

# JAPAN PRIZE NEWS

THE SCIENCE AND TECHNOLOGY  
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## Japanese and American Scientists Named as Laureates of the 2005(21st)Japan Prize

### Information and Media Technology



Dr. Nagao, Makoto  
(Japan)

The Science and Technology Foundation of Japan (Chairman:Yoshikawa, Hiroyuki) announced that Japanese and American scientists have been named as laureates of the 2005(21st) Japan Prize.

Dr. Nagao, Makoto (68), President, National Institute of Information and Communications Technology, Japan, will receive the Japan Prize in this year's category of "Information and Media Technology."He contributed to the Natural Language Processing and Intelligent Image Processing.

Dr. Takeichi, Masatoshi (61), Director, RIKEN Center for Developmental Biology, Japan, and Dr. Erkki Ruoslahti (61), Distinguished Professor, The Burnham Institute, U.S.A., will receive the Japan Prize in the category of "Cell Biology." They contributed to the Elucidating the Molecular Mechanisms of Cell Adhesion.

### Cell Biology



Dr. Takeichi, Masatoshi  
(Japan)



Dr. Erkki Ruoslahti  
(U. S. A.)

The Japan Prize is awarded to people from all parts of the world whose original and outstanding achievements in science and technology are recognized as having advanced the frontiers of knowledge and served the cause of peace and prosperity for mankind.

No distinction is made as to nationality, occupation, race or sex. Only living persons may be named.

Fields of study for the prize encompass all categories of science and technology, with two fields designated for the prize each year in consideration of developments in science and technology.

Each Japan Prize laureate receives a certificate of merit and a commemorative medal. A cash award of 50 million yen is also presented for each prize category. The award is intended for a single person, in principle.

## “Information and Media Technology”

### Achievement:

Pioneering Contributions to Natural Language Processing and Intelligent Image Processing

- Dr. Nagao, Makoto (Japan)  
President, National Institute of Information and Communications Technology

### Reason for the Award:

Dr. Nagao led the research of machine translation and for the first time in the world, successfully developed a Japanese-to-English and an English-to-Japanese translation systems for abstracts of scientific and technical papers. These systems are still being used practically, and became the foundation for later commercial machine translation systems. Dr. Nagao has also proposed the analogical use of past translation examples in translation process. This example-based translation method has given extensive influence to research and development in this field among many countries.

In addition to conducting research in various fields, including digital dictionaries, important word extraction, and Japanese morphological analysis, all of which are key elements in natural language processing, Dr. Nagao has proposed methods appropriate to the analysis of long and complex Japanese sentences, and has achieved extensive results in the field of context analysis. These achievements were open to the public as free software's and have been used by researchers in Japanese language processing worldwide, have contributed dramatically to the research community, and have significantly expanded the scope of Japanese language processing research.

In image processing, he was the first to introduce feedback analysis mechanisms in the analysis and recognition of facial photographs, which had a dramatic effect on many later research activities. He has demonstrated numerous achievements in image processing using methods based on artificial intelligence; for example, he introduced the "blackboard model" for analysis of remote sensing images and other images, and demonstrated that this model could be used to analyze complex images with ambiguous analysis procedures.

Since 1990, Dr. Nagao has made essential proposals regarding the ideal form of digital libraries that incorporate natural language processing and image processing technologies, including digital library system configurations, user interfaces, and network configurations. He developed "Ariadne," one of the earliest digital library prototype systems and opened it actually. From early on, he has emphasized the importance of digital libraries that incorporate not only language information but image and audio information as well, and has contributed to the new digital library era.

Natural language processing, machine translation, and intelligent image processing play Key Technology in our ICT society. Dr. Nagao has pioneered these fields, and has been a leader in this research both in Japan and overseas, through the establishment of the International Association for Machine Translation and The Association for Natural Language Processing. In today's society, where information and communication networks have expanded and become increasingly global, we feel that Dr. Nagao's contributions are extremely significant in terms of promoting international understanding and information sharing on a global scale. Therefore, Dr. Nagao deserves the 2005 JAPAN PRIZE.

## “Cell Biology”

### Achievement:

Fundamental Contribution in Elucidating the Molecular Mechanisms of Cell Adhesion

- Dr. Takeichi, Masatoshi (Japan)  
Director, RIKEN Center for Developmental Biology
- Dr. Erkki Ruoslahti (United States of America)  
Distinguished Professor, The Burnham Institute

### Reason for the Award:

Cell adhesion forms the basis in construction of tissues and organs. It is classified to cell-to-cell adhesion and cell-to-extracellular-matrix adhesion. Dr. Masatoshi Takeichi and Dr. Erkki Ruoslahti played the decisive roles in elucidating the molecular mechanism of cell-to-cell adhesion and that of cell-to-extracellular-matrix adhesion respectively.

