International Prize for BIOLOGY

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

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From Japan to the World Working toward the further progress of biological sciences

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 His Majesty the Emperor Emeritus, who has labored for many years to advance the taxonomical study of gobioid fish, while striving continuously to elevate the international stature of the Prize.

Each year, the International Prize for Biology is conferred upon a distinguished researcher in a field selected by the Prize Committee from among all the fields of biology. Based on nominations gathered from around the world, the Prize is awarded to a biologist judged to have a superlative record of achievements in the subject field. Once every decade, "systematic biology and taxonomy" is selected for the Prize as it is the field in which, like Emperor Showa before him, His Majesty the Emperor Emeritus has conducted research over many years.

So as to spread global recognition of the International Prize for Biology as a tribute to excellent achievement while accelerating the advancement of biology, the Prize Committee asks for your sustained cooperation and support.

Overview of International Prize for Biology

Purpose

Establishment

Prize Committee

Selection Process

Presentation

Ceremony

Prize Fund

Imperial Gift

and Secretariat

Recipients

Fields

While paying tribute to the long-sustained research endeavors of Their Majesties, Emperor Showa and the Emperor Emeritus, the International Prize for Biology gives prestigious recognition to biologists around the world who have made superlative contributions to advancing their fields of biological science.

The Prize was established in April 1985 to accede to a fervent desire voiced by biological scientists and others to create an international award to recognize the work of leading scientists in "systematic biology and taxonomy" and other fields of fundamental biology. In establishing the Prize, a dedicated effort was made by a consortium of organizations including the Ministry of Education, Science and Culture, The Japan Academy, Japan Society for the Promotion of Science, Zoological Society of Japan and Botanical Society of Japan. Also helping greatly to realize the desire of biological scientists to create an international prize were many individuals and associations who made generous financial contributions.

The Committee on the International Prize for Biology comprises up to 40 members, who choose the committee chair. Operating under the Prize Committee are two sub-committees: a selection committee and finance committee. The secretariat for the Prize is situated in the Japan Society for the Promotion of Science.

The Prize is awarded to researchers who have made exceptional contributions to the advancement of fundamental biology.

The branch of biology for which t Committee.

The selection committee invites the nomination of candidates from relevant individuals and organizations in Japan and abroad. The selection committee, then, screens the nominated candidates and forwards the top candidates to the Prize Committee along with supporting statements. The Prize Committee makes the final selection of each year's recipient.

The Prize is presented every year in a dedicated ceremony. The Prize consisting of a certificate, medal and purse of 10-milion yen is given to the recipient. In conjunction with the ceremony, an international symposium is held in which the Prize recipient is invited to give a special lecture.

A Prize Fund is established for accepting and managing donated money. It is operated by the Japan Society for the Promotion of Science.

Through the 34th ceremony of the International Prize for Biology, the imperial gift was presented to the awardee by the Emperor. In the 35th ceremony, it was presented by the Crown Prince.

The branch of biology for which the Prize is awarded is chosen each year by the Prize

Achievements of Emperor Showa in Biology

As a biologist, Emperor Showa devoted himself for many years to research in the systematics of hydroids collected from Sagami Bay along with studies he carried out on other marine animals, seaweeds and myxomycetes. He also conducted studies of plants in Japan's Nasu and Suzaki areas. The Emperor was known as one of the world authorities on hydroids, for which his research was highly acclaimed having described for the first time two genera of thecate Clathrozonidae, Clathrozoon wilsoni and Pseudoclathrozoon cryptolarioides gen. et sp. nov.. He was



Emperor Showa in Imperial Biological Laboratory

able to succeed in describing these genera by keeping colonies of them alive in his biological laboratory at 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 fields have conducted studies and written 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 grounds of the Imperial Palace.

Medal of the International Prize for Biology



The medal of the International Prize based on part of a colony of Clathrozoni-

Designer: YOSHIDA Sagenji University of Fine Arts and Music)

Pseudoclathrozoon cryptolarioides



Achievements of the Emperor Emeritus in Biology

Making time between his official duties, the Emperor Emeritus has over many years pursued a taxonomical study of fish in the suborder Gobioidei. Between 1963 and the present, he published a total of 28 original papers on this research in 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 had been undetermined. As a result of his studies of these three species of Cristatogobius, the Emperor Emeritus identified the Tosakahaze as Cristatogobius lophius Herre and described the Hime-tosakahaze as a new species, Cristatogobius aurimaculatus.

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

For his work in ichthyological research, the Emperor Emeritus was invited in 1980 to become a foreign member of the Linnean Society of London, whose membership numbers less than fifty. Then in 1986, he was elected as an honorary member of the Society. 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 Second Medal, awarded by the Royal Society of London to heads of state who have made outstanding contributions to the advancement of science.

