

*International Prize*  
*for*  
**BIOLOGY**

Japan Society for the Promotion of Science  
Committee on the International Prize for Biology



**JSPS**

# From Japan to the World

## Wishing for the further progress in



Takashi Sugimura

Chairperson  
Committee on the International  
Prize for Biology

The International Prize for Biology was established in 1985 to commemorate the sixty-year reign of Emperor Showa and his long devotion to biological research. It also pays tribute to the present Emperor, His Majesty, Emperor Akihito, who has striven for many years to advance the study of gobioid fish taxonomy, while contributing continuously to the development of this Prize. Each year, the International Prize for Biology is conferred in a field selected by the Committee from among all the fields of biology. Based on recommendations gathered from around the world, it is awarded to the researcher who has the most outstanding record of achievements in that field. Once every decade, the discipline selected has been systematic biology and taxonomy, the field in which, like Emperor Showa before him, His Majesty the present Emperor has conducted research over many years.

The annual presentation is made with due ceremony at the Japan Academy in the presence of Their Majesties the Emperor and Empress. At the reception that follows the ceremony, we are fortunate indeed to have the opportunity for the recipient and the supporters of the Prize to enjoy conversation with Their Majesties, and I consider it a very great honor to be able to discuss scientific matters and other topics in person with His Majesty, who is a biologist of distinction.

I pledge my utmost efforts to ensure its further development as a prestigious award in the biological sciences that has earned esteem around the world. To this end, I ask scientific researchers and all concerned for your sustained support and cooperation.

# biological sciences

## Overview-The International Prize for Biology

Purpose	<p>The International Prize for Biology is a commemorative prize to celebrate the sixty-year reign of Emperor Showa and his longtime devotion to biological research. It also pays tribute to the present Emperor, His Majesty, Emperor Akihito, who has striven for many years to advance the study of gobioid fish taxonomy while contributing continuously to the developing of this Prize.</p>
Establishment	<p>The establishment of the Prize was realized mainly through the earnest desire of biological scientists and others concerned for the creation of an international prize to be awarded to distinguished scientists in systematics and taxonomy and other fields of fundamental biology. Great efforts made by the Ministry of Education, Science and Culture, the Japan Academy, the Japan Society for the Promotion of Science, the Zoological Society of Japan, the Botanical Society of Japan and other institutions and organizations concerned as well as the generous cooperation extended by economic organizations contributed to the realization of this wish of biological scientists.</p>
Committee	<p>Committee on the International Prize for Biology</p> <p><i>Chair:</i> Dr. Takashi Sugimura, President of the Japan Academy</p> <p><i>Structure:</i> The Committee consists of no more than 40 members.</p> <p>The Selection Committee and the Finance Committee are organized as subcommittees under the Committee on the International Prize for Biology.</p> <p><i>The date of establishment:</i> April 25th, 1985</p> <p><i>Secretary Office:</i> the Japan Society for the Promotion of Science</p>
Recipient	<p>The Prize shall be awarded to an individual who has made an outstanding contribution to the advancement of research in fundamental biology.</p>
Field	<p>The branch of biology to which the Prize will be presented shall be decided upon annually by the Committee.</p>
Selection Process	<p>The selection committee shall invite nominations of candidates from such relevant individuals and organizations at home and abroad as the selection committee may deem appropriate. The selection committee shall submit to the Committee a report containing recommendations of the candidate for the Prize and supporting statement. The recipient is selected by the Committee.</p>
Awards	<p>The Prize shall consist of a certificate, a medal, a prize of ten million yen and the Imperial Gift of a silver vase bearing the Imperial crest.</p>
Presentation Ceremony	<p>The Prize shall be presented in Tokyo every year. In conjunction with the Presentation Ceremony, an international symposium is held and the recipient of the Prize is invited to give a special lecture.</p>
Fund	<p>The fund was established by the Japan Society for the Promotion of Science to accept donations and finance the management of the Prize.</p>

## *Achievements of Emperor Showa in Biology*

As a biologist, Emperor Showa devoted himself in his spare time for many years to research in the systematics of hydroids from Sagami Bay and other marine animals, seaweeds and myxomycetes as well as to general studies of plants in Nasu and Suzaki. Especially, the Emperor was known as one of the world authorities for his study of hydroids which was highly appreciated by describing two genera of thecate Clathrozonidae, *Clathrozoön wilsoni* and *Pseudoclathrozoön cryptolarioides* gen. et sp. nov. for the first time.

