TANSEI

The University of Tokyo Magazine

TANSEI aims at sharing worldwide the latest developments at UT with everyone interested in education and research.

Vol. 02
March, 2002

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TANSEI – The school color for the University of Tokyo is light blue. This originated from the first rowing meet between the University of Tokyo and the University of Kyoto in 1920. The colors for both were determined by lots. The University of Kyoto drew dark blue and the University of Tokyo light blue. Since then light blue has become the school color for the University of Tokyo.

Title of this magazine has changed from “UT Forum 21” to “TANSEI”.

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Issued in March, 2002

Greeting from the Editor

The new century started and the new president of University of Tokyo, Takeshi Sasaki acceded to the office one from April 2001. Since the University of Tokyo was established more than 120 years ago and was keeping matured activities as one of top universities in Japan as well as in the world, a new quantum leap based on such long history is being expected inside the University of Tokyo and outside in new century.

At this moment, we take this opportunity of sending a new issue of the official English magazine of the University of Tokyo, TANSEI, which includes recent activities, people, events, opinions, and vision for the University of Tokyo in the 21st century.

The University of Tokyo should be working as a center of excellence and create a lot of knowledge and intelligence in educations and research in future, and furthermore we should take feedbacks from society.

Recently the University of Tokyo is trying to throw a lot of information through various channels and medias to the outside of the university not only for keeping accountability but for establishing new relationship with society. I hope all of readers will enjoy this issue and understand our activities. We are looking forward to hearing your comments on this issue or activities of the University of Tokyo.

Masatoshi ISIKAWA, Dr. Eng.
Director, the Committee of Public Relations

Welcome to the University of Tokyo

The University of Tokyo, which has the longest history among universities in Japan, has braved diverse elements over time and is now coming to witness a third century. Various seals of history have left marks on the University of Tokyo. But we take pride in the fact that we have always turned our ears sincerely to the voices of wisdom and conscience and have strived tenaciously and repeatedly toward their realization.

The University of Tokyo, which has 10 faculties, 14 graduate schools, and 12 research institutes (including the Research Center for Advanced Science and Technology) and over 27,000 students, has begun taking firm steps appropriate for existing as a research-oriented university in the twenty-first century. In the wake of the new Graduate School of Frontier Sciences, which was established with the aim of fusing academic fields, the Interfaculty Initiative in Information Studies, another new graduate school, was then launched in the spirit of merging the humanities and the sciences anew. Moreover, a new Graduate School of Interdisciplinary Information Studies has been set up, allowing this university to meet the new century under even better circumstances. Such recent improvements in the University of Tokyo are its response to the intellectual tides of the new era; they are none other than this university's concrete expression of its leap from the twentieth century into the twenty-first.

During this same time, as is introduced in "The University of Tokyo: the Present and Task No 3," this university has produced a distinguished, world-class research record befitting a research-oriented institution. In particular during the past 10-some years, these have shown an increase of startling energy, so our reputation is in the process of becoming solidified in academic circles around the world. I firmly believe that in the future, too, as long as there is not a major change in circumstances, the University of Tokyo will continue to provide remarkable achievements in research. In addition, it is quite encouraging to see that the Japanese government has been devising measures more positive in respect to improvements in research and educational facilities than it has in the past. Therefore, I greatly expect the research and educational environmental at the University of Tokyo to get even better.

The University of Tokyo has fulfilled its social duty so far by providing outstanding personnel to society. But expectations now are that this university will elevate its sense of being by actively returning its own research results to both society and industry. In order to respond to this new task, this university has been energetically arranging a situation on campus enabling it to cope with this through continuous self-examination. We imagine that the results of that will lead to some remarkable things a number of years hence.

Of course, the University of Tokyo's greatest mission is to offer an outstanding education to the young men and women who will be the leaders of tomorrow. To accomplish this duty, this university is now open to citizens from throughout the world, regardless of nationality, gender, or age. We are acutely aware of the need to create an even better system for meeting the educational needs of all our students, and we are considering many ways to accomplish that. If we manage to build even closer ties with the students who are an essential part of this institution, the University of Tokyo will be able to realize its great potential even further some day.

Takeshi SASAKI, President.

Takeshi SASAKI

Born in 1942. Graduated from the Faculty of Law, the University of Tokyo in 1965 and received Ph.D. degree from the University of Tokyo in 1973. He joined the University of Tokyo in 1968 as an Associate Professor in the Faculty of Law and was promoted to a Professor in 1978. He served as a senate from 1990 to 1992, dean of Graduate School of Law and Politics from 1998 to 2000 and took office as the twenty-seventh president of the University of Tokyo in April 2001.

The University of Tokyo Establishes a System to Award Honorary Doctorates

Professor Masao TACHIBANA,

Department of Psychology, Graduate School of Humanities and Sociology

In December 2001, a new system for awarding honorary doctorates was established by the Senate of the University of Tokyo. Honorary doctorates will recognize both those persons who have made notable contributions to humanity and those whose outstanding work has helped to expand the education and research mission at the University of Tokyo. The introduction of honorary degrees will establish a means to recognize the contributions of humanitarian leaders and of faculty members who make contributions to the education and pedagogy at the University. As the University of Tokyo is one of the world's leading institutions in the study of the humanities, research and higher education, this recognition is important because the contributions of the honorees will have effect throughout the globe.

The first honorary doctorate awarded by the University of Tokyo was to Dr. Amartya Sen, Master of Trinity College at the University of Cambridge. Born in India, Dr. Sen experienced the Great Bengal Famine at the age of nine and resolved to study economics in order to effect change in the world. Seeking a desirable economic system, he restructured the "social choice" theory by proposing an index to measure inequality and poverty and a concept to determine standards of welfare. He undertook practical research into the state of public policy regarding economic growth and raising living standards in developing countries. He also emphasizes the importance of democracy in preventing famine.

Dr. Sen's idea of capability has been incorporated into the construction of the United Nation's Development Index. Today, we are confronted by the serious problems of economic profits and their limits within a market economy. Dr. Sen has offered us an extremely effective stance from which to understand fundamental questions of economics, society and human dignity.

On February 19, a ceremony to award Dr. Sen an honorary doctorate from the University of Tokyo was held on the Hongo campus. Dr. Sen gave a commemorative lecture titled "Questioning the Question: Do Civilizations Clash?" which made a deep impression on everyone in attendance.

The University of Tokyo in the Twenty-First Century

Diversity, Internationalism, Open Knowledge

In the past the university was an organization where the highest types of knowledge conceived by people were nourished. Now, in response to the needs of the times, the idea of the university is undergoing great changes. What characterizes the world and the university in the new century and the new millennium, is, more than anything else, immeasurable diversity. When we look at the actuality of the twenty-first century, we are confronted with many problems that seem far removed from the idealized picture of the future held during the previous century. To deal with them we must be able to respond to needs of a "diverse" society and to bring into play knowledge that goes beyond specialist boundaries. As a result, people look to the university to produce complex kinds of output different from what it has traditionally done. Given the nature of modern globalization, the world looks to the university as the focus of diversity, internationalism and a new kind of open knowledge.

How can the University of Tokyo respond to these demands? In this special feature we will look at the changes it has undergone in the context of world and Japanese history, examine how it stands in 2002, and view its future as a center of open knowledge from the various ideas about that future held by a number of leading members of the university.

The Auditorium of the University of Tokyo floodlit to welcome the new millennium. January 1, 2001.

The Kashiwa Campus of the University of Tokyo. Here various studies and disciplines will be brought together in an effort to forge a way to meet the requirements of a new age.

Past, Present and Future: the World, Japan and the University of Tokyo

The University of Tokyo can trace its beginnings in the Shoheizaka academy and the post of astronomer established by the Tokugawa Shogunate in the seventeenth and eighteenth centuries, both of which had their base in the private academy of the Hayashi family in Edo. Over the past five centuries the University of Tokyo, in its many prototypes and forms has undergone numerous changes in response to the currents of history, to emerge as it is today. It is other words, a product of its accumulated history and tradition. The university of tomorrow will need to have diverse loci in order to meet the new demands of the twenty-first century. At the same time, though, it is also important to recognize where the university stands within its history, so as to understand the direction in which it is moving.

The World

Galileo's Law of Falling Bodies

1600

Kepler's Laws
Grotius, concept of international law
Descartes, Discourse on Method
Newton's Law, differential and integral calculus
England, Glorious Revolution of 1688
Beginning of the Industrial Revolution proper

1700

The Encyclopedia
The steam engine
The theory of a social contract
Adam Smith, Wealth of the Nations
USA, Declaration of Independence
Kant, Critique of Pure Reason
French Revolution

1800

Avogadro, molecular theory
Algebra, anti-Euclidian geometry
von Helmholtz, conservation of energy
Darwin, Origin of the Species
Maxwell, electromagnetism
Marx, Das Kapital
The telephone, wireless telegraphy

1900

Anglo-Japanese Alliance, theory of relativity, quantum theory
Russian Revolution
First World War, aircraft, radio, television
Second World War, computers, atomic power
Molecular biology
Launch of Sputnik, the Apollo program
Cold War, the Internet

2000

17c

Japan

The Tokugawa Shogunate
Shogunate sponsors private academy of Hayashi Razan
Shimabara rebellion, Closed Country policy
Beginning of work on the 397-volume Dai Nihon shi (History of Great Japan)
Seki Takakazu, mathematician, theory of determinants
Appointment of the first official astronomer by the Shogunate
Establishment of Yushima Seido, official Confucian academy. . Beginning of Nikko(daily lectures).

