



KUNGL.
VETENSKAPS
AKADEMIEN

THE ROYAL SWEDISH ACADEMY OF SCIENCES

THE ROYAL SWEDISH ACADEMY OF SCIENCES



...promotes the sciences and strengthens
their influence in society



The North Star:

part of the seal of the Royal Swedish Academy of Sciences since 1742

GRAPHIC DESIGN AND PRODUCTION: Christina Ajax, Fräulein Design

PRINTING: Ätta.45 Tryckeri AB, 2013

ISBN: 978-91-7190-184-2

Front cover illustration, from top left down:

Sir Martin Rees, Carl Linnæus, Lene Vestergaard Hau (PHOTO: JUSTIN IDE), Gunnar von Heijne, Sara Snogerup Linse (PHOTO: MARKUS MARCETIC), Staffan Normark (PHOTO: MATTIAS PETERSSON), Li Bennich-Björkman (PHOTO: MARTIN CEJJE), Kerstin Fredga (PHOTO: MARKUS MARCETIC), Svante Pääbo (PHOTO: PUBLIC LIBRARY OF SCIENCE), Barbara Cannon (PHOTO: ERIK HUSS), Ahmed Zewail (PHOTO: LARS FALCK), J. Jacob Berzelius, Yoshinori Yasuda (PHOTO: TAKESHI TAKEDA), Jan Lindsten (PHOTO: TORBJÖRN ZADIG), Karin Markides (PHOTO: JAN-OLOF YXELL), Nils Nordenskiöld, Stefan Claesson (PHOTO: ERIK HUSS), Gunnar Öquist (PHOTO: MARKUS MARCETIC), Rita Colwell, Svante Lindqvist, Catharina Larsson (PHOTO: TORBJÖRN ZADIG), Alfred Nobel, Marcus Storch (PHOTO: ULLA MONTAN, ©NOBEL FOUNDATION), Veerabhadran Ramanathan, Mårten Triewald, Juleen Zierath (PHOTO: ULF SIRBORN), Sven Kullander, Sheila Kirkwood, Bert Bohlin, Carl Folke (PHOTO: CECILIA NORDSTRAND), Reiko Kuroda, P C Jersild.



...is a scientific force in society

THE ROYAL SWEDISH ACADEMY OF SCIENCES is an independent, non-governmental organisation with a charter that, in its first article, defines its function as *promoting the sciences and strengthening their influence in society*. The Academy **PROMOTES SCIENCE OF THE HIGHEST QUALITY** by fostering development and innovation in Swedish research. It **ENHANCES THE STATUS OF SCIENCE IN SOCIETY** by drawing attention to key social issues, examining them in scientific terms and communicating the results, and **JOINS IN COOPERATION ON GLOBAL ISSUES**, with the aim of being an international scientific proponent of sustainable development.

A knowledge-based society that gives priority to education, research and innovation has the best scope for meeting future challenges.



PHOTO: MARKUS MARCETIC AND ORASISFOTO ©NOBEL FOUNDATION

Organisation

The Academy consists of its **MEMBERS**. Today it has some 450 Swedish and 175 foreign members. They are divided into ten subject categories called **CLASSES**: mathematics, astronomy and space science, physics, chemistry, geosciences, biosciences, medical sciences, engineering sciences, social sciences and a class for humanities and outstanding services to science.

The Academy's foremost representative is its **PRESIDENT** (Chair), who is assisted by three **VICE PRESIDENTS**. They are all elected to hold office for fixed terms. With the full-time **PERMANENT SECRETARY**, they constitute the **PRESIDING COMMITTEE**. Responsibility for developing the Academy's activities and making effective use of available resources lies with the **ACADEMY BOARD**, which comprises the Presiding Committee and ten members, one from each class.