He could describe these genera by

keeping the colonies alive for some days in his Biological Laboratory in the Imperial Palace.

Over a period of many years, the Emperor also collected numerous specimens of opisthobranchs, sea stars, crustaceans, and other marine creatures from the tide pools and shallows of Sagami Bay. Collaborating researchers in a variety of fields conducted studies and wrote critiques on these specimens, which are published as literature of the Imperial Biology Laboratory. Also interested in botany, the Emperor coauthored a number of books on studies he made of the flora in Nasu and Suzaki, as well as on the Imperial Palace grounds.



Emperor Showa at the Biological Laboratory, Imperial Household

## *The Medal of the International Prize for Biology*



Prize Medal

The medal of the International Prize for Biology bears an abstract design based on a part of the colony of the Clathrozonidae, especially of the species *Pseudoclathrozoön cryptolarioides* described by Emperor Showa who was also a biologist.

Designer: Sagenji Yoshida  
(Professor Emeritus, Tokyo National University of Fine Arts and Music)



*Pseudoclathrozoön cryptolarioides*

## Achievements of His Majesty the Emperor in Biology

Finding time between his official duties, for many years His Majesty the Emperor has pursued the taxonomic study of fish of the suborder Gobioidi, and between 1963 and the present he has published a total of 28 original papers in the journals of the Ichthyological Society of Japan.

For example, of the three known Japanese species of the genus *Cristatogobius* (family Gobiidae) — the Kuro-tosakahaze, Tosakahaze, and Hime-tosakahaze—the latter two were known only by their Japanese common names as their scientific names were undetermined. As a result of his studies of these three species of *Cristatogobius*, His Majesty identified the Tosakahaze as *Cristatogobius lophius* Herre and described the Hime-tosakahaze as a new species, *Cristatogobius aurimaculatus*.

He has also coauthored a paper that estimated the evolutionary process in gobioid fishes using mitochondrial DNA and compared the findings with phylogenetic relationships based on morphology; this study appeared in *Gene*, the international journal of genetics published in the Netherlands.

For his work in ichthyological research, in 1980 His Majesty was invited to become one of the foreign members of the Linnean Society of London, whose number does not exceed fifty. He was elected an honorary member of that Society in 1986; he is also an honorary associate of the Australian Museum, an honorary member of the Zoological Society of London, and a permanent honorary member of the Research Institute for Natural Science of Argentina. In 1998, he became the first recipient of the King Charles the Second Medal, which is awarded by the Royal Society of London to those heads of state who have made an outstanding contribution to the advancement of science.

Further, in 1992, when the American journal *Science* published a special issue on Japan, at the editors' request His Majesty contributed an article titled "Early Cultivators of Science in Japan." In 2007, he presented the keynote lecture, entitled "Linné and Taxonomy in Japan," at the Linnean Society of London when it marked the 300th anniversary of Carl von Linné's birth, and an extract of the lecture was published in the British scientific journal *Nature*.



His Majesty the Emperor conducts research on gobioid fishes



Imperial Gift  
the recipients are  
to receive a silver vase  
bearing the Imperial crest

*International Prize for Biology -Research fields and Recipients-*

The Prize is awarded annually to a researcher who has made an outstanding contribution to make advance in biological sciences.

The branch of biology to which the Prize will be presented is selected by the Committee every year. The Prize is awarded to an individual in recognition of his/her distinguished scientific achievement in the branch. The selection committee invites nominations of candidates from such relevant individuals and organizations at home and abroad. After screening the nominations, the Selection Committee submits the report with recommendations and supporting statements to the Committee on the International Prize for Biology. On the basis of this account, the recipient of the Prize is chosen by the Committee.