18c

1700

Arai Hakuseki, Seiyo kibun (geographical account of the West)
Shogunate establishes the Koishikawa Yojosho (charitable hospital)
Yamawaki Toyo and others, first officially approved dissection of the human body
Sugita Genpaku, Maeno Ryotaku, Kaitai shinsho (New Book of Anatomy)
Hiraga Gennai, experiments with electricity
Hayashi Shihei, Kaikoku heidan (Discussion on the Military Problems of a Maritime Nation)
Shogunate establishes an official academy, the Shoheizaka Gakumonsho (its academic system was the precursor of the civil service examinations)

1800

Shogunate sets up an official institution for the translation and study of western books (Bansho shirabesho)
Siebold establishes an academy, the Narutakijuku, in Nagasaki
Perry's expedition arrives in Uraga, Kanagawa
Treaty signals opening of Japan and end of seclusion policy
Shogunate establishes smallpox vaccination clinic
Foundation the University of Tokyo
Satsuma Rebellion
Sino-Japanese War

19c

1900

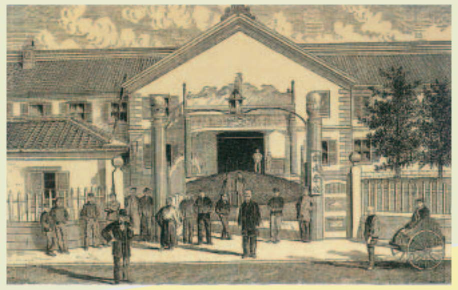
Russo-Japanese War
Kanto Earthquake
Manchurian incident
Dropping of the atomic bomb, Potsdam Declaration
University of Tokyo reorganizes under the postwar system
Assault by riot police on student radicals at the University of Tokyo
Hanshin earthquake

2000

20c

21c


Lecture at the Shoheizaka Gakumonsho


Kaisei Gakko in 1874. This was an amalgamation of the various academic facilities of the former Shogunate


The Akamon (Red Gate) awaiting repair after the Kanto earthquake, 1924


Student soldiers leaving the Auditorium, December 1943


Riot police battling students at the Auditorium, January 1969


Komaba's Second Campus, a new meeting point for society and the university

University of Tokyo

1800

Establishment of Kaisei Gakko
Establishment of the University of Tokyo (Tokyo Daigaku)
consisting of four departments, Law, Science, Literature and Medicine (1877).
Kobu Daigakko (Engineering College) absorbed into the University of Tokyo and the name of the University changed to Imperial University (1886).
Establishment of the Agriculture and Forestry School (1890)
With the establishment of the Kyoto Imperial University, this university's name was changed to Tokyo Imperial University (1897)

1900

Institute for Infectious Diseases established (1916)
Faculty of Economics established (1919)
Aeronautical Research Institute and Astronomical Observatory established (1921)
Auditorium completed, Earthquake Research Institute established (1925)
Institute of Oriental Culture established (1941)
Second Faculty of Engineering established (1942)
Institute of Social Science established (1946)
Fundamental Law of Education and School Education Law enacted, University of Tokyo renamed (Tokyo Daigaku) (1947)
Promulgation of National School Establishment Law, new style University of Tokyo came into being, College of Arts and Sciences, Faulty of Education, Institute of Journalism and Communication Studies, Institute of Industrial Science established (1949)
Historiographical Institute established (1950)
Graduate School inaugurated (1953)
Institute of Applied Microbiology and Institute for Cosmic Ray Research established (1953)
Institute for Nuclear Study established (1955)
Institute for Solid State Physics established (1957)
Establishment of the Faculty of Pharmacy (1958)
Ocean Research Institute established (1962)
Graduate School reorganized (1963)
Dispute in the Faculty of Medicine over reform of the intern system led to a student strike involving the whole university (1968)
Celebrations marking the hundredth anniversary of the University (1977)
Restructuring of the Graduate Schools (1991-)
Institute for Cosmic Ray Research and Institute for Solid State Physics moved to the Kashiwa Campus

2000

University of Tokyo

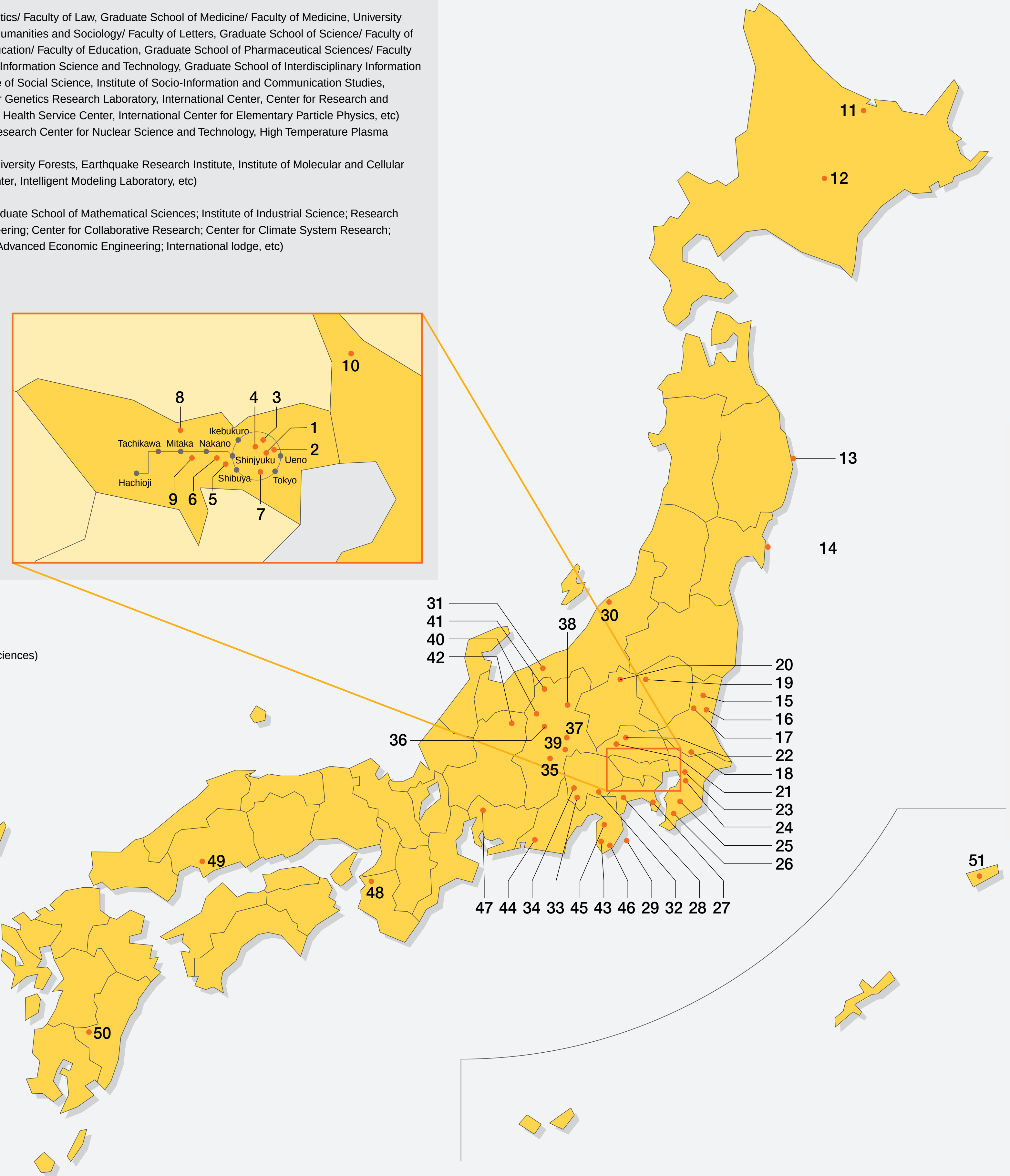
Important Dates in the Restructuring of the Graduate Schools:

Graduate School of Humanities and Sociology (1995)
Graduate School of Education (1995)
Graduate School of Law and Politics (1991)
Graduate School of Economics (1996)
Graduate School of Arts and Sciences (1996)
Graduate School of Science (1993)
Graduate School of Engineering (1995)
Graduate School of Agricultural and Life Sciences (1996)
Graduate School of Medicine (1997)
Graduate School of Pharmaceutical Sciences (1997)
Graduate School of Mathematical Sciences (1992)
Graduate School of Frontier Sciences (1998)
Graduate School of Interdisciplinary Information Studies (2000)
Graduate School of Information Sciences and Technology (2001)

