



JAPAN PRIZE

2024 Japan Prize Presentation Ceremony

Their Majesties the Emperor and Empress
in attendance at this year's function



On Tuesday, April 16, 2024, the 40th Japan Prize Presentation Ceremony took place in the presence of Their Majesties the Emperor and Empress at the Imperial Hotel in Chiyoda-ku, Tokyo. The Japan Prize is an international award presented to individuals whose original and outstanding achievements in science and technology have promoted peace and prosperity for the humankind.

At the ceremony, the 2024 prize laureates were presented with a certificate of merit, a prize medal, and 100 million yen per field as a supplementary prize. This year's laureates were Professor Sir Brian J. Hoskins and Professor John Michael Wallace from the field of Resources, Energy, the Environment, and Social Infrastructure as well as Professor Ronald M. Evans from the field of Medical Science and Pharmaceutical Science.

Each year, the Japan Prize Foundation receives nominations from around 15,500 prominent scientists and researchers worldwide, and the winners are chosen through a rigorous year-long selection process. Of the fields eligible for the prize in 2024, there were 130 nominations for the Resources, Energy, the Environment, and Social Infrastructure field and 198 for the Medical Science and Pharmaceutical Science field.

JAPAN PRIZE

The establishment of the Japan Prize was motivated by the Japanese government's desire to create an internationally recognized award that would contribute to scientific and technological development around the world. With the support of numerous donations, the Japan Prize Foundation received endorsement from the Cabinet Office in 1983.

The Japan Prize is awarded to scientists and engineers from around the world who have made creative and dramatic achievements that help progress their fields and contribute significantly to realizing peace and prosperity for all

humanity. Researchers in all fields of science and technology are eligible for the award, with two fields selected each year in consideration of current trends in scientific and technological development. In principle, one individual in each field is recognized with the award, and receives a certificate, a medal, and a monetary prize. Each Award Ceremony is attended by the current Emperor and Empress, heads of the three branches of government and other related officials, and representatives from various other elements of society.

Address by His Majesty the Emperor



It brings me great pleasure to be here at the 2024 Japan Prize Presentation Ceremony, together with the distinguished participants and guests from many countries and regions across the world. On the occasion of this esteemed ceremony, I would like to extend my heartfelt congratulations to each of the distinguished laureates, Professor Sir Brian J. Hoskins, Professor John Michael Wallace, and Professor Ronald M. Evans.

The Japan Prize was established based on private donations in 1982, in accordance with the Japanese government's vision of contributing to the development of science and technology throughout the world. The Prize is awarded to scientists and engineers from across the globe who are recognised for their remarkable efforts to contribute to the peace and prosperity of humankind based on their achievements that have contributed significantly to the advancement of science and technology.

The eligible fields for this year's Japan Prize were Resources, Energy, the Environment, and Social Infrastructure and Medical Science and Pharmaceutical

Science. I would like to pay tribute to the laureates for their continued outstanding contributions through research to the prediction of extreme weather events caused by global warming and the improved well-being of humanity.

In recent years, the challenges facing the world on a global scale, including those in the aforementioned fields, have become increasingly diverse and complex. Therefore, we must work together hand-in-hand to overcome these challenges, drawing on the collective wisdom from various fields of endeavour, underpinned by broader perspectives.

I would like to conclude by expressing my sincere hope that the Japan Prize will further facilitate the advancement of science and technology, bringing happiness to people and contributing to the peace and prosperity of humankind. Thank you very much.

Presentation Ceremony



The 2024 Japan Prize Presentation Ceremony was held at the Imperial Hotel, Tokyo in the presence of Their Majesties the Emperor and Empress. The magnificent occasion was celebrated by approximately 150 attendees, including distinguished guests such as Mr. Hidehisa Otsuji, President of the House of Councillors; Mr. Saburo Tokura, Chief Justice of the Supreme Court; and Dr. Masahito Moriyama, Minister of Education, Culture, Sports, Science and Technology. During the presentation ceremony, Chairman Yoshio Yazaki of the Japan Prize Foundation presented the laureates certificates of merit and prize medals. The laureates received warm applause from the audience as they held up their prize medals and expressed joy in their acceptance speeches.



Prof. Sir Brian J. Hoskins



Prof. John Michael Wallace



Prof. Ronald M. Evans



Congratulatory Speech
Mr. Hidehisa Otsuji



Their Majesties the Emperor and Empress applauding the recipients



Opening Remarks
Dr. Hiroshi Komiyama



Commemorative concert

Establishment of a scientific foundation for understanding and predicting extreme weather events



Prof. Sir Brian J. Hoskins

Born: 17 May 1945 Based in: UK

Professor
Department of Meteorology, University of Reading

Message from the Laureate

Your Majesties the Emperor and Empress, Excellencies, Members of the Japan Prize Foundation and its Selection Committees, My Fellow Laureates and Distinguished Guests,

I am delighted and very honoured to be awarded the 2024 Japan Prize, and to share it with my friend and colleague, Professor Wallace. It is particularly meaningful to me that the award of the Japan Prize is described as recognising achievements that have contributed significantly to the peace and prosperity of humankind.