*The List of Recipients of the International Prize for Biology*

1985 (1st)	<b>Dr. Edred John Henry Corner</b> <i>Taxonomy or Systematic Biology</i>	2000 (16th)	<b>Dr. Seymour Benzer</b> <i>Developmental Biology</i>
1986 (2nd)	<b>Dr. Peter Hamilton Raven</b> <i>Systematic Biology and Taxonomy</i>	2001 (17th)	<b>Dr. Harry B. Whittington</b> <i>Paleontology</i>
1987 (3rd)	<b>Dr. John Bertrand Gurdon</b> → P6 <i>Developmental Biology</i>	2002 (18th)	<b>Dr. Masatoshi Nei</b> <i>Biology of Evolution</i>
1988 (4th)	<b>Dr. Motoo Kimura</b> <i>Population Biology</i>	2003 (19th)	<b>Dr. Shinya Inoué</b> <i>Cell Biology</i>
1989 (5th)	<b>Dr. Eric James Denton</b> <i>Marine Biology</i>	2004 (20th)	<b>Dr. Thomas Cavalier-Smith</b> → P7 <i>Systematic Biology and Taxonomy</i>
1990 (6th)	<b>Dr. Masakazu Konishi</b> <i>Behavioral Biology</i>	2005 (21st)	<b>Dr. Nam-Hai Chua</b> <i>Structural Biology in Fine Structure, Morphology and Morphogenesis</i>
1991 (7th)	<b>Dr. Marshall Davidson Hatch</b> <i>Functional Biology of Plants</i>	2006 (22nd)	<b>Dr. Serge Daan</b> <i>Chronobiology</i>
1992 (8th)	<b>Dr. Knut Schmidt-Nielsen</b> <i>Comparative Physiology and Biochemistry</i>	2007 (23rd)	<b>Dr. David Swenson Hogness</b> <i>Genetics</i>
1993 (9th)	<b>Dr. Edward Osborne Wilson</b> → P6 <i>Ecology</i>	2008 (24th)	<b>Dr. George David Tilman</b> <i>Ecology</i>
1994 (10th)	<b>Dr. Ernst Mayr</b> <i>Systematic Biology and Taxonomy</i>	2009 (25th)	<b>Dr. Winslow Russell Briggs</b> <i>Biology of Sensing</i>
1995 (11th)	<b>Dr. Ian Read Gibbons</b> <i>Cell Biology</i>	2010 (26th)	<b>Dr. Nancy Ann Moran</b> → P7 <i>Biology of Symbiosis</i>
1996 (12th)	<b>Dr. Ryuzo Yanagimachi</b> <i>Biology of Reproduction</i>	2011 (27th)	<b>Dr. Eric Harris Davidson</b> <i>Developmental Biology</i>
1997 (13th)	<b>Dr. Elliot Martin Meyerowitz</b> <i>Plant Science</i>	2012 (28th)	<b>Dr. Joseph Altman</b> → P8 <i>Neurobiology</i>
1998 (14th)	<b>Dr. Otto Thomas Solbrig</b> <i>The Biology of Biodiversity</i>	2013 (29th)	<b>Dr. Joseph Felsenstein</b> <i>Biology of Evolution</i>
1999 (15th)	<b>Dr. Setsuro Ebashi</b> <i>Animal Physiology</i>	2014 (30th)	<b>Dr. Peter Crane</b> <i>Systematic Biology and Taxonomy</i>
		2015 (31st)	<b>Dr. Yoshinori Ohsumi</b> → P8 <i>Cell Biology</i>

## Developmental Biology

We *Homo sapiens* start life as a single fertilized egg in our mother's womb, and by the time we are born our bodies have a complex structure complete with organs such as the brain, lungs, and digestive tract. Other animals and plants—even fungi, if they are multicellular—also generally start life as a zygote (like the fertilized egg), which becomes an embryo through cell division; as the cells continue to divide, they differentiate and become organized into the structures and morphology of the adult form. The study of the processes and mechanisms involved in the adult's formation is known as developmental biology. In the 19th century, biologists made comparative studies of embryo morphology between different organisms. Research reached the molecular level—genes and proteins—when the techniques of molecular biology were introduced in the 20th century, and this led to discovery of the homeobox genes, which direct development. Dr. John Gurdon, the third recipient of the International Prize for Biology, shared the Nobel Prize in 2012 with Dr. Shinya Yamanaka of Kyoto University, who produced iPS cells.