The University of Tokyo in 2002

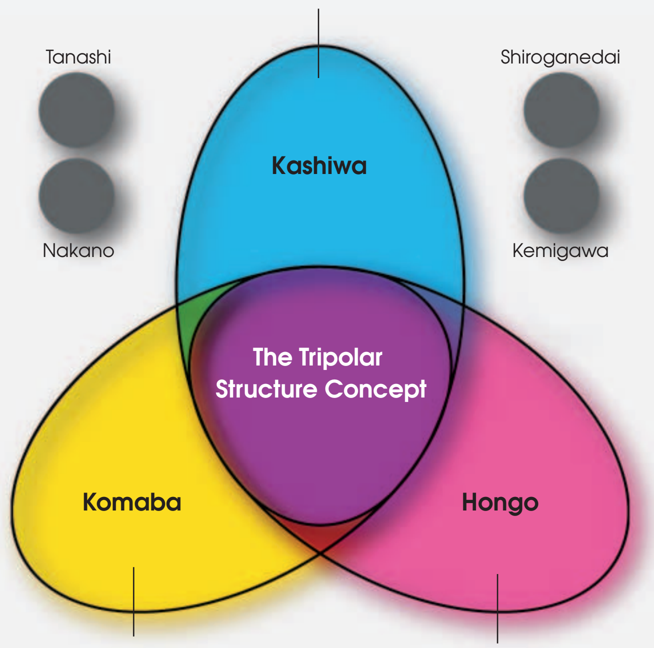
01 Hongo Area (Administration Bureau, University Library, Graduate School of Law and Politics/ Faculty of Law, Graduate School of Medicine/ Faculty of Medicine, University Hospital, Graduate School of Engineering/ Faculty of Engineering, Graduate School of Humanities and Sociology/ Faculty of Letters, Graduate School of Science/ Faculty of Science, Graduate School of Economics/ Faculty of Economics, Graduate School of Education/ Faculty of Education, Graduate School of Pharmaceutical Sciences/ Faculty of Pharmaceutical Sciences, Graduate School of Frontier Sciences, Graduate School of Information Science and Technology, Graduate School of Interdisciplinary Information Studies/ Interfaculty Initiative in Information Studies, Institute of Oriental Culture, Institute of Social Science, Institute of Socio-Information and Communication Studies, Historiographical Institute, University Museum, Environmental Science Center, Molecular Genetics Research Laboratory, International Center, Center for Research and Development of Higher Education, International Research Center for Medical Education, Health Service Center, International Center for Elementary Particle Physics, etc)
02 Asano Area (Engineering Research Institute, Cryogenic Center, Radioisotope Center, Research Center for Nuclear Science and Technology, High Temperature Plasma Center, Information Technology Center, VLSI Design and Education Center, etc)
03 Yayoi Area (Graduate School of Agricultural and Life Sciences/ Faculty of Agriculture, University Forests, Earthquake Research Institute, Institute of Molecular and Cellular Biosciences, Biotechnology Research Center, Asian Natural Environmental Science Center, Intelligent Modeling Laboratory, etc)
04 Koishikawa Area (Botanical Gardens, etc)
05 Komaba Area (Graduate School of Arts and Sciences/College of Arts and Sciences; Graduate School of Mathematical Sciences; Institute of Industrial Science; Research Center for Advanced Science and Technology; Research into Artifacts; Center for Engineering; Center for Collaborative Research; Center for Climate System Research; Komaba Open Laboratory; Center for Spatial Information Science; Research Center for Advanced Economic Engineering; International lodge, etc)
06 Nakano Area (Secondary Education School, Ocean Research Institute, etc)
07 Shirokane Area (Institute of Medical Science, Institute Hospital, International Lodge, etc)
08 Tanashi Area (University Farm, experiment station at TANASHI, etc)
09 Mitaka Area (Institute for Astronomy, etc)
10 Kashiwa Campus

11 Tokoro Research Laboratory (Graduate School of Humanities and Sociology)
12 University Forest in Hokkaido (Graduate School of Agriculture)
13 Otsuchi Marine Research Center (Ocean Research Institute)
14 Enoshima Tsunami Observatory (Earthquake Research Institute)
15 Nuclear Engineering Research Laboratory (Graduate School of Engineering)
Neutron Scattering Laboratory (Institute for Solid State Physics)
16 Experimental Station for Bio-animal Science (Graduate School of Agriculture)
17 Coordinated Research Group on Utilization of Gamma Fields (Faculty of Agriculture)
18 Tsukuba Seismological Observatory (Earthquake Research Institute)
19 Nikko Botanical Garden (Graduate School of Science)
20 Students' Recreation House, Tanigawa
21 University Forest in Chichibu (Graduate School of Agriculture)
22 Dodaira Seismological Observatory (Earthquake Research Institute)
23 Kemigawa Athletic Ground
Experiment Station for Landscape Plants (Graduate School of Agriculture)
Experimental Station for Medicinal Plant Studies (Graduate School of Pharmaceutical Sciences)
24 Chiba Experiment Station (Institute of Industrial Science)
25 University Forest in Chiba (Graduate School of Agriculture)
26 Nokogiriyama Geophysical Observatory (Earthquake Research Institute)
27 Marine Biological Station (Graduate School of Science)
Aburatsubo Geophysical Observatory (Earthquake Research Institute)
28 Ninomiya Orchard (Graduate School of Agriculture)
29 Izu-Oshima Volcano Observatory (Earthquake Research Institute)
30 Yahiko Geophysical Observatory (Earthquake Research Institute)
31 Students'Recreation House, Ikenodaira
32 University Forest at Yamanakako (Graduate School of Agriculture)
Students'Recreation House, Yamanaka
33 Fujigawa Geophysical Observatory (Earthquake Research Institute)
34 Akeno Observatory (Institute for Cosmic Ray Research)
35 Kiso Observatory (Graduate School of Science)
36 Shin'etsu Seismological Observatory (Earthquake Research Institute)
37 Asama Volcano Observatory (Earthquake Research Institute)
38 Komoro Volcano-Chemical Observatory (Earthquake Research Institute)
39 Yatsugatake Geo-electromagnetic Observatory (Earthquake Research Institute)
40 Norikura Observatory (Institute for Cosmic Ray Research)
Suzuran Branch Office (Institute for Cosmic Ray Research)
41 Students' Recreation House, Nojiri
42 Kamioka Observatory (Institute for Cosmic Ray Research)
43 Arboricultural Research Institute (Graduate School of Agriculture)
44 Fisheries Laboratory (Graduate School of Agriculture)
45 Students' Recreation House, Heda
46 Students' Recreation House, Shimogamo
47 University Forest in Aichi (Graduate School of Agriculture)
48 Wakayama Seismological Observatory (Earthquake Research Institute)
49 Hiroshima Seismological Observatory (Earthquake Research Institute)
50 Kirishima Volcano Observatory (Earthquake Research Institute)
51 Amami Laboratory of Injurious Animals (Institute of Medical Science)



The University of Tokyo, with its tripolar structure centered on the campuses of Hongo, Komaba and Kashiwa, is set to meet the requirements of the twenty-first century as an important education and research facility. The Hongo campus is at the center of the structure and maintains the traditional disciplines. The Komaba campus looks after the first two years of undergraduate studies for all faculties and is also the base for extensive contacts with society as a whole. The Kashiwa campus experiments in intellectual adventure and seeks to create a new academic domain. Together the campuses are developing knowledge and taking a world-class lead in academic research.

This campus will be at the center of fresh developments in education and research. Here a new academic domain is being created, where graduate education and research will be carried out through a fusion of disciplines at different levels of maturity and intellectual adventures will experimented with.



Besides offering the first two years of education to all undergraduates, the Komaba campus carries out academic research and education at the upper undergraduate and graduate level based on exchanges with society as a whole and on the mutual functioning of different disciplines.

Hongo is the campus at the center of the tripolar structure. It undertakes higher undergraduate and graduate teaching and research, based on the traditional disciplines.

The Tripolar Structure

Images of the Future

Hiroshi KOMIYAMA

Dean, Graduate School of Engineering/Faculty of Engineering

The essential problem confronting human knowledge is that no one can see it in its totality. This is obvious when we think ,for example, of the controversial project to separate Isahaya Bay in Nagasaki from the rest of the Ariake Sea by creating a sea wall. We cannot see the totality because of the specialization that has come with the expansion of knowledge.

As a result of the expansion of knowledge through specialization, we have experienced a growing complexity in the questions raised and also a subdivision of fields. What we need now is to structure knowledge. Since human beings live within three-dimensional space, we would assume that direct understanding was possible in terms of a three-fold parameter. However,the complex problems confronting us may have hundreds of interlocking parameters, and each specialist will consider it from his or her own individual axis. Though it is difficult to find a correspondence among several hundred different viewpoints,it is essential that it be found. While we talk about the subdivision of fields, the principles of each field have many unexpected and simple common points. If we can come up with a structure of knowledge that will clarify the fields themselves and elucidate the connections between them, knowledge can be manufactured electronically in IT. In the School of Engineering, we are beginning to tackle the structure of knowledge as it is concerned with academic creativity, social technology, nanotechnology, the science of error, and industrial science. We hope to achieve a truly revolutionary knowledge base to add to the methodologies based on the movable type which has sustained human knowledge since the time of Gutenberg.