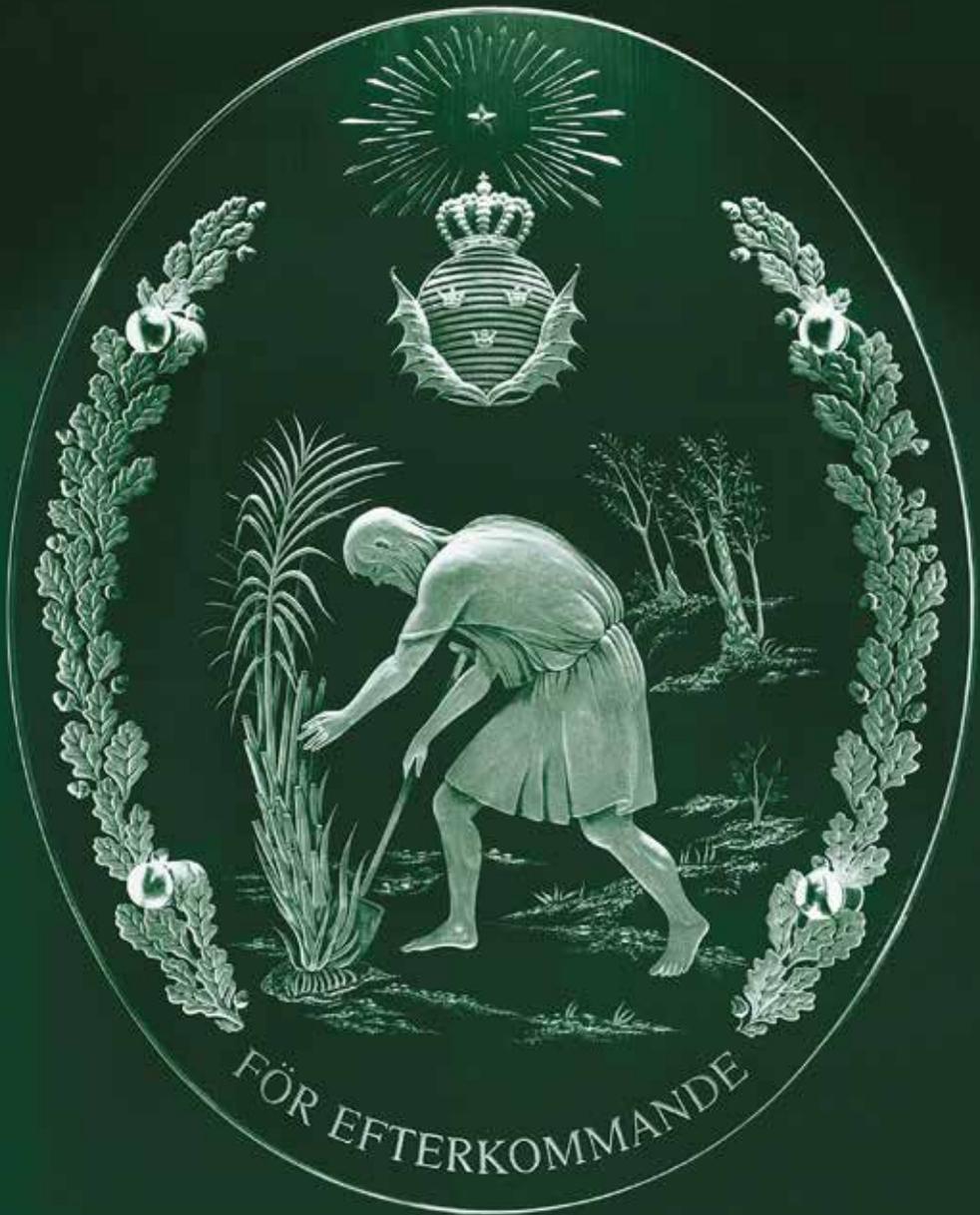


The Academy is served by a **SECRETARIAT** with a staff of some 40, headed by the Permanent Secretary. The secretariat's responsibilities include communications, administration, financial management and events. The Academy also operates through its four **RESEARCH INSTITUTES**.

The Academy holds press conferences in the Session Hall, where the Academy itself meets ten times a year, to announce the Nobel Prizes in Physics and Chemistry and the Prize in Economic Sciences.

PHOTO: MARKUS MARCETIC





'The Old Man Digging', planting a tree for posterity, has been used as an emblem in the Academy's Proceedings (*Vetenskapsakademiens handlingar*) ever since the first issue was published in 1739.

ILLUSTRATION: LISA BAUER. ENGRAVER: LARS BÖRNESSON. PHOTO: LARS FALCK



...promotes excellence in science

EFFORTS TO PROMOTE TOP-QUALITY SCIENCE are made primarily within the Academy's classes. They include issuing consultation responses, holding scientific meetings and conferences, conducting research at the Academy's institutes and carrying out work relating to prizes, awards, fellowships and research appointments.