Dr. Takeichi at first succeeded in dissecting cell-to-cell adhesion into a calcium-dependent one and a calcium-independent one. Then, he concentrated his efforts on elucidating the mechanism of calcium-dependent cell adhesion, which plays the major role in specific cell sorting. Dr. Takeichi found that different cells have different calcium-dependent cell-adhesion molecules, and named the epithelial cell-type molecule E-cadherin, the nerve cell-type one N-cadherin and the extra-embryonic-cell-type one P-cadherin. Then, he demonstrated that E-cadherin is directly responsible for the adhesion by transfecting the molecularly cloned E-cadherin cDNA. Cadherins were found to be structurally related molecules and form a protein family. Dr. Takeichi verified homophilic binding of cadherins, namely E to E and N to N etc. Furthermore, he examined the expression of cadherins during embryogenesis and established that homophilic binding of cadherins is the basis of selective cell-to-cell adhesion.

Dr. Ruoslahti analyzed the functional domains of fibronectin and he succeeded in narrowing down the active domain to identify RGD sequence as the cell binding site. Then he proceeded to isolate the membrane molecule that binds fibronectin, namely the fibronectin receptor. He accomplished the difficult task by a brilliant method consisting of elution of the receptor from the fibronectin column by the RGD peptide. Dr. Ruoslahti revealed that the fibronectin receptor is a heterodimeric protein composed of two polypeptide chains. Then, he identified the vitronectin receptor and showed that it is structurally related to the fibronectin receptor. Now these molecules are known to belong to the integrin family.

Both Dr. Takeichi and Dr. Ruoslahti pinpointed the essential core processes in the complex phenomena of cell adhesion and succeeded in elucidating their mechanisms at the molecular level. Their accomplishments are expected to fundamentally contribute to elucidating the etiology and developing therapy of serious diseases such as malignant tumors.

# JAPAN PRIZE

## MEMBERS OF THE 2005 (21st) JAPAN PRIZE SELECTION COMMITTEE

	Name	Post
Chairman	Kumagai, Nobuaki	President, University of Hyogo
<b>Selection Panel for Information and Media Technology</b>		
Panel Chairman	Aiso, Hideo	President, Tokyo University of Technology
Acting Chairman	Tsujii, Shigeo	President, Institute of Information Security
Members	Tida, Takashi	Senior Advisor, National Institute of Information and Communications Technology (NICT)
"	Inagaki, Yasuyoshi	Dean, School of Information Science and Engineering, Aichi Prefectural University
"	Imai, Hideki	Professor, Institute of Industrial Science, The University of Tokyo
"	Miyake, Sei	Executive Managing Director, Engineering, Japan Broadcasting Corporation (NHK)
"	Yasuda, Yasuhiko	Professor, Faculty of Science and Engineering, Waseda University
<b>Selection Panel for Cell Biology</b>		
Panel Chairman	Fujii-Kuriyama, Yoshiaki	Professor, Center for Tsukuba Advanced Research Alliance and Institute of Basic Medical Sciences, University of Tsukuba Professor Emeritus, Tohoku University
Acting Chairman	Tanaka, Keiji	Vice-Director, The Tokyo Metropolitan Institute of Medical Science
Members	Idc, Chizuka	Professor, Graduate School of Medicine, Kyoto University
"	Kamiya, Ritsu	Professor, Graduate School of Science, The University of Tokyo
"	Takai, Yoshimi	Professor and Chairman, Graduate School of Medicine / Faculty of Medicine, Osaka University
"	Muramatsu, Takashi	Professor, Faculty of Psychological and Physical Sciences, Aichi Gakuin University Professor Emeritus, Nagoya University
"	Yamamoto, Masayuki	Professor, Graduate School of Comprehensive Human Sciences and Center for Tsukuba Advanced Research Alliance, University of Tsukuba

(As of 13 January, 2005)

## CATEGORIES SELECTED FOR THE 2006 (22nd) JAPAN PRIZE

The Science and Technology Foundation of Japan announced the two categories for the 2006(22nd) Japan Prize, and determined their definition as follows.

Letters are sent to numerous scholars and researchers throughout the world, requesting nominations in the fields the award is being made. The selection committee will then recommend candidates to the Board of Directors of the Foundation, and make their decisions.