I do not like to say to students just "Learn broadly." Breadth alone can give rise to shallow criticism. What is necessary is learning that is both broad and deep. If a knowledge base manufactured electronically in IT is fully sustainable in all areas, we should be able to attain a flexible and reliable style of learning piloted by that knowledge which can delve deeply and obliquely into the sea of surplus information. Researchers,too,will be able to forward their own research interests knowing clearly where they stand both in society and in their specialized fields, ever changing and becoming increasingly complex. The university is moving toward a new standard where it must send a message to society, devise the whole picture, put this into words to appeal to society as a whole, and answer society's needs with a flexible network of knowledge. Universities in the twenty-first century will go beyond the restrictions of time and space to become places where people are drawn together and an effervescent knowledge is structured in new ways.

Yoshihiro HAYASHI

Dean, Graduate School of Agricultural and Life Sciences/Faculty of Agriculture

Teachers and students concerned with agricultural science know that once life has begun, its end is already clear. They hope therefore, whatever the confusion of the times, to be able to cope calmly and purposefully. "Calm",however,does not mean to be enclosed in one's world protected from change. Agriculture is concerned with "growing," unlike engineering, which contributes to society by "making." Agriculture cannot therefore afford to ignore the independence and autonomy of that which it "grows." As a result,it may sometimes seem to be a field that is slow and not very progressive. However, it is because of the very fact that agriculture moves slowly that our human inheritance has been maintained down to the twentieth century, and, ironically, may be one reason for the expectations placed on it in the twenty-first. In athletic terms, it is like being one lap behind the lead runner. This is both good and bad. One good point is that in the latter half of the twentieth century in particular agriculture recovered the self esteem that it had previously lost. A problem, though, is that because it is a lap behind it must ask itself whether it has the ability to answer the expectations of the nation.

Elucidation is sought from agriculture both as an applied science,which has accumulated much competence,and in terms of the extremely important concepts of relationship and diversity ,which do not impinge much on twentieth-century science. This implies that agriculture might be able to release twentieth century science from the bonds of diligently pursuing universality by shedding light on the individuality of diverse living beings and on regionality. Agriculture is that field of learning which deals with the relationship between human beings and other living beings, and with the relationship of living beings with the total environment. We need to be able to put these characteristics to the very best use, as well as to question fundamentally the relationship between subject and object as it occurs in our observations and experiments. Agriculture looks set for an exciting future.

Takashi TSURUO

Director, Institute of Molecular and Cellular Biosciences

What direction is the university as a whole moving regarding those important facets of twenty-first century scholarship, the life sciences and information science? How can the life sciences as studied at the University of Tokyo be absorbed organically into the various faculties?

The Institute of Molecular and Cellular Biosciences is concerned with the "post-genome" life sciences, with "creativity"as the key. If faculties such as Agriculture, Medicine and Pharmaceutical Sciences have a responsibility within the university organization to teach the basics of science, the Institute must always bear in mind the social climate and should continue to produce new creative scientific research.

Learning itself has changed. In my own field, cancer research, for example, cancer is no longer a terrifying disease. In addition, as we continue to crack the genetic code, cancer will cease to engender unnecessary fear. The results of genome, biological and cancer research in the seventies and eighties changed, by the early nineties, our ideas about an anti-cancer drug from something which would kill cancerous cells to one that could send a signal which would either switch on the information that cancerous cells would die, or switch off the information that they exist.

The Institute of Molecular and Cellular Biosciences is continuing creative scientific research based on genome informatics in cooperation with research organizations both within and without the University, and with industry. Functional material design based on protein informatics has become a possibility, and we are moving steadily towards "order-made" treatment based on the genetic information of each individual patient. Brain research, too, has changed greatly since genome research. With advances in information technology, the latest research in the life sciences can be shared with the world in an instant.

At the same time, the life sciences are also meaningful in the context of traditional diversified research. When we are dealing with more than 35,000 human genes, research has to be diversified. It is important that the university be structured to support the administration of this type of research. Not only are the buildings important, but so, too,are structural forms, networks which include education and entrance exams, etc. and a system that can be clearly evaluated. The cooperation of industry is essential as well in the clinical development of new medicines.

With "information," "life" and "sickness" as our key words for the twenty-first century, we will continue our creative research and work to apply our results from it.

Masao SAKAUCHI

Director, Institute of Industrial Science

I think that what is most required of the University of Tokyo in the twenty-first century is that the individuality of the various faculties which make up the university be more greatly defined, while at the same time the whole be synthesised in order to send out its various specific outputs more effectively to society. This leads us to deal anew with what at first glance may seem a simple question, but which in fact is extremely important: what is the essence of the university itself?

We continue to affirm that the university is basically a place that has both a responsibility to create the values, which should be passed on to the next generation, and a mission to foster wisdom and people of talent for the sake of the world. Over and above this ideal we should stress that action is also necessary. To further this, in the Institute of Industrial Science, our research target is to synthesise deliberately existing fields to create a dynamic synthetic engineering with a new value for society. As a result, the Institute has exercised all its faculties to put in place a viable system. Education should foster human resources from the basics so that its fruits might be found somewhere in the future. On top of this, what is extremely important is targeted postgraduate education able to meet the needs of industry and society. The Institute regards these as the two pillars of its education.

There are many issues surrounding trends towards American-led globalization. We must consider very carefully the output and intellectual product that have true international impact. To this end, in 2000 we issued a manifesto for an International General Engineering Institute (http://iis.u-tokyo.ac.jp/). During the twentieth century, no one looked to the university for aggressive knowledge regarding international society. To respond to the multiple needs of the twenty-first century, though, it is important that the university have a clear direction and well-defined targets, which it can meet individually. In this way the university will be able to demonstrate its worth.

Images of the Future

Michikata KONO

Dean, Graduate School of Frontier Sciences

When I think about the future of the university, the phrase "scrap and build" comes to mind. The question then is, of course, what must be scrapped and what should be built. Society has come to expect tangible results from universities. But the intangible ones are also important, and how we should evaluate these is of vital concern.

Any hasty decision about rethinking the education of children, including the university entrance exam system, is to be avoided. We need to think about how Japan is to survive in international society, to confront and reconsider events in recent Japanese history, such as the Meiji policy of "rich country and strong army," the various wars fought since the nineteenth century, and the events of the latter part of the twentieth century, so that we might learn what kind of society we should strive for in the future.

In the Graduate School of Frontier Sciences, our research seeks to merge various academic disciplines, while in our teaching, since we do not have undergraduate students, we establish links with existing faculties and institutes. Administratively, we have an independent academic administrative committee, and are forwarding a plan for the future that agrees with all the elements of the national strategy for science and technology upon which the Kashiwa Constitution is based. The university should provide a space for debate and discussion, and be prepared to confront society head-on. This is what democracy means. Of equal importance is a good relationship between the university and its locality. If the University of Tokyo proposed leaving its Hongo campus, how strongly would local residents try to dissuade it from doing so? At Kashiwa, a close relationship with the local community is of the utmost importance. At the same time, the University of Tokyo, as a national university, should not become a university serving just the capital region. Students and staff alike should create that which is necessary for the country as a whole, and they should be held responsible by society to do so. The university should not be too pure. Unless it is a meeting place for people of varying opinions, it will lose its stamina as an intellectual institution. It is not enough to pursue the target directly before one's eyes; rather it is by generously joining various ways of thinking together that the base can be achieved for a truly vital academic fusion. It is from an environment where scholars of many different abilities can be active and in which aware students can learn that a structure of value can be reconstituted. This is a necessity for university administration in the twenty-first century.

Junichi HAMADA

Dean, Interfaculty Initiative in Information Studies
and Graduate School of Interdisciplinary Information Studies

Information Studies will be the human studies of the twenty-first century. One of the chief characteristics of the University of Tokyo is its all-round depth in all the disciplines. Interdisciplinary Information Studies was conceived by asking what would happen if this depth could be extended laterally.

One of the University of Tokyo's strong points is the strength of its education and research in the traditional faculties. As it faces difficult questions in its experiments with different kinds of academic structure, it can, I feel, come up with a new appeal as a university for the twenty-first century by combining heterogeneous cultures in a form different from its previous experience. Within the traditional faculties staff may not have been always able to give full rein to their abilities. In order to build a space that can encourage individual strengths within the combined strength of the university, an appropriate theme is necessary. "Information" is ideal as such a theme. It is something not covered in traditional academic fields, gathered by people and participating in intellectual experimentation. Other themes not treated fully up to now,like the Arts and the Media, could also become objects of academic study, not in the sense of picking up what has previously been discarded, but in the sense of applying them to broader questions in a way not previously attempted. Information allows analysis of elements through signals. It is also something that people can grasp through the senses and which can be understood as acting within society. When the expansion of information brings about social change, we can think that the role of information may end when a period of equilibrium is reached. However, today, at the beginning of the twenty-first century, Interdisciplinary Information Studies has the ability to establish within a few years a new field of study based on the theme of Information and supporting a fluidity of organization.

Moreover, its results will be returned to the various faculties. This is my belief, both as a constitutional scholar and as an individual. When we combine in an appropriate way the orthodox with what might be considered a subculture, a great power may be unleashed. The university must ask itself how it is to manage in the future the diversity thus attained.