Consultation responses, reviews and evaluations

As an independent, non-governmental organisation, the Academy is a highly reputed body involved in public consultations, primarily regarding research-related issues. The Academy also carries out reviews and evaluations of research foundations, such as the Swedish Foundation for Strategic Research and the Swedish Foundation for Strategic Environmental Research (Mistra).

Lectures, workshops, conferences and seminars

Initiatives on subjects of current interest involve Academy members and other invited experts. The initiatives come from individual members, the Academy's classes and permanent and ad hoc committees, or from one of the national committees. The latter's function is to monitor research and liaise with international scientific organisations in their respective fields.

The Academy also publishes **SCIENTIFIC JOURNALS**: *Acta Mathematica*, *Acta Zoologica*, *Ambio*, *Arkiv för matematik* ('Mathematical Archives'), *Physica Scripta* and *Zoologica Scripta*.



Institut Mittag-Leffler.

PHOTO: LARS FALCK



Interdisciplinary workshops are an important part of the Beijer Institute's activities.

PHOTO: SUSANNA ASKLÖF

The Academy's research institutes

Over the years, numerous research institutes have been established at the Academy's initiative. Several of these have subsequently been hived off. This is true of, for example, the Swedish Museum of Natural History, the Swedish Meteorological and Hydrological Institute (SMHI), Kristineberg Marine Research Station, Abisko Scientific Research Station and the Institute for Solar Physics.

Today the Academy runs the **BERGIUS FOUNDATION**, a botanical research institute located in the Bergius Botanic Garden in Stockholm, the **BEIJER INSTITUTE FOR ECOLOGICAL ECONOMICS**, which focuses on the interplay of ecological systems with social and economic development, **INSTITUT MITTAG-LEFFLER**, which is an international institute for mathematics, and the **CENTER FOR HISTORY OF SCIENCE**, which maintains the Academy's archives, scientific instrument collection and the Nobel archives.

Prizes, research positions and grants

Being elected as an Academy member is itself an exclusive recognition of successful research. Outstanding contributions to research are also acknowledged in other ways, such as the many prizes awarded by the Academy.



The Nobel Prize® and the Nobel Prize® medal design mark are registered trademarks of the Nobel Foundation.

The Royal Swedish Academy of Sciences is responsible for awarding the **NOBEL PRIZES IN PHYSICS AND CHEMISTRY**, which reward discoveries, inventions and improvements that have brought the greatest benefit to mankind. The Academy also awards the **SVERIGES RIKSBANK PRIZE IN ECONOMIC SCIENCES IN MEMORY OF ALFRED NOBEL**, following the same procedure as for the Nobel Prizes. For each prize, there is a prize committee in charge of nominations and investigation. In this work, the Academy has established an important international network of eminent researchers and research institutes. In awarding the Nobel Prizes, the Academy defines the highest level of excellence in international science.



Peter Higgs receiving his Nobel Prize in Physics from His Majesty the King of Sweden at the ceremony in Stockholm Concert Hall 2014.

PHOTO: ALEXANDER MAHMOUD ©NOBEL MEDIA



H.M. King Carl XVI Gustaf presents the 2011 Crafoord Prize in Biosciences to Ilkka Hanski.

PHOTO: MARKUS MARCETIC

THE CRAFOORD PRIZE. The Anna-Greta and Holger Crafoord Fund was established in 1980 to promote basic research in the subject areas for which the prize is awarded: mathematics and astronomy, biosciences (especially ecology), geosciences and polyarthritis (e.g. rheumatoid arthritis). Both an international prize and a research grant for Swedish researchers are awarded for each of these disciplines in turn.

THE GÖRAN GUSTAFSSON PRIZES. Since 1991, the Göran Gustafsson Foundation for Research in Natural Sciences and Medicine has been awarding prizes to young researchers considered to have especially good prospects of making significant contributions in mathematics, physics, chemistry, molecular biology and medicine. The Academy is responsible for the work of investigation and communication, and the award consists of a personal prize and a major research grant spread over three years.

THE ROLF SCHOCK PRIZES. Since 1993, in accordance with the terms of Rolf Schock's will the Academy has been selecting two laureates, one for logic and philosophy and one for mathematics. The Royal Swedish Academy of Music and the Royal Swedish Academy of Fine Arts concurrently select recipients of prizes in music and visual arts respectively. The prizes are awarded every three years.

THE SÖDERBERG PRIZE has been awarded for economic sciences and jurisprudence by the Academy every other year since 1986, and in alternate years in medicine by the Swedish Society of Medicine. The prize is funded by the Torsten Söderberg Foundation and the Ragnar Söderberg's Foundation.