### 3rd (1987, Research field: Developmental Biology)

Recipient

#### Dr. John Bertrand Gurdon

John Humphrey Plummer Professor of Cell Biology,  
University of Cambridge, UK

Date of Birth: 2 October 1933 Nationality: United Kingdom

Achievements  
recognized  
by the Award

By injecting the nucleus of another cell into the cytoplasm of an egg, using amphibians, Dr. Gurdon was the first to show that even the nucleus of a fully differentiated cell can be “initialized” so that it repeats its development, becoming a larva and eventually even a parent. This work had a major impact on the advancement of developmental biology, cellular engineering, and the biological sciences as a whole.



## Ecology

How organisms live in their natural environment is called their ecology; this is also the name of the branch of science that studies the way they live. Ecologists study how organisms live and interact with their environment, being influenced by it and influencing it in their turn. The state of an ecosystem—the complex formed by a community of organisms and their environment—is not easy to grasp because, among other reasons, the environment is not circumscribed like a forest or a lake, and there are complex relationships among predators and prey. Recently, ecology has been gaining in importance as biodiversity is increasingly threatened by global warming and the spread of invasive species.

### 9th (1993, Research field: Ecology)

Recipient

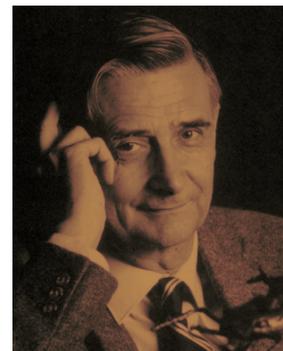
#### Dr. Edward Osborne Wilson

Professor and Curator in Entomology Museum of Comparative Zoology,  
Harvard University, USA

Date of Birth: 10 June 1929 Nationality: USA

Achievements  
recognized  
by the Award

Dr. Wilson's studies on ants, taking ecological, biogeographical, and behavioral approaches, have yielded a wealth of new knowledge in such areas as community structure, distribution, caste differentiation, and communication. His argument that understanding the social behavior of animals requires a synthesis of ecology, ethology (the study of behavior), and population genetics, and his advocacy of social biology contributed greatly to the advancement of ecology and the biological sciences as a whole.



\*Please note that the affiliations of recipients are the ones that they were awarded.

## Systematic Biology and Taxonomy

The science of taxonomy groups living things to make their enormous diversity easier for humans to understand, while systematic biology infers how these organisms evolved and traces their evolutionary history. We used to group organisms and infer their evolutionary pathways according to their morphology (appearance). Since the 1980s, the ability to sequence the DNA of genes and the amino acids of proteins has allowed us to utilize differences in the arrangements of these biomolecules as clues to evolutionary pathways. Thus, biologists can now employ the common benchmark provided by biomolecules to compare different organisms and shed light on the age-old processes of evolution. Emperor Showa pursued evolutionary studies over many years, and His Majesty the present Emperor continues to do so. Accordingly, once every ten years “systematic biology and taxonomy” are chosen as the field for the International Prize for Biology.

### 20th (2004, Research field: Systematic Biology and Taxonomy)

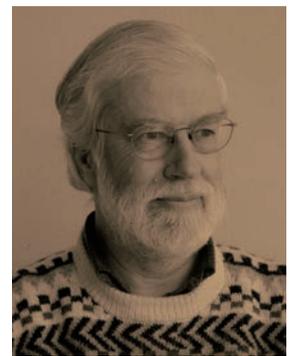
Recipient

#### Dr. Thomas Cavalier-Smith

Professor of Zoology, University of Oxford, UK  
Date of Birth: 21 October 1942 Nationality: United Kingdom and Canada

Achievements  
recognized  
by the Award

Dr. Cavalier-Smith has published many works which organize and systematize the classification of the living world, taking a bold yet detailed approach on the basis of his special expertise in cell biology, electron microscopy, and molecular biology, backed by his knowledge of the latest developments in every field of biological science. Focusing on the evolution of cells by endosymbiosis, he has helped create a more natural classification system, primarily by proposing the “six kingdom theory,” which added the kingdom Chromista to the five kingdoms (the Monera, Protista, Plantae, Fungi, and Animalia) that had been generally accepted for some time.



## Biology of Symbiosis

No biological organism can live without interacting in some way with other living things. The relationships that arise between such partners vary. For example, when only one of the parties benefits, the relationship is known as “commensalism”; when both benefit, it is known as “mutualistic symbiosis.” And when one party benefits at the other’s expense, it is called “parasitism.” The more we learn about the complexity of relationships among living things, however, the more difficult it becomes to distinguish between symbiosis and parasitism. The 1970s saw the birth of endosymbiotic theory, which holds that in the course of evolution certain cells came to live inside other cells. Also, symbionts influence each other’s evolution, and this “coevolution” is another area where research is making progress.