Hidenori FUJITA

Dean, Graduate School of Education /Faculty of Education

Academic ethics and the basic task of universities as organizations have changed little since universities were first founded in medieval times. Universities have consistently functioned based on the three pillars of advanced specializd teaching, the training of scholars and the promotion of research.
The modern university has its roots in medieval Europe, where such institutions grew out of groupings of students, such as in Bologna, Italy, or of teachers, as Paris or Oxford. This basis has not changed greatly down to the present time. What is important today, at the beginning of the twenty-first century are the changes occurring in the forms of teaching and research. The university has the responsibility of incorporating the intellectual product into society and of promoting it as an aggregate. As a result, the old "closed" system must be opened up. Students must not necessarily study full-time; the doors of the university should be opened widely to part-time and mature students as well. Further more, accreditation between universities should be facilitated and cooperation in and promotion of education conducted from an international viewpoint.
The employment of staff, too, should be broadened, with more joint appointments, joint work with other research facilities encouraged, and terms of tenure extended. Through a more flexible staffing system, teachers and researchers should be able to increase their activities, thus allowing greater use to be made of human resources. There is also a growing need for practical professional training, such as can be seen in the Business Law Centre in the Faculty of Law and in professional schools, which concentrate on on-the-job training. The status of university staff is sure to become more diversified in the future.
In terms of research in the humanities and social sciences, theories constructed on the basis of European and American systems and models have been adapted to Japanese conditions, and the period of so-called "imported research" had treminated by the end of the 1960s. In a situation where international competition regarding the hegemony of knowledge has become more severe, Japan must announce its theoretical stance more and increase its strength in setting international agendas.

Shinichi SATO

Dean, Graduate School of Humanities and Sociology/Faculty of Letters

Within the enormous changes that are taking place in the world at the beginning of the twenty-first century, the University of Tokyo ,too, must inevitably transform along with the times. The Faculty of Letters and the Graduate School of Humanities and Sociology are no exception.
The Humanities as a whole will collapse if, while resting within tradition in the narrow sense, they cannot respond to the needs of the times. My rough impression is that it is important that between 20% and 30% ought to change as required, while the remaining 70% or 80% should continue to preserve the orthodox basics. Recent trends in Japan have followed the American system of general education at the undergraduate level and specialist training in graduate school. My own preference would be early specialization leading to late generalization. In the humanities and social sciences, whatever the field, true research ability is taught by first teaching the student to cope with primary texts and then finally by having him or her "sweat blood" by writing a dissertation of high academic reliability.
In my own field of Chinese philosophy, our research is greatly helped by information technology, as we are able to convert basic Chinese classics to data bases. Truly, the computer is an essential tool of today's scholar. However, if scholars are not trained professionally to interpret their data correctly, they will not be able to produce work of true international standing. While needing to avoid digging ourselves into ever-narrowing areas of specialization, we should stand firmly on the basics and promote academic contacts with scholars in other areas of the humanities, and intellectual exchanges with staff and students in the sciences. Society in the twenty-first century will face new challenges, which will go beyond the old divisions between the humanities and the sciences, such as "applied ethics" like life, environment and information ethics.
At a time when there are fears that academic standards are falling and that general education is weakening, we must create a new common base of knowledge in order to encourage a flexible type of knowledge capable of responding to society's demands. This is the social raison d'etre of the humanities in the twenty-first century.

UT Forum 2000 in Silicon Valley

Sumiko WATANABE
Associate Professor, Institute of Medical Science
URL http://www.ims.u-tokyo.ac.jp/moldev/

This poster was designed by Professor Ken Sakamura.

In many ways, the integration of what might be considered the most important of scientific fields, the life sciences and the information sciences, is progressing rapidly. At the forefront of this integration, scientists from around the world are working to develop the field of bioinformatics in order to decipher genome information. Japanese research lies considerably behind that of the United States in this area. Other countries also have much to learn from the United States concerning how collaboration between the university and industry is actually implemented.

In an attempt to open up this situation somewhat, we established in 1999 an overseas academic exchange center near Stanford University in California, with assistance from the University of Tokyo academic research fund. This Center is adjacent to Silicon Valley, a driving force in the development and growth of computer science. The large numbers of venture businesses there have fostered close ties with the university and the world of business and industry and are conducting pioneering research in genetic engineering. We regard the Center as a base for gathering information, for undergraduate and postgraduate research, and for joint research with Stanford University and other leading research institutions.

With the aim of widely introducing the University of Tokyo, its research in the life

Preparing to break open the sake barrels.

sciences and its human resources to local universities, industrial researchers and venture businesses, and encouraging international academic and industrial cooperation, the Center sponsored the UT Forum (University of Tokyo Forum) 2000 at Stanford University. The Forum lasted two days. During the Pre-Forum session on the first morning, representatives from American and Japanese universities and founders of biotechnology venture businesses spoke about strategies for university administration and about starting biotechnology enterprises in both countries. During the afternoon, there were visits to the new campus being constructed by the University of California at San Francisco (UCSF) at Mission Bay and to a number of biotechnology venture businesses at Palo Alto. At the final company visited, the University of Tokyo hosted a dinner, which helped deepen contacts. The next day was the Forum itself. During the morning the former President of the University of Tokyo, Dr. Shigehiko Hasumi; the president of Stanford University, Dr. John Hennesy; the Vice-President of UCSF, Dr. Zach Hall; and the head of the Institute of Medical Science at the University of Tokyo, Professor Kenichi Arai, gave lectures about university administration at present and in the future. In the afternoon presentations were given by researchers in the life sciences affiliated with the three universities. More than one hundred people from the universities and from business attended the main symposium, including twenty students from the University of Tokyo. The meeting allowed participants not only to gain a wider perspective on the work being done in the Silicon Valley but also enabled them to make valuable contacts with people from different fields. The Forum, moreover, provided a valuable opportunity for researchers and administrators from both universities and business as well as people connected with government to think about strategic ideas from a new basis of cooperation. It is hoped that what was achieved there will lead to many new developments in the future.

Dr. Arthur Kornberg, Nobel Prize-winner from Stanford University.


Dinner-meeting with venture businesses.


The first day - the pre-Forum session.


The symposium hall.


Presenters and organizers.

Teachers in UT

The University of Tokyo has a faculty of approximately 2,800 professors, associate professors, and lecturers, all of whom devote their energies both to their research in their particular fields at a world-class level and to providing students with a solid education.

The UT faculty members have received numerous awards for their outstanding achievements in their respective fields.

Here we introduce a selection of six UT scholars who received prestigious awards in 2001, and who represent the rich variety and high level of scholarship at this university. Among the prizes are the Shijuhosho (Purple Ribbon Medal), which is given to a scholar who has made a great invention or carried out important research in a field of science or technology; the Saruhashisho, which is granted to a woman scholar who has achieved outstanding scholarship in a field of natural science; and the Rantier Award from the French Academy.

By introducing these award-winning scholars, we hope to give you at least a slight feel of the wonderful research and education being carried out at UT. We, moreover, hope you will realize that there are many other faculty members engaged similarly worthy activities.

Searching Source Materials of the Solar System and the Earth

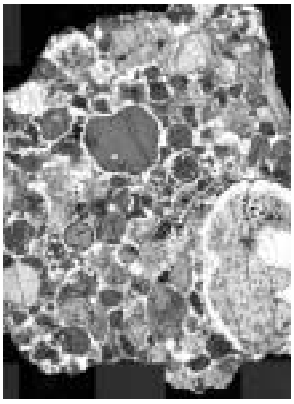
Hiroko NAGAHARA
Professor, Graduate School of Science

Since human beings started to ask themselves the very fundamental question about their own origin, they have been eager to know the origin and evolutionary history of the universe, solar system, and particularly the planet Earth where they live. It took about 4.7 billion years to attain the current solar system, ant its ongoing evolution draws from us a keen interest to know our ultimate destination. Many different approaches, ranging from astronomical observation, laboratory experiments, theory, computer simulation, and meteorite studies, are applied to answer the question. I have been involved in several of these approaches, and will present some of the results here.

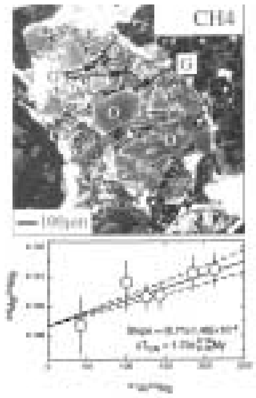
Before going into my studies, it may be a good idea to summarize a widely accepted scenario on the evolutional history of our solar system at the very beginning. It began from a density perturbation in an interstellar cloud, which grew into a core of molecular clouds through a gravitational collapse. Further collapse of interstellar dust and gas to the core gave birth to a star surrounded by a whirling nebula. In the nebula, dust particles sank on to the mid-plane, which grew into a planetesimal through dust coagulation, accretion by collision, and fragmentation of the dust layer. Further collision of planetesimals resulted in fewer larger protoplanets, which grew into the current planets of the solar system.

Are there any materials that have preserved records of the evolution of the early solar nebula? The answer is yes, and they are meteorites, extra terrestrial materials that mostly came from the asteroid belt. Although the record is very fragmental, meteorites give us very unique chance to look into the past of the solar system, because they are date back as far as 4.7 billion years ago, much older than the oldest rock record found on the earth (~4.0 billion years). Another important character of meteorites lies in their composition, which is very similar to that of the sun's atmosphere, except for the volatile elements. Because the sun occupies 99% of the solar system in mass, and it therefore represents the composition of the solar nebula.