In 1992 when the American journal Science published a special issue on Japan, the editors requested the Emperor Emeritus to contribute an article titled "Early Cultivators of Science in Japan." In 2007, he presented the keynote lecture, titled "Linné and Taxonomy in Japan," at the Linnean Society of London, marking the 300th anniversary of Carl von Linné's birth. An excerpt of that lecture was published in the British scientific journal Nature.



The Emperor Emeritus conducting research on gobioid fishes

Imperial Gift until the 34th presentation ceremony, a silver vase bearing the imperial crest

Research fields and Recipients

The Prize is awarded each year to a researcher who has made an exceptional contribution to the advancement of biological sciences.

Each year's branch of biology is selected by the Prize Committee. The Prize is awarded to a biologist in recognition of his/her lofty scientific achievements in the subject field. Each year, candidates for the Prize are solicited and screened by the selection committee, with the recipient chosen by the Prize Committee. To date, the following distinguished scientists have been awarded the Prize.

The List of Recipients

1985 (1st)	Dr. Edred John Henry Corner <i>Taxonomy or Systematic Biology</i>	2003 (19th)
1986 (2nd)	Dr. Peter Hamilton Raven Systematic Biology and Taxonomy	2004 (20th)
1987 (3rd)	Dr. John Bertrand Gurdon → P6 Developmental Biology	2005 (21st)
1988 (4th)	Dr. Motoo Kimura Population Biology	2006 (22nd)
1989 (5th)	Dr. Eric James Denton Marine Biology	2007 (23rd)
1990 (6th)	Dr. Masakazu Konishi Behavioral Biology	2008 (24th)
1991 (7th)	Dr. Marshall Davidson Hatch <i>Functional Biology of Plants</i>	2009 (25th)
1992 (8th)	Dr. Knut Schmidt-Nielsen Comparative Physiology and Biochemistry	2010 (26th)
1993 (9th)	Dr. Edward Osborne Wilson \rightarrow P6 <i>Ecology</i>	2011 (27th)
1994 (10th)	Dr. Ernst Mayr Systematic Biology and Taxonomy	2012 (28th)
1995 (11th)	Dr. Ian Read Gibbons Cell Biology	2013 (29th)
1996 (12th)	Dr. Ryuzo Yanagimachi Biology of Reproduction	2014 (30th)
1997 (13th)	Dr. Elliot Martin Meyerowitz Plant Science	2015 (31st)
1998 (14th)	Dr. Otto Thomas Solbrig The Biology of Biodiversity	2016 (32nd)
1999 (15th)	Dr. Setsuro Ebashi Animal Physiology	2017 (33rd)
2000 (16th)	Dr. Seymour Benzer Developmental Biology	2018 (34th)
2001 (17th)	Dr. Harry B. Whittington Paleontology	2019 (35th)
2002 (18th)	Dr. Masatoshi Nei Biology of Evolution	2020 (36th)

)3 (19th)	Dr. Shinya Inoué Cell Biology
)4 (20th)	Dr. Thomas Cavalier-Smith \rightarrow P7 Systematic Biology and Taxonomy
05 (21st)	Dr. Nam-Hai Chua Structural Biology in Fine Structure, Morphology and Morph
06 (22nd)	Dr. Serge Daan Chronobiology
)7 (23rd)	Dr. David Swenson Hogness Genetics
)8 (24th)	Dr. George David Tilman Ecology
)9 (25th)	Dr. Winslow Russell Briggs Biology of Sensing
10 (26th)	Dr. Nancy Ann Moran \rightarrow P7 Biology of Symbiosis
11 (27th)	Dr. Eric Harris Davidson Developmental Biology
12 (28th)	Dr. Joseph Altman $\rightarrow P8$ Neurobiology
13 (29th)	Dr. Joseph Felsenstein Biology of Evolution
14 (30th)	Dr. Peter Crane Systematic Biology and Taxonomy
15 (31st)	Dr. Yoshinori Ohsumi → P8 Cell Biology
16 (32nd)	Dr. Stephen Philip Hubbell Biology of Biodiversity
17 (33rd)	Dr. Rita Rossi Colwell Marine Biology
18 (34th)	Dr. Andrew Herbert Knoll Paleontology
19 (35th)	Dr. Naomi Ellen Pierce Biology of Insects
20 (36th)	Dr. Kazuo Shinozaki

Biology of Environmental Responses

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 Physiology or Medicine in 2012 with Dr. Shinya Yamanaka of Kyoto University, who produced iPS cells.