In addition, many other prizes in various subject areas are awarded by the Academy with funds from foundations it administers.

The Royal Swedish Academy of Sciences also awards funding for research and education in the form of scholarships or fellowships, grants, scientific exchanges and research positions. Since 2000, the Academy has filled over 100 research positions for young researchers and a number of academic professorships in various subject areas. The research positions receive funding from the Knut and Alice Wallenberg Foundation, the Marianne and Marcus Wallenberg Foundation, the Tobias Foundation, the Torsten Söderberg Foundation and the Ragnar Söderberg's Foundation. In 2012, jointly with the Knut and Alice Wallenberg Foundation and four other royal academies, the Academy set up the Wallenberg Academy Fellows, a career programme for young researchers. This programme provides long-term funding for the most promising young researchers, and the objective is to give them a work situation that enables them to focus on research and address difficult long-term research issues.



Kirsten Kraiberg Knudsen, Chalmers University of Technology, one of the first Wallenberg Academy Fellows in natural sciences.

PHOTO: PETER WIDING, CHALMERS UNIVERSITY OF TECHNOLOGY



Patrik Ernfors, Karolinska Institutet, holder of the Torsten Söderberg Professorship of Medicine since 2012.

PHOTO: ULF SIRBORN, KAROLINSKA INSTITUTET



...enhances the status of science in society

WORK TO ENHANCE THE STATUS OF SCIENCE in society is conducted mainly on an interdisciplinary basis. It includes the Academy's permanent and ad hoc committees and working groups.

The Academy's permanent committees

Since autumn 2012, the Academy has had five permanent committees engaged in some of the Academy's primary activities:

EDUCATION COMMITTEE

ENVIRONMENTAL COMMITTEE

EVENTS COMMITTEE

INTERNATIONAL COMMITTEE

RESEARCH POLICY COMMITTEE

Their mission is to initiate, coordinate and prepare the Academy's activities in their own specific areas. They can also serve as official consultative bodies.

The Academy also works with the **HUMAN RIGHTS COMMITTEE**, which is composed of representatives of the Royal Swedish Academy of Sciences, the Royal Swedish Academy of Letters, History and Antiquities and the Swedish Academy. The function of this committee is to monitor the situation for researchers all over the world who have suffered from miscarriages of justice of various kinds. Its work is based on the UN Declaration of Human Rights and other international conventions.

The Academy's ad hoc committees and working groups

Questions that concern energy often cover many different disciplines. The Academy's **ENERGY COMMITTEE** has reviewed and compiled knowledge about current energy issues, with an emphasis on their scientific and technological aspects. Trends of supply and use of energy as well as ongoing research, development and demonstration projects provide the basis for this committee's analyses. Its perspective is global and extends about 40 years into the future. The results of its work are circulated to stakeholders in the energy sector and to the general public.

The importance of open-ended basic research is highlighted in the publication **UNEXPECTED BENEFITS**. It provides many examples of how fundamental research, without being driven by ideas about applications, has nonetheless been highly beneficial to society. History is full of unexpected discoveries that paved the way for self-evident features of our everyday life, such as our wired IT society, healthcare and drugs that keep us healthy, or new materials with astonishing properties.

Scientific councils

Since 2012 the secretariat of the Mistra Council for Evidence-Based Environmental Management, **MISTRA EviEM**, has occupied premises at the Academy. Mistra EviEM works for environmental management that rests on a scientific foundation. Through systematic reviews of various environmental issues, it aims to improve the basis for decision-making in Swedish environmental policy.