Increasing the understanding of weather and climate is a major scientific challenge, and one that has been hugely stimulating to me. Since understanding can enable improved prediction, meeting the scientific challenge is also immensely rewarding. The need for improved predictions is particularly clear at a time when a changing climate and the associated extreme weather events are having ever larger impact.

I should like to pay tribute to the input of all my colleagues and students for their major contributions to the research that is recognised in the citation, and to my wife and family for their inspiration and support.

Brian J. Hoskins



Prof. John Michael Wallace

Born: 28 October 1940 Based in: USA

Professor Emeritus
Department of Atmospheric Sciences, University of Washington

Message from the Laureate

Your Majesties the Emperor and Empress, Members of the Japan Prize Foundation and the Selection Committee, Colleagues, and Distinguished Guests,

I'm honored to have been chosen as a co-recipient of the 2024 Japan Prize. Like other laureates, I owe a debt of gratitude to the students and postdocs who worked with me and to my family. I also want to acknowledge the hundreds of scientists and engineers who contributed to the development of remote sensing of the atmosphere from space and the assimilation of these newly available observations into numerical weather prediction models. My work reflects the brilliance of their achievements, as do the dramatic advances in the skill of weather forecasts, which make our lives safer and more comfortable, and our society better prepared to cope with the impacts of climate change. Thank you.

John Michael Wallace

Field: Medical Science and Pharmaceutical Science

**Discovery of the nuclear hormone receptor family
and its application to drug development**



Prof. Ronald M. Evans

Born: 17 April 1949 Based in: USA

Professor, Director of Gene Expression Laboratory,
The Salk Institute for Biological Studies

Message from the Laureate

Your Majesties the Emperor and Empress, I am truly delighted to be the recipient of the 2024 Japan Prize for the discovery of the Nuclear Hormone Receptor Superfamily. I want to thank the distinguished jury for this honor.

At times it seemed that our work was everything, enveloping us in a world of complex ideas and swirling emotion, taking us to a place that no one had seen. Science is about asking the right question as I tell everyone who joins my lab, “if you want a big answer, you must ask a big question.” I have had the good fortune to work with a remarkable cadre of people, my “comrades in science,” some of whom are here today, who were not afraid to ask and work on the big questions that opened doors to a new era of molecular physiology and the science of living systems. For us, we ask how our studies of transcriptional physiology can help to understand human development and control human disease. Biomedical research can only be pushed forward by the next generation, and it is my hope to encourage the spirit of young people to pursue science and bring their energy and enthusiasm to help answer these questions.

I want to thank my wife Ellen and daughter Lena for unflinching emotional support, advice and inspiration. And many thanks to you all for sharing this special day.

Ronald M. Evans

Japan Prize Commemorative Lectures



Prof. Sir Brian J. Hoskins

Field: Resources, Energy, the Environment, and Social Infrastructure

Theme: Reflections on Many Years of Trying to Understand Atmospheric Motion



When I began my research career, much data on atmospheric and weather behavior had already been accumulated. However, there was a significant gap between this data and weather forecasting systems. Later, satellite observations were added, improving calculations by high-performance computers and allowing more accurate predictions. The Norwegian cyclone model, developed about 100 years ago is also incorporated into today's weather forecast maps. We further developed our weather forecasting system performance, so it determines temperature and wind direction and speed in specific atmospheric layers mathematically and then converts this data into a three-dimensional distribution map.

More precise and complex models were subsequently employed to examine which pattern of atmospheric fluctuations in the troposphere develops most rapidly with the forming of warm and cold fronts, to demonstrate the flow development associated with each low- or high-pressure system over time. Furthermore, by applying the conserved quantity called potential vorticity to examine the development of atmospheric flow at a distance about 10 kilometer above ground, we made it possible to understand the development and decline of extratropical cyclones and the impact of the stagnant circulation anomaly that brings abnormal weather.

Distant impact patterns have also clarified the far-reaching effects of phenomena occurring within a certain region. Their cause, Rossby waves, can now explain extreme weather events, interannual variations, and climate change. Their highly orderly movements enable us to predict weather within days, predict extreme weather events and conduct comparative analyses of annual global warming.



Prof. John Michael Wallace

Field: Resources, Energy, the Environment, and Social Infrastructure

Theme: Encounters with Atmospheric Gravity Waves and Teleconnection Patterns



His doctoral research at the Massachusetts Institute of Technology focused on a newly discovered phenomenon called quasi-biennial oscillation (QBO) in the tropical stratosphere. Assuming that gravity waves are the source of energy causing wind fluctuations, a paper published by Dr. Matsuno of the University of Tokyo suggested that there are gravity waves different from conventional gravity waves due to the influence of the Earth's rotation. Our research found eastward waves with a long cycle relative to baroclinic waves, demonstrating that these were Kelvin waves as proposed by Dr. Matsuno. In contrast, Messrs. Yanai and Maruyama at the University of Tokyo discovered Rossby waves that travel westward with a short cycle. The behavioral movement of these gravity waves are explained using a simple model. A similar model is also employed to explain the stagnation in mountainous regions and other areas.