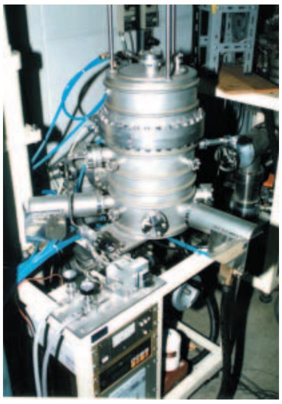
A recent important finding in our meteorite study is the time scale of the early evolution of the solar nebula. A chondrule, which is a partially molten spherical object with ~ 1mm diameter set in a finer grained matrix (Fig. 1), gives us conclusive evidence for the high temperature stage in the solar nebula. We have determined the time scale of chondrule formation by using extinct radionuclide of ^{26}Al, which decays to ^{26}Mg with a half-life of 0.7 million years (Fig. 2). From the ages obtained, it is inferred that the nebular time scale and chondrule formation were about than 2 million years



1. Photograph of a chondrite, the most primitive material in the solar system. It is full of chondrules, which are rounded rocky objects formed through an incipient heating in the early solar nebula. The width of the photograph is about 1cm.



2. Enlarged view of one of fragmented chondrules. O is olivine, P is pyroxene, and G is glass. Mg isotopic composition of the phases was measured for age determination, and the lower figure gives the time interval of 1.73 m.y. from the oldest object in the solar system for the formation of this object.



3. Equipment used for the experimental study of the evaporation behavior of minerals and liquids at low pressures, which was designed by the author and which has been installed in the Build. #5 of the Faculty of Science.

from the formation of the oldest solid object in the solar system.

I used together laboratory experiments to constrain chemical evolution and the source composition of the Earth. The major elements of the solar system are O, Mg, Si, and Fe, if volatile elements are ignored. The solid materials consisting of these elements with a wide stability field in terms of pressure and temperature conditions are forsterite Mg_2SiO_4, enstatite, $MgSiO_3$, and Fe metal. These solids evaporate directly into gas when heated at a low pressure of the solar nebula. We have determined the evaporation rate of those minerals in laboratory experiments (Fig. 3). By using experimentally determined evaporation rates, we can predict the possibility of elemental fractionation among Mg, Si, and Fe during a high temperature stage in the evolution of the solar nebula. It was found that the chemical evolution of the solar nebula was established by dust/gas separation during dust movement in the nebula.

Mechanisms of Organogenesis and Embryonic Body Formation in the Early Development of Animals

Makoto ASASHIMA
Professor, Graduate School of Arts and Sciences

The bodies of all animals, including human beings, are constructed of various organs. On the basis of what kind of sequential and ordered gene expression are these organs generated during the development process? By what mechanism is the individual organ formed as one of a group of organs in a body? The answers to these questions have been demonstrated in vitro, using the eggs of the Platanna frog (Xenopus) and the newt. It has been also shown that in vitro organogenesis and embryonic body formation are virtually the same as the developmental program of a normal embryo.

When the animal cap (undifferentiated cell mass) of amphibian blastula is treated with activin (an agent that promotes cell differentiation), differentiation is induced into various organs and tissue in a dose-dependent manner. A low concentration induces differentiation into the ventral site, blood cells and the coelomic epidermis, a medium concentration into muscle, and a high concentration into the notochord. Further more, high concentrations induce endodermal organs such as a beating heart, a small intestine, and a liver. The heart thus made in vitro does not only have the physiological function of beating, but also under the electron microscope intercalated discs can also be seen clearly and specific gene expression in the cardiac muscle can be confirmed. The in vitro combination of activin and retinoic acid induces 100% differentiation of pronephric tubules (kidney). The genes expressed normally in these pronephric tubules are the same as those in normal development. New genes related to kidney formation using this system can be cloned and analyzed. Moreover, we transplanted pronephric tubules made in vitro into embryos removed from presumptive pronephorous areas. The control embryos developed severe edema within nine days, and all died. But the transplanted embryos were able to survive for more than a month. It is therefore clearly possible to make pronephric tubules from undifferentiated cells in vitro and transplant them to a normal embryo. By treating undifferentiated cells with activin, and then after a certain time lag, with retinoic acid, the pancreas can be formed. This pancreas scrupulously secretes hormones such as insulin and glucagon and works the same as a normal pancreas. Concerning embryonic body formation, it is possible to produce head and trunk/tail structures in vitro. Thus, at present, a variety of organogenesis is possible during early animal development, and ,furthermore, groups of genes associated with it are gradually being revealed. Also, it is becoming possible to make sensory organs such as eyes and ears in vitro. At present, not only can we make fourteen types of organ and tissue from an undifferentiated cell mass, but we are also building the foundations of the new fields of regeneration science and organogenesis, as we come to understand at a genetic level the mechanism of embryonic body formation.

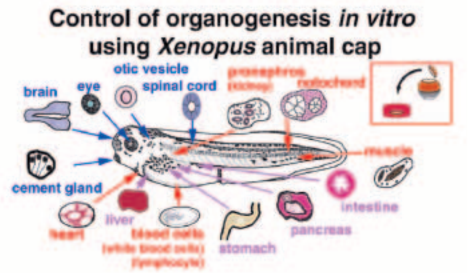
Note

On January 6, 2002 it was announced that Professor Asashima and his group at the University of Tokyo had succeeded in growing eyeballs in tadpoles by using undifferentiated cells taken from frog embryos. This is the first time a sensory organ grown in this way has been proven to have normal functions.

Summary

We have succeeded to make 14 organs and tissues in vitro using from undifferentiated cells (animal cap) treated with activin and other factors.

They are a beating heart, pronephric tubules, pancreas, which produces the specific hormones, sensory organs such as eye and ear. These in vitro induced organs and tissues are almost the same as the normal ones in structure and function. We have also cloned and analyzed the organ specific genes by using our original system.



Kamiokande, Super-Kamiokande and Hyper-Kamiokande

Yoji TOTSUKA
Professor, Institute for Cosmic Ray Research

The three names in my title stand for the past, present and future detectors of elementary particles called neutrino. Neutrino physics is one of the last frontiers in studying the most fundamental constituents of the universe and matter, elementary particle or simply particle. The University of Tokyo has been playing the leading role in this field thanks to successful operations of the Kamiokande and Super-Kamiokande detectors.

The pioneering Kamiokande detector was built to search for proton decay, still the most wanted signal for particle physics. Charged particles, if they run in water faster than a flashing light in water (slower by a factor 1.33, the refractive index of water, than light in vacuum), they emit blue light called Cherenkov light after the discoverer's name. One is able to obtain information on the parent particles by detecting images, intensity and direction of Cherenkov light. This was the basic principle of the Kamiokande detector. Kamiokande was operational in 1983, but was unfortunately not successful at discovering proton decays. The detector was then upgraded to observe neutrinos generated in the Sun, called solar neutrino. It was ready in December 25, 1986. To our big surprise, 11 neutrino signals were detected on February 23, 1987. Their duration was only 13 seconds, and they were just in coincidence with a long awaited supernova, SN1987A, which, however, went off at Large Magell- anic Cloud, a totally unexpected location.

In any case, this event was the birth of neutrino experiments in Japan and, of course, in the University of Tokyo. We were then successful in observing solar neutrinos and also atmospheric neutrinos in 1988. The experiment went on until 1996.

It was soon realized that Kamiokande was too small, despite 3000 tons of water, and its photon detection efficiency was too low, as well. We designed a 50000 ton water Cherenkov detector with a photo-sensitive coverage by a factor of two larger than that of Kamiokande. This detector, called Super-Kamiokande (Super-K), fortunately received funding in 1991 and completed in 1996. The primary purpose of Super-K was to study solar and atmospheric neutrinos in detail. The observation started in April 1996. Two years later we were confident that signals of atmospheric neutrinos had an anomaly, namely they showed a strong up-down asymmetry or in other words the signal rate depended on the length that neutrinos had traveled. This phenomenon was postulated many years ago; so called neutrino oscillation, provided that neutrinos have non-zero masses. The data accumulated by Super-K were quantitatively explained by the neutrino oscillation, and thus the first evidence for the finite neutrino mass was found.

In 2001, Super-K data on solar neutrinos, together with the experiment, SNO, in Canada, again provided evidence for neutrino oscillation- a different one from the atmospheric neutrino oscillations. This is not contradictory, because there are three kinds of neutrinos: electron-, muon-, and tau-neutrinos. The atmospheric neutrino oscillations depend on the mass squared difference of tau- and muon-neutrinos, while the solar neutrino oscillations take place due to the non-zrero mass squared difference of muon- and electron-neutrinos.

One can realize that there is the third mass squared difference of tau- and electron-neutrinos, which will induce oscillations between tau- and electron-neutrinos. A third generation detector of a 1,000,000 ton water Cherenkov type, Hyper-Kamiokande (Hyper-K), is indeed for studying this last oscillation phenomenon. Hyper-K has a detector mass unprecedented among those built for basic science. We have already started to design it, though it will require substantial R&D work and a construction time of more than five years.

