Board meeting, 16-17 March 2017

1. *Revision of the Statutes*: The Board asked the working group to prepare a final draft for approval by the Board at its AGM 2017.
2. *Strategic Plan*: The Board asked the working group to prepare a final draft for approval by the Board at its AGM 2017.
3. *CDA program*: The Board agreed to establish a joint working group of the Board of Trustees and the Council of Scientists to provide advice to the Board on the future of the CDA program.
4. *2017 awards*: Based on the recommendation of the Recommendation Committee, the Board unanimously approved the award of the following in FY 2017:
  - 30 Research Grants (21 Program Grants and 9 Young Investigator Grants)
  - 85 Fellowships (74 Long-Term Fellowships and 11 Cross-Disciplinary Fellowships)
  - 10 Career Development AwardsThe Board also unanimously authorized the announcement of awards as proposed.
5. *Election of Treasurer*: Dr. Palmer was unanimously elected Treasurer.
6. *Election of Vice President*: Dr. Charest was unanimously elected Vice-President of the Board of Trustees.
7. *Revised Bylaws*: The Board unanimously approved Bylaw Section C, Council of Scientists, subject to agreed rewording.



HFSP0  
Registre des Associations de Strasbourg  
Volume 60 - Folio 99  
Achevé d'imprimé en juin deux mille quinze  
sur les presses de Faber

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HFSP0 thanks Sandro Weltin (pp. 10, 15, 33, 45), Jean-Marc de Balthasar (pp. 12, 15), Manoj Sudhakaran (p. 14), Guntram Bauer (pp. 17, 59), Robin Davies, University of Wisconsin-Madison Media Lab. (p. 23), MRC Laboratory of Molecular Biology (p. 29), Christian Lünig (p. 29), Stefania Rossi (p. 29), University of Waikato website (p. 41), for supplementary photos in addition to the one provided by Marja Timmermans (p. 30).

Illustrations, including the cover page, are on the theme of water, earth and water creatures (Shutterstock - Luca Luppi, pockygallery, Galore777, Vitaly Korovin, Lotus studio, Volodymyr Krasnyuk, Karramba Production, Klagyivik Viktor).

## Acknowledgements

HFSP is grateful for the support of the following organizations:



**Australia**  
National Health and Medical Research Council (NHMRC)



**Canada**  
Canadian Institute of Health Research (CIHR)  
Natural Sciences and Engineering Research Council (NSERC)



**European Union**  
European Commission - Directorate General Research (DG RESEARCH)



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



**Germany**  
Federal Ministry of Education and Research (BMBF)



**India**  
Department of Biotechnology (DBT), Ministry of Science and Technology



**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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