### 26th (2010, Research field: Biology of Symbiosis)

Recipient

#### Dr. Nancy Ann Moran

William H. Fleming Professor, Department of Ecology and  
Evolutionary Biology, Yale University, USA  
Date of Birth: 21 December 1954 Nationality: USA

Achievements  
recognized  
by the Award

Dr. Moran has contributed greatly to the advancement of the biology of symbiosis in recent years through her studies of intimate coevolutionary relationships between insects and the endosymbiotic bacteria that live within them, studies which have yielded by far the largest number of outstanding research results in this field thanks to Dr. Moran’s versatile approach, which draws on molecular biology, genomics, and experimental and theoretical biology.



## Neurobiology

In order to survive, living creatures perceive changes in their environment using senses such as sight, hearing, taste, smell, and touch. The information obtained is carried to the brain for processing, as a result of which the organism may take action or changes may occur in its body. The information is conducted there by the nervous system, which developed as multicellular organisms evolved due to the need to transmit information among the cells in order to permit coordinated functioning. Research into the brain, the center of the nervous system, dates back to ancient Egypt, and sketches of microscopic observations of nerve cells were published as early as 1865. The information processing system centered on the brain is highly complex, however, and there is much that we still do not understand.

### 28th (2012, Research field: Neurobiology)

Recipient

#### Dr. Joseph Altman

Professor Emeritus, Purdue University, USA  
Date of Birth: 7 October 1925 Nationality: USA



Achievements recognized by the Award

Dr. Altman proved in the 1960s that neurons continue to be generated in certain areas of the adult mammalian brain. His discoveries, which were reaffirmed 30 years later, laid the foundations of a new field of medicine and bioscience which brings together neuroscience, stem cell biology, psychiatry, and neurology, thus contributing greatly to the advancement of the biological sciences as a whole.

## Cell Biology

Exactly when the genesis of life occurred remains unclear, but fossils of microorganisms have been found in sedimentary rock from at least 3.5 billion years ago. Life at that time was unicellular, consisting of a single cell. Cells eventually took on a structure with a membrane-surrounded nucleus and organelles such as the mitochondria, and multicellular organisms followed. All life consists of cells, and our knowledge of the cell is the key to our knowledge of life. Cells themselves are equipped with functions such as self-replication and metabolism, while in multicellular organisms cells of the same kind come together to form tissues and perform various functions to maintain life. Cell biology is the study of the structures and functions of cells.

### 31st (2015, Research field: Cell Biology)

Recipient

#### Dr. Yoshinori Ohsumi

Honorary Professor, Frontier Research Center,  
Tokyo Institute of Technology, Japan  
Date of Birth: 9 February 1945 Nationality: Japan