The Academy's publications can be downloaded at <http://kva.se>

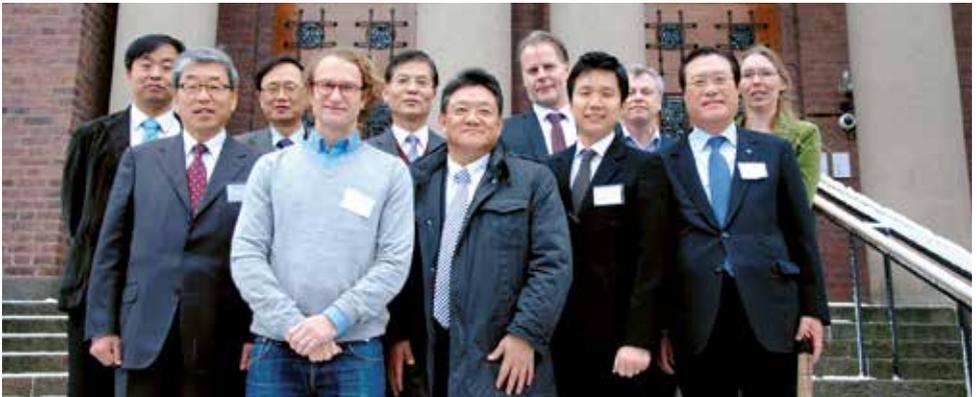


...cooperates on global issues

INTERNATIONAL COOPERATION is dealt with primarily by the International Committee and involves mainly cooperation within the framework of international academic and research organisations.

Sweden is represented by the Academy in a number of international academic organisations. The International Council for Science (ICSU) is an organisation comprising a large number of non-governmental scientific associations. The Academy is the principal for several national committees that represent Sweden in ICSU's various International Scientific Unions for different subject areas.

The Academy is an active participant in a range of other organisations and associations, to which a large number of the world's academies, research councils and similar organisations belong.



Jointly with the Korean Academy of Science and Technology (KAST), the Academy arranged a seminar in November 2012 where future challenges and research frontiers in the area of *urban resilience building* were discussed.

PHOTO: AGNETA SUNDIN

Sustainable development

The Academy takes part in work on global issues with the purpose of being an international scientific proponent of sustainable development.

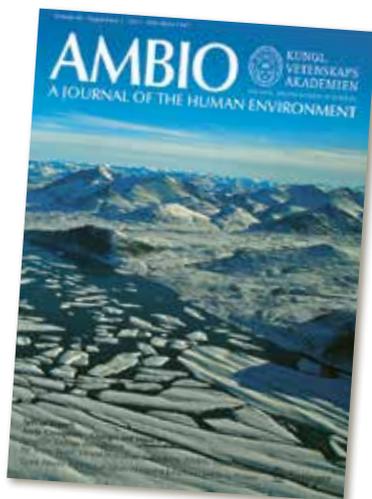
THE BEIJER INSTITUTE OF ECOLOGICAL ECONOMICS, one of the Academy's institutes, carries out studies at the interface of ecology and economics. Since 2006, the institute has been running Stockholm Resilience Centre with the Stockholm Environment Institute and Stockholm University.

GLOBAL ECONOMIC DYNAMICS AND THE BIOSPHERE is a research programme at the Academy that addresses the economic dynamics of global change and its implications for a sustainable future.

THE SWEDISH SECRETARIAT FOR ENVIRONMENTAL EARTH SYSTEM SCIENCES (SSEESS) has been active at the Academy since 2010. Its objective is to boost Sweden's involvement in international transdisciplinary research efforts in global environmental and resource issues, and to be a reliable source of information for Swedish decision-makers in these issues.

THE INTERNATIONAL GEOSPHERE BIOSPHERE PROGRAMME (IGBP) is a global research programme funded by ICSU, with its secretariat at the Academy. IGBP's research focuses on every component of the Earth system – the land, atmosphere and oceans, and their interfaces. IGBP's activities will conclude by the end of 2015 when they, along with other global ICSU programmes, are brought together in a new programme: **FUTURE EARTH**. The latter's secretariat shall be divided between five countries and one part will be located in Stockholm.

The environmental journal **AMBIO**, issued by the Academy, publishes research reports and scientific overview articles in all the disciplines of environmental science.





...fosters school pupils' interest in natural sciences and mathematics

SINCE THE BEGINNING of the 1980s, the Academy has launched and been involved in numerous activities aimed at improving teaching in schools and inducing pupils to learn more about natural sciences.

The Academy wishes to support and encourage teachers in their important endeavours. Since 1991 the **INGVAR LINDQVIST PRIZES** have therefore been awarded for meritorious contributions to the teaching of mathematics and natural sciences.

Jointly with the Swedish National Agency for Education, the Academy holds **INSPIRATION DAYS** for teachers at compulsory and upper secondary school. Their purpose is to inspire teachers by presenting exciting news from research in natural sciences and mathematics. The Inspiration Days are funded with contributions from the National Agency for Education, the Wenner-Gren



One of the recipients of the 2011 Ingvar Lindqvist Prize, Peter Lindström of the Nyströmska School in Söderköping.

PHOTO: GÖRAN HEDLUND



The Nobel Prize Posters, with their popular science presentations, are produced by the Academy every year and are its most widely disseminated publications. The primary target group is young people at upper secondary school, but many research institutes worldwide order them as well.