Category Area I :  
Environment Infrastructure

Prize Category: Global Change

Human beings, as is widely understood, are imperiling the globe for this generation and for future generations through high consumption of energy and natural resources--the very foundations of society--and by intensive use of land. Scientific observation, conducted all over the world, has detected what is going on, and has pointed to the vulnerability of our environment. Countermeasures to the worldwide deterioration afoot were prepared. In consequence we see new technologies coming forward, aimed at letting us live in harmony with nature in a sustainable society, while husbanding scarce resources. New international regimes have developed and have built up momentum.

The Japan Prize for 2006 will be awarded for innovative work in the field of monitoring global changes and evolving new and core unit technologies and ways of thinking about technology and society--thereby structuring a socio-technological system that has worked.

Category Area II :  
Health Care Therapeutic (Technology)

Prize Category: The Development of Novel Therapeutic Concepts and Technologies

Recent life science and medical sciences have seen significant advancements that have led to a number of pivotal developments in the treatment of various diseases, including malignancies, infections, and lifestyle-related ailments. Such developments were built upon the discovery and invention of novel therapeutic concepts and technologies in the areas of ontogenesis and differentiation, as well as advances in the regeneration of cells, tissues, and organs and in the study of intermolecular interactions in those scientific domains.

The Japan Prize for 2006 will be awarded for significant accomplishments in the development of novel therapeutic concepts and technologies in the fields of biology, medicine, and medicinal chemistry, and the underlying research that have enabled such concepts and technologies.

## MEMBERS OF THE 2006 (22nd) JAPAN PRIZE FIELDS SELECTION COMMITTEE

	Name	Post
Chairman	Kurokawa, Kiyoshi	President, Science Council of Japan
Category Area I : Environment Infrastructure		
Panel Chairman	Gohshi, Yohichi	President, National Institute for Environmental Studies
Members	Nishioka, Shuzo	Executive Director, National Institute for Environmental Studies
"	Matsumoto, Kazuko	Professor of Chemistry, Waseda University
"	Yamaji, Kenji	Professor, Department of Advanced Energy, School of Frontier Sciences, The University of Tokyo
"	Yoshihara, Kazuhiro	Vice President, National Institute for Materials Science
Category Area II : Health Care Therapeutic (Technology)		
Panel Chairman	Ikeda, Yasuo	Professor, Keio University School of Medicine Director, Keio Integral Research Center
Members	Asashima, Makoto	Professor, The University of Tokyo Dean and Head, Graduate School of Arts and Sciences
"	Tanaka, Koichi	Professor, Kyoto University Graduate School of Medicine Director, Kyoto University Hospital
"	Nagai, Ryoza	Professor, The University of Tokyo Graduate School of Medicine Director, The University of Tokyo Hospital
"	Mitsuya, Hiroaki	Professor at Kumamoto University Graduate School of Medicine; The US National Cancer Institute, Section Head

(As of 11 November, 2004)

## JAPANESE STUDENTS ATTEND THE NOBEL PRIZE AWARD CEREMONY

Each year, the Science and Technology Foundation of Japan send two Japanese students to the Stockholm International Youth Science Seminar (SIYSS), organized by the Swedish Federation of Young Scientists and supported by the Nobel Foundation. This year, it sent Ms. Arako, Megumi of Tohoku University and Mr. Hashimoto, Okito of the University of Tokyo to the 29th SIYSS. Their report follows:



Ms. Arako



Mr. Hashimoto

We participated from December 4-11 in the Stockholm International Youth Science Seminar 2004 as representatives of Japan sent by the Science and Technology Foundation of Japan. We learned about the life in Stockholm before we left Japan, as the staff of the Foundation kindly held meetings to introduce us to travel agency staff, and previous participants in the program. Together, they briefed us on what to expect in Stockholm.

Once over there we had to follow a tough schedule, actually beyond our imagination. We gathered for seminars and sessions with participants in the program from other countries. All of us, no doubt, want to serve as scientists. We experienced many programs together. Almost all the others were 2-3 years younger than we, but they turned out to be strong characters with projects of their own. Talking with them was a great experience.



With Prof. Linda Buck (2004 Nobel Prize winner) at the reception

Following the program we took part in the Nobel Festival and other events, and we had the great good fortune to speak with the Nobel prize-winners on occasion. They were friendly towards us, quite beyond our expectations. Thus we had the opportunity to hear from them about their research and to learn how they regard science. We came to understand the sincerity of their interest in studies, and the pride they take in their work. In addition, we were able to visit institutes near Stockholm, and meet with high school students also.

Summing up, we were able to expand our horizons, thanks to this SIYSS2004. The program served to give us incentives for the future, and enabled us to make friends. To continue to progress, we aim to study more and to keep in mind the precious experiences we had. Last but not least we are deeply grateful to those who gave us the chance to participate in the program.