3rd Prize (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 P	
Achievements recognized by the Award	By injecting the nucleus of another cell into the cyte amphibians, Dr. Gurdon was the first to show that ev differentiated cell can be "initialized" so that it re becoming a larva and eventually even a parent. Hi impact on the advancement of developmental biolog 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.

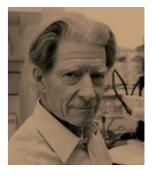
9th Prize (1993, Research field: Ecology)

Recipient	Dr. Edward Osborne Wilson Professor and Curator in Entomology Museum of Comp Harvard University, USA Date of Birth: 10 June 1929 Nationality: USA
Achievements recognized by the Award	Dr. Wilson's studies on ants, taking ecological, bioged ioral approaches, have yielded a wealth of new know community structure, distribution, caste differenti cation. His argument that understanding the socia requires a synthesis of ecology, ethology (the stu population genetics, and his advocacy of social greatly to the advancement of ecology and the biologi

*Please note that the affiliations of the recipients were current at the time of the award.

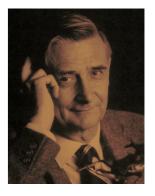
Kingdom

toplasm of an egg, using even the nucleus of a fully repeats its development, is work exerted a major ogy, cellular engineering,



nparative Zoology,

eographical, and behavwledge in such areas as iation, and communial behavior of animals udy of behavior), and biology contributed gical sciences as a whole



Systematic Biology and Taxonomy

The science of taxonomy groups living things so as 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 Akihito continues to do so. Accordingly, once every ten years "systematic biology and taxonomy" is chosen as the field for the International Prize for Biology.

20th Prize (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 Prize (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 Prize (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 conti certain areas of the adult mammalian brain. His d reaffirmed 30 years later, laid the foundations of a and bioscience which brings together neuroscien psychiatry, and neurology, thus contributing greatly 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. Dr. Ohsumi was later awarded the Nobel Prize in Physiology or Medicine in 2016.

31st Prize (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 auto completely unknown before his studies. He first ider multiple autophagy-related genes (ATG genes) in ye autophagy as an important research field in Cell Biolog key molecular mechanisms and by showing that it i phenomenon, widely conserved throughout the living	

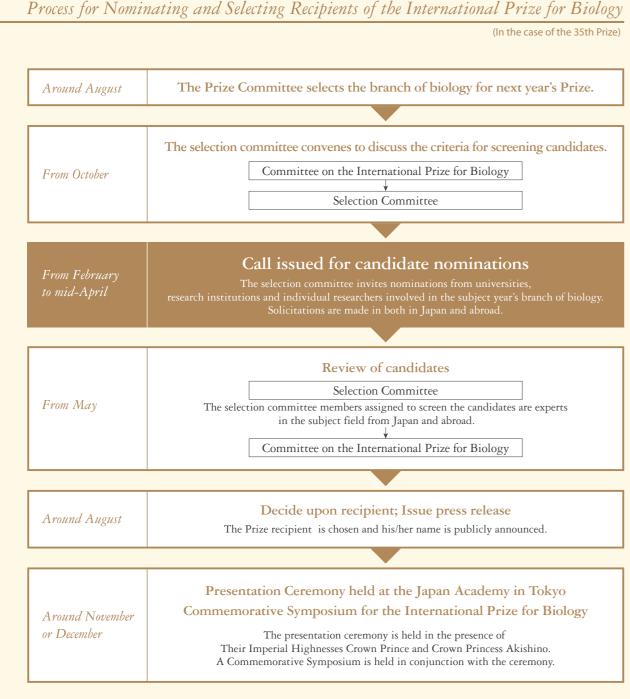
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ophagy, which were entified and analyzed veast. He established gy by elucidating its is an important life world.







The Presentation Ceremony for the 2019 Prize (Recipient: Dr. Naomi Ellen Pierce)



Dr. Yoshinori Ohsumi (2015 recipient) With Their Majesties the Emperor and Empress at the reception

Donations

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A fund for the International Prize for Biology is established in the Japan Society for the Promotion of Science, which manages the donated money. To maintain and grow the Prize over the long term, donations are essential. The Prize Committee invites your greatly appreciated contributions.

> 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, email your donation form to the Secretariat, and make a bank transfer using the account shown below.

Bank Account Information

Bank Name : Sumitomo Mitsui Banking Corporation Swift code : SMBCJPJT Branch : Tokyo Public Institutions Operations Office Branch Address : 18th floor, Nishi-shimbashi Square 3-1, Nishishimbashi 1-chome, Minato-ku, Tokyo 105-0003, Japan Account Type : Ordinary Account Account Number : 3006718 Account Holder's Name : Japan Society for the Promotion of Science

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