Foundations, the Kjell and Märta Beijer Foundation and the Sven and Dagmar Salén Foundation. The Academy also organizes a teachers' day in physics and the Ingvar Lindqvist Day, mainly for teachers and school managers. The Ingvar Lindqvist Day focuses on issues regarding the school system and teaching, and the Lindqvist Laureates present their pedagogic work. The Ingvar Lindqvist Prize is funded by the Torsten Söderberg Foundation.

SCIENCE AND TECHNOLOGY FOR ALL (the NTA programme) was initiated by the Academy and the Royal Swedish Academy of Engineering Sciences (IVA). It offers municipalities and schools scope for developing teaching through scientific and technological themes. The teaching programme includes guides for teachers and pupils, sets of material for laboratory and practical work, and training for theme teachers and NTA coordinators. In 2013 NTA gathered their operations in the cooperative association "NTA School Development", where the Academy is represented in both the Board and the Scientific Council.

POSTERS presenting the Nobel Prizes in Physics and Chemistry and the Prize in Economic Sciences in popular terms are produced each year and circulated to upper secondary schools and science departments at higher education institutions.



...is a learned society with traditions

THE ROYAL SWEDISH ACADEMY OF SCIENCES was founded in 1739 by Jonas Alströmer, Anders Johan von Höpken, Sten Carl Bielke, Carl Linnæus, Mårten Triewald and Carl Wilhelm Cederhielm. Their aim was to devise practical advances in agriculture, forestry and mining that would benefit the rebuilding of Sweden after the hard times following the wars of this country's period as a great power.

The current activities of the Academy are based on the foundations laid by the chemist Jöns Jacob Berzelius, when he reformed its operations as its Permanent Secretary in the 1820s. Greater focus was placed on basic research in mathematics and the natural sciences. Since it was founded in 1739, some 1 650 Swedish and 1 250 foreign members have been elected to the Academy.



Carl Linnæus (1707–78), one of the founders of the Royal Swedish Academy of Sciences, a Swedish botanist, physician and zoologist.



The Academy's main building in Frescati, Stockholm, was inaugurated in 1915. Today, it houses the Academy's secretariat and many of its activities.

PHOTO: THOMAS WINGSTEDT



Back cover illustration, from top left down:

Bo Sundqvist (PHOTO: ERIK HUSS), Anna-Karin Tornberg (PHOTO: HENRIK GUSTAVSSON), Per Olof Hulth (PHOTO: TERESA VALLON HULTH), Arvid Carlsson (PHOTO: JOHAN WINGBORG), Deliang Chen (PHOTO: JACINTA LEGG), Ari Laptev (PHOTO: VLADIMIR MAZ'YA), Britt-Marie Sjöberg (PHOTO: MARIA LINDSTRÖM), Jonas Frisé (PHOTO: CAMILLA SVENSK), Sune Svanberg, Lars Calmfors, Catherine Cesarsky, Olle Häggström, Ylva Engström (PHOTO: SIMON SÖDERBERG), Gösta Mittag-Leffler, Partha Dasgupta, Kersti Hermansson, Jeffrey Friedman, Bengt Kasemo (PHOTO: JAN-OLOF YXELL), Inga Fischer-Hjalmars, Janne Carlsson, Erna Möller, Erling Norrby, Björn von Sydow, Pierre Deligne (PHOTO: RANDAL HAGADORN), Peter Gärdenfors (PHOTO: M. EARTHY), Håkan Wennerström (PHOTO: MARKUS MARCETIC), Anders Björner, Barbro Åsman, Svante Arrhenius, Gunnar Wetterberg (PHOTO: JENNY LUNDBERG), Per Krusell (PHOTO: LASSE LYCHNELL), Carl Woese.

THE ROYAL SWEDISH ACADEMY OF SCIENCES

BOX 50005 (LILLA FRESCATIVÄGEN 4 A), SE-104 05 STOCKHOLM, SWEDEN
RECEPTION +46 8 673 95 00, INFO@KVA.SE, HTTP://KVA.SE

THE ROYAL SWEDISH ACADEMY OF SCIENCES, founded in 1739, is an independent organisation whose overall objective is to promote the sciences and strengthen their influence in society. The Academy takes special responsibility for the natural sciences and mathematics, but endeavours to promote the exchange of ideas between various disciplines.