We subsequently focused on tropospheric disturbances in addition to gravity waves, with a particular focus on persistent circulatory abnormalities. By correlation coefficient mapping of pressure surface changes at a point having a height of 500 millibars and all other points, we successfully narrowed down the vast amount of data accumulated over many years. Remote influence patterns (teleconnection patterns) centered around reference grid points are now employed for weather prediction. For example, if a polar vortex forms over the Far East, we can predict that a cold winter will come to East Asia including Japan, resulting in an increased demand for fuel. Similarly, accumulated data on the El Niño phenomenon can be employed to predict rainfall and temperature deviation patterns and other components. We will also be able to make even more accurate weather predictions based on gravity waves and remote influence patterns.



Prof. Ronald M. Evans

Field: Medical Science and Pharmaceutical Science

Theme: Organ Physiology and Its Transcriptional Underpinning



Nuclear hormone receptors involved in gene regulation have been investigated for about 40 years. This article explains nutritional management after food intake, with a particular emphasis on the role of gene networks. The human body contains 50 nuclear receptors, with each cell having at least 22 of these receptors. These nuclear receptors also exist in animals other than humans, but not in bacteria, viruses, or plants. Remarkably, these receptors can identify the exact sequence among 3.2 billion nucleotides within seconds.

Nuclear receptor cloning, a field within organ physiology, encompasses the study of various biological functions, including endocrinology, kinesiology, enzymology, nutritional science, immunology, cytology, and hemodynamics. This study has facilitated the identification of various hormone receptors, most notably, bile acid receptors and peroxisome proliferator-activated receptors (PPARs). The identification of nuclear receptors has significantly contributed to drug discovery, with many commercially available drugs developed based on these receptors. Bile acids play a crucial role in fat absorption, while PPARs are involved in fat metabolism, leading to the development of medications to combat the epidemics of obesity and diabetes. Currently, a next-generation PPAR being developed in Boston, targets specific subnetworks and is undergoing clinical trials to evaluate its effectiveness for central nervous system diseases besides obesity. A bile acid receptor called the farnesoid X receptor (FXR) has been suggested as effective in treating colorectal cancer by altering serum bile acid levels, thus overcoming virtually the relationship between diet and genes.

Watch the videos of the commemorative lectures online.

 <https://www.youtube.com/user/JapanPrize/videos>



Japan Prize Week

April 16

Presentation Ceremony



April 17

Commemorative Lectures



Interaction Gathering



April 18

Media Interview



April 19

Courtesy Call on the Prime Minister



Courtesy Call on the British Embassy



Projects of the Foundation

For the further development of science and technology...

In addition to selecting and awarding the Japan Prize, the Japan Prize Foundation is engaged in projects designed to contribute to the development of science, technology, and society, including the offering of research grants for the training of young scientists, and our “Easy-to-understand Science and Technology Seminars” aimed at the children who will lead the coming generations.



JAPAN PRIZE

The creation of the Japan Prize was motivated by the Japanese government's desire to “contribute to the development of science and technology worldwide by establishing a prestigious international award.” The Japan Prize was established in 1983 with a cabinet endorsement and is supported by numerous private donations.

The award honors scientists and researchers from around the world, recognizing individuals who have contributed significantly to the peace and prosperity of humankind through original and outstanding achievements that have greatly advanced the progress of science and technology.

Researchers working in all fields of science and technology are eligible to receive the Japan Prize. Each year, it is awarded for achievements in two fields, which are selected by considering recent developments in science and technology. As a general rule, one award is given for each field and each laureate receives a certificate of merit, a prize medal, and prize of 100 million yen.

The Presentation Ceremony is held annually in the presence of Their Majesties the Emperor and Empress of Japan and is also attended by the Prime Minister, the Speaker of the House of Representatives, the President of the House of Councillors, the Chief Justice of the Supreme Court, numerous government ministers, and eminent figures from various other areas.



Research Grants

The Heisei Memorial Research Grant Program is named after Their Majesties the Emperor Emeritus and Empress Emerita, who have been interested in the research activities of young scientists and have encouraged them for many years.

The Foundation primarily provides research grants to scientists under 45 years of age. The Foundation annually selects four to eight scientists engaged in research that transcends the boundaries between different fields and disciplines and contributes to solving social issues. They are then provided with grants worth five to ten million yen.

The Heisei Memorial Research Grant was established as a means of expressing our profound appreciation to their Majesties the Emperor Emeritus and Empress Emerita for their great generosity in granting this award.

(Applicants must belong to a research organization in Japan to be eligible for a grant.)



“Easy-to-Understand Science and Technology Seminars”

The Foundation holds various seminars for students and other members of the public. These seminars are conducted by experts who use plain language to explain the advanced technologies commonly used in everyday life.

More than 300 seminars have been held since the program was launched in March 1989.