Crisis of the Spirit - Europe and Japan

Megumi SAKABE
Emeritus Professor, Graduate School of Humanities and Sociology

Among the early works of critical thought of the philosopher Immanuel Kant (1724-1804) is a singular volume called *Dreams of a Spiritseer Elucidated by the Dreams of Metaphysics* (1766). Discussing the spiritual abilities and literary works of his contemporary, the Swedish theosophist and mystic Emanuel Swedenborg (1688-1772), he revealed his own "critical" wavering between the two extremes of affirmation and denial, by finally presenting his conception of "a science of the limits of human reason." I regard this as a pioneering work revealing an acute crisis of identity and maintain its importance as a document of such early crisis in modern times. Together with *Rousseau juge de Jean-Jacques, Dialogues* (Rousseau Judges Jean-Jacques, Dialogues) and *Le neveu de Rameau* (Rameau's Nephew) of Diderot (1713-1784), it can be seen as anticipating the critical situation of twentieth century humankind, going beyond the Romantics who were soon to follow.

The Japanese word "omote" means both "face" and "mask." The mask is not a copy of the face; indeed, the face itself can be said to be a kind of mask. When we consider that in Latin ,too, and the word persona originally meant "mask," later changed in meaning to "personality," we can discern the same situation. I dealt with these questions in my *Kamen no kaishakugaku* (Hermeneutics of the Mask, 1976) because while examining the response of western thinkers in the sixties to the critical situation of the times, I wanted to seek the possibility of contributing to elucidating the crisis of identity of human beings through the Japanese language and according to Japanese thought processes.

I place Watsuji Tetsuro (1889-1960) and Kuki Shuzo (1888-1941) at the head of pioneering scholars who thought through Japanese and according to its thinking processes. Watsuji in his later works witnessed a vision of the possibilities lost within Japanese cultural history after medieval times, while Kuki may be evaluated for *the farsightedness in his work Iki no kozo* (The Structure of Iki, 1930) in rehabilitating the decadent and baroque-type individualism of the first three decades of nineteenth century Japan.

Late Medieval French Chansons de geste

Takeshi MATSUMURA
Associate Professor, Graduate School of Arts and Sciences

One of the many genres of medieval French literature is the *chanson de geste*. "Geste" has as its first meaning "great deeds," and as its second, "tales relating the great deeds of individuals and families," and, by extension, also "lineage." The chanson de geste is characterized as a tale relating to the exploits of a family rather than an individual. Where a tale was composed about the deeds of a particular person, there were also added tales about his youth, episodes about his latter years, and works focusing on the activities prior and later generations. This tendency can be seen in the twelfth and thirteenth centuries, but was given further emphasis in the fourteenth and fifteenth centuries. As a result, the voluminous works that remain today may seem overlong to modern sensibilities. One such work was *Jourdain de Blaye*, consisting of 4200 lines written in a ten-syllable verse form early in the thirteenth century, and rewritten in the first half of the fifteenth in alexandrines and 23,000 lines in length.

Conceived as a sequel to Ami et Amile, this work deals with the exploits of Ami's descendants, beginning with his son Gerard, then Jourdain, and his children Jourdaine and Gerard, his grandson Richard and his great grandson Thibaud. Their opponent, the heathen Qualefrin, also is the center of a large family, as is the evil Fromond, who devises strategies against the hero. Finally Thibaud converts Qualefrin, at which point the tale ends. The tale holds much interest for its rich nuances of characterization, for its ability to portray the heathens not as evil but as having their own nobility, and for its concern about showing the female characters as having more than a passive role. It is also of interest linguistically, as it contains regional words and common sayings. Since there was no revised edition of this important work, in 1999, I published such an edition in Geneva, hoping it would be an aid to medievalists in reading it.

Tapestry "Jourdain de Blaye," fourteenth century, Padua Museum. An illustration of an episode at the beginning of the *chanson de geste.*

Jourdain de Blaye en Alexandrins. Critical edition. Geneva: Librairie Droz, 1999. 2 volumes. The edition, Textes litteraires francais, is a well-known series consisting of critical editions of works of French literature from medieval times to the present.

Charms and Power of Electrons in Nano-Space

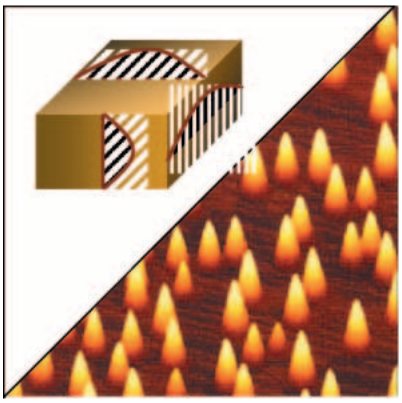
Hiroyuki SAKAKI
Professor, Institute of Industrial Science

Recently, "Nanotechnology" has attracted a global attention, since President Clinton stressed its importance two years ago. "Nanotech", however, has a much longer history with significant works done in Japan as well as overseas. As suggested by Democritus in the 5th century BC and proven by scientists about 100 years ago, matters in this world are made up of atoms. Hence, a variety of phenomena result from microscopic processes in a tiny space with the scale of "nano-meter" (nm) or one billionth of a meter. In such a nano space, electrons and other particles follow the "quantum mechanics" and behave as "waves". This "wave-mechanics" has not only explained basic properties of metals, semiconductors, etc. but also has allowed their use, opening electronics and other fields of modern technology.

For the last few decades, semiconductor electronics has made an enormous progress and has revolutionized computer and communication systems. In fact, most of these advances have been achieved by optimizing the device structures with the scale of nm. For example, core parts of transistors and lasers are now made of 10nm-scale films, and their lateral sizes are also reduced to the range of several tens of nm. It is because the efficient processing and high speed transmission of information can be done only when electrons are controlled in tiny space and time.

The prime objective of "Nanotechnology" is not limited to the improvement of existing devices but extends to the creation of new materials and devices. For example, an alternating stack of 10nm-scale layered structures (superlattices) was proposed by Dr. Leo Esaki, and electron waves in such superlattices are now used to realize new infrared detectors and lasers. Moreover, we proposed from the mid 70s a series of new devices, in which electron waves are confined in semiconductor nano-wire or box structures. Despite the early pessimism, methods to form such quantum wires (QWR) and quantum dots (QD) have been developed since the mid 80s. For example, 10nm-scale dots can be formed by a self-organized growth, as shown in the attached figure. Their unique electronic functions are now exploited to construct novel lasers, detectors, memories, and other devices. Also, a unique method to form carbon QWRs was developed by Dr. S. Iijima in 1991, by rolling up a sheet of graphite into a nm-scale tube. This carbon nanotube exhibits not only attractive electronic properties but also new chemical functions such as the hydrogen storage needed for ecological applications.

The charm and importance of electrons confined in engineered nano structures are now recognized in numerous fields of science and technology. For example, their unique potentials are being explored, and their impacts are to come in other fields such as magnetism, molecular electronics, biotechnology and medicines.



Maps of the Universe and Evolution of Galaxies

Sadanori OKAMURA Professor, Graduate School of Science

When I was a child, I would venture into the hills and discover hidden ponds and go and play in the parks of neighbouring villages. Looking back, the places I went to are not particularly significant, but to me they were like experiencing a new world. I'm sure everybody has similar tales to tell.

Mapping the universe

Human beings have a fundamental desire to find the answers to questions like "What exists in the world around the place we live in?" and "What lies beyond?" Just as the navigators of the Age of Exploration travelled the world and made maps of the earth, so do astronomers now make maps of the universe. Galaxies, enormous aggregations of stars and gases held together by universal gravitation, feature on these maps. There are 100,000,000,000 individual stars in a single galaxy. The Milky Way is an example showing how stars aggregated together in a galaxy to which our solar system belongs. Galaxies can be of various shapes, some like a spiral, others elliptical. Maps of the universe record how the various galaxies are distributed.

Such maps show an interesting pattern. There is a marked distinction between where galaxies are and where they are not. Galaxies are distributed like sheets or filaments, surrounding the void. The large scale structure of the universe, which has the size of more than one hundred million light years, preserves within it the records of the earliest stages of the universe, since little dynamical relaxation has occured. The maps should also give us a means of knowing the nature of dark matter, whose true character yet remains unknown. Maps of the universe show places we can never visit, but they are essential for understanding the origin of the universe.

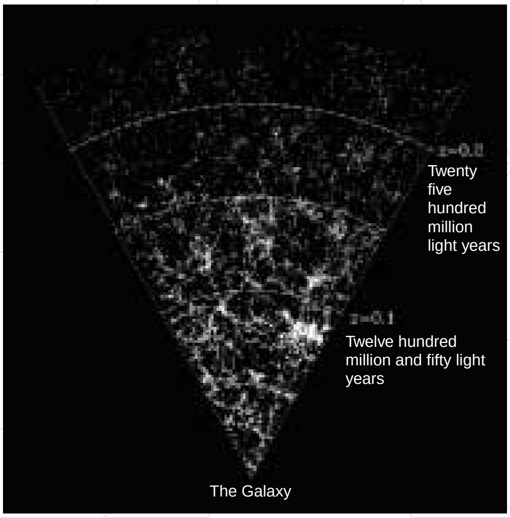
Maps of the universe on your personal computer

The Sloan Digital Sky Survey (SDSS), a joint project of a number of research institutions in the United States, Japan and Germany, has released early data obtained from its observations. Images of 400 square degrees (about one-hundredth of the entire sky taken by a highly sensitive CCD camera, a catalogue of more than 10 million celestial objects and the spectra of more than 50,000 galaxies taken in order to measure distances are now available through the Internet.