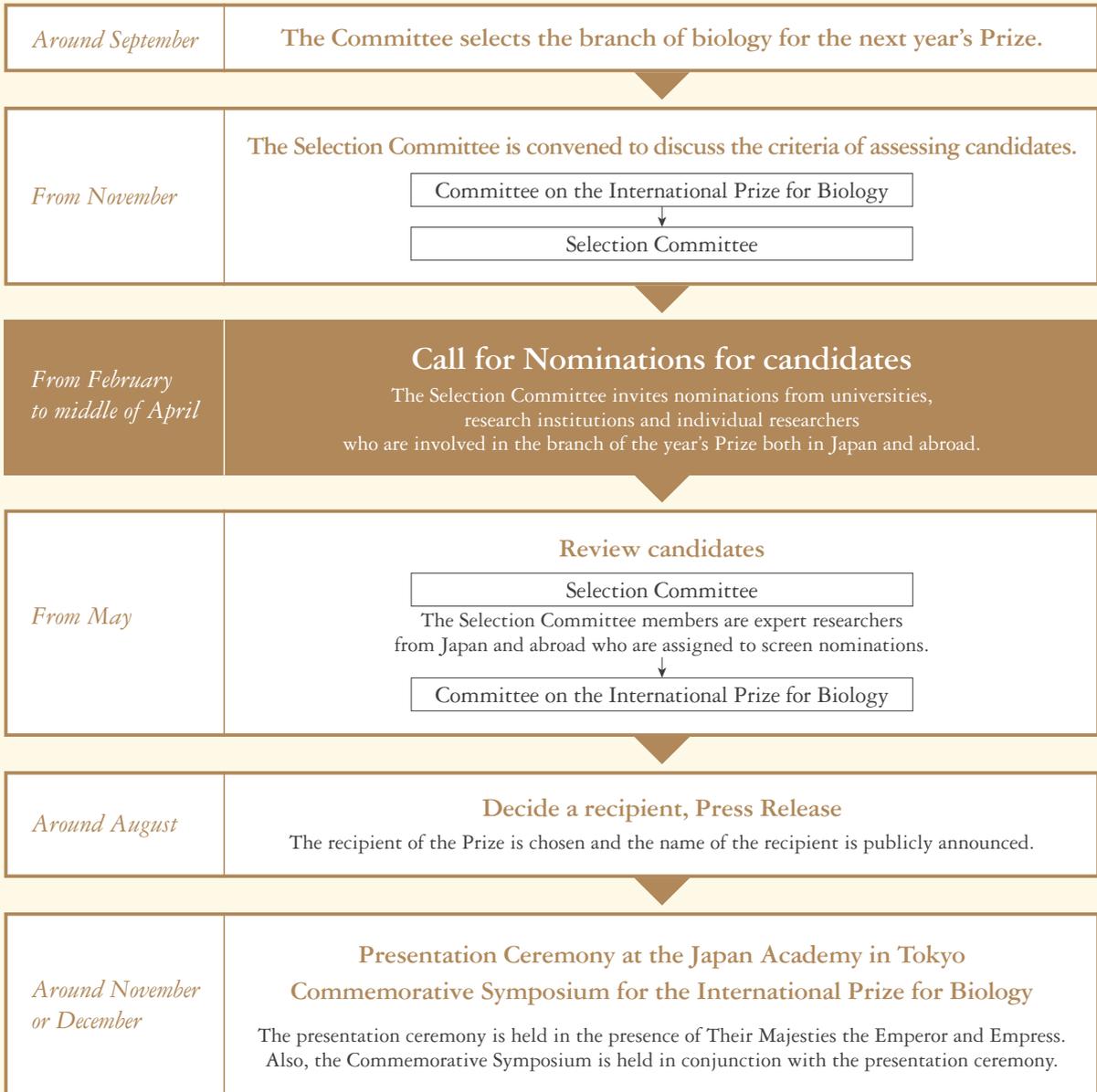


Achievements recognized by the Award

Dr. Ohsumi elucidated the key mechanisms of autophagy, which were completely unknown before his studies. He first identified and analyzed multiple autophagy-related genes (ATG genes) in yeast. He established autophagy as an important research field in Cell Biology by elucidating its key molecular mechanisms and by showing that it is an important life phenomenon, widely conserved throughout the living world.

\*Please note that the affiliations of recipients are the ones that they were awarded.

## Process of nomination and selection of a recipient of the International Prize for Biology



The Presentation Ceremony for the 2014 Prize  
(Recipient: Dr. Peter Crane)



Dr. Joseph Felsenstein (2013 recipient)  
with Their Majesties the Emperor and Empress (at the reception)

# Donation



The International Prize for Biology established a fund in the Japan Society for the Promotion of Science, and it is managed by your donation.

To maintain and grow this prize for a long time, your donation is essential. The Committee on the International prize for biology invites your donations.

If you would like to donate to the fund, please download the form from our website at [http://www.jsps.go.jp/english/e-biol/03\\_donation.html](http://www.jsps.go.jp/english/e-biol/03_donation.html), email your donation form to the Secretary Office and make a bank transfer using the account details below.

Thank you for your cooperation.

## *Bank Account Information*

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Branch : Tokyo Public Institutions Operations Office  
Branch Address : 18th floor, Nishi-shimbashi Square 3-1,  
Nishishimbashi 1-chome, Minato-ku Tokyo. Japan  
Account Type : Ordinary Account  
Account Number : 3006718  
Account Holder's Name : Japan Society for the Promotion of Science

## *Contact details for inquiries*

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