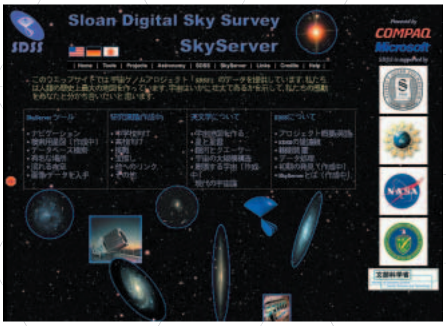
We can experience on our computer screen the slow movement of the night sky due to the diurnal motion through the CCD camera attached to the 2.5-m telescope at the Apache Point Observatory in New Mexico, USA, site of the SDSS telescopes. If we turn off the lights in the room, it does not seem like a computer screen any longer. Rather we feel as if we are travelling through the universe.

To the far side of the map

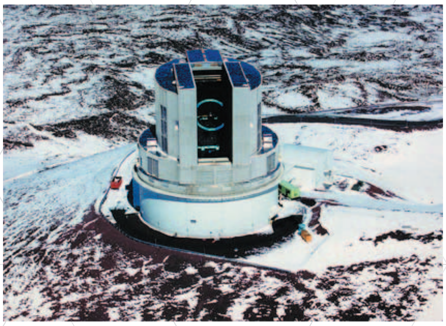
Though it is the map of the largest area ever created by human beings, the SDSS map of the universe gradually begins to fade from around 2,500,000,000 light years. To see further, we need to be able to observe fainter galaxies. A large aperture telescope such as the Subaru Telescope that Japan has built in Hawaii can reach far places although it can view only a very narrow region of the sky. By observing fainter galaxies, we do not just travel over distance but also through time, tracing the history of the universe. The further we can see, the more of the past we can observe. The period of 2,500,000,000 light years is, however, hardly any time at all in terms of the age of the universe, and little change is apparent in the properties of galaxies during such a period. However, the galaxies several times older than that which we can see through large telescopes, are in their period of growth. We might even find a galaxy at the moment of its birth. There is great hope that we can soon make comparative and systematic study of both the mature galaxies being studied by SDSS and the growing galaxies observed through the Subaru Telescope in order to understand more clearly how they evolved.



Space map of SDSS



Website of SDSS data (http://skyserver.fnal.gov/jp)


Subaru telescope

Solving Ancient Chinese Disputes about Legitimacy through IT

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We tend to take it for granted that historical dates don't change. If we don't know what they are, we leave it at that, or if there is a dispute about them, we explain that they still have to be elucidated. However, we have come to understand that there is a considerable problem about the dates recorded in ancient Chinese historical works. This is a particularly important issue because we have constructed our view of history based on the dates taken from such works.

The Records of the Historian (Shiji) compiled by Sima Qian in the second century BCE is divided into several sections, which include the Basic Annals, dynastic histories giving a year-by-year account of imperial activities, and Hereditary Houses, histories of various feudal states. Therefore, the same incident may be recorded in various places. When we try to date the incident by means of a chronological list of the rulers of the various states, we frequently find that the dates do not agree with each other. There are around 2900 instances in records before the time of the unification under the first Qin emperor (221 BCE) where there are problems with dating, and of these some 830 have multiple dates. In other words, there are enormous contradictions in the Records of the Historian concerning dating.

Having realized this inconsistency, I was able to discern historical facts that had never before been recognized. For example, it was obvious that so-called Chinese legitimism was created in the middle of the Warring States period (403-221 BCE), not earlier. Legitimism means that between the death of the old ruler and the succession of the new, there was a space for evaluating the dead king's reign and for discussing the legitimacy of the prospective sovereign. I will explain this further below.

The core of the problem of dating lies in a misunderstanding about when a ruler actually began his reign. Chinese reign eras traditionally began the year after a new ruler's accession. The year of accession itself would remain the last year of the former ruler. The reign eras set out in the *Records of the Historian* follow this traditional method. However, while looking at the problem of the contradiction of dates, I realized that this "traditional method" only began in 338 BCE, in the state of Qi. Before that the general method of assigning reign eras was to change the name of the year immediately upon the new ruler's accession (which means that a single year could have two different era names). The people who compiled the Records of the Historian in the second century BCE did not know this, and so events that were dated by the older method were mistakenly organized as if they had been dated by the "traditional method."

Since under the older method the first year of a reign era is also the last year of the former ruler's reign, and by the "traditional method" the first year is the year after the death of the former ruler, a gap of one year occurs over one reign. When this happens over a number of reigns, the differential grows even larger. The compilers of the Records of the Historian, mistakenly thinking that all reign eras were done according to the "traditional method," calculated the reigns of hereditary rulers, which in fact were according to the old method, and discovered discrepancies in the number of years between, for example, the death of Confucius and later events. They did not realize their dating methodology was wrong and so attributed the differences to mistakes in character transcription of numbers. This is why there can be great variations in dating from state to state.

The results of my analysis showed that the contradictions had arisen over and over again through human error. When I reconstruct the original dating according to my analysis, the differences disappear. This has been the result of considering a number of conditions, so some revision in the future may be necessary. But as of now no insuperable problem has arisen. If such work had been done by scholars in the past, they would have needed a very large workspace and conditions conducive to the storage of notes. By contrast, I used a personal computer and typed the information into a data base program. I used no more space than was needed for one desk. Moreover, the data base program I used allowed me, as long as I made no mistakes in typing in the keywords, to pick up all the places where that keyword occurred. I was often surprised to find the same item hiding in other, completely unexpected places. Scholars of the past could not have had that experience.

If the results of my reorganization are correct, then a further, larger problem arises. The "traditional method" of counting reign eras, as one form of the traditional imperial system, became intertwined with other forms of that system. As I mentioned previously, this method came into use in the middle of the fourth century BCE. Generations of scholars have argued that this traditional imperial system was also that of the Xia, Shang and Zhou Dynasties. However the traditional imperial system as such did not exist then. Whether or not the aforementioned dynasties existed or not and what they were actually called are a completely different problem. Nevertheless, by the middle of the fourth century BCE, a little over a century after the death of Confucius, they were being discussed by philosophers as ideal dynasties. The significance of this is very important, since it is related to several disputes about legitimacy that existed during the Warring States period. It is now possible to determine, without any inconsistency, the date of the decline of the Shang dynasty through historical materials such as traditional historical writings, oracle bone inscriptions and bronze inscriptions. I have recently published a book in Japanese on this subject, called *Yomigaeru moji to jujutsu no teikoku* (Empire of Letters and Magic in the Xia, Shang and Zhou Dynasties). In it I also speak of my ideas for further research.

Empire of Letters and Magic in the Xia, Shang and Zhou Dynasties . Published June 2001, Second edition August.

Sima Qian

Symposium on Zeami

The first international symposium focusing on the medieval Noh actor, playwright and critic Zeami (ca 1364 - ca 1443) was held between July 7 and 9, 2001 at the International Conference Center at the National Olympic Memorial Youth Center in Tokyo, sponsored jointly by the Department of Interdisciplinary Cultural Studies - Culture and Representation at the University of Tokyo and the Noh troupe, Hashi no kai.

The symposium featured a great amount of lively discussion among participants, both scholars and performers, from Japan and abroad, concerning Noh and Kyogen, theatrical forms considered to be representative of Japanese traditional culture, and about Zeami in particular, as a critic, playwright and performer of world importance in theatrical history. The purpose of the symposium was to look anew at both Noh and Zeami from a diversified, modern perspective.

The first day opened with a keynote address by Watanabe Moriaki , emeritus professor of the University of Tokyo (and now vice chancellor of the University of the Air) and chairman of the symposium committee. It was followed by a performance of the Noh play Okina (Old Man). The first discussion session, "The Okina in Asia," attempted to throw new light on Okina plays, which retain an early form of Noh, from the viewpoint of the religiosity underlying the medieval East Asian world. The second discussion session, "Zeami Seen from Outside," consisted of reports by participants from Switzerland and France, who spoke, with many interesting personal interpolations, about the way Zeami is understood in the French-speaking world and about his impact there.

Session Three, which began proceedings on the second day, was entitled "The Body of Noh." Discussion pivoted around the question of continuity between Zeami's time and the present, in terms of the particular physicality that supports the performance of Noh. A special program followed, entitled "Zeami in the 21st Century." It began with video interviews with six leading theatrical directors, including Peter Brook and Robert Wilson. This was extremely valuable, as the participants spoke for the first time for the symposium about the meaning for them of Zeami. Matsuoka Shinpei then spoke on the same theme.

Session Four, on the final day, "Words and Spirit of Noh Chants," explored the various possibilities of literary interpretation of Zeami's Noh chants. The final session, "Music, Voice, Reverberation and Intervals in Noh," which sought to bring the various themes of the symposium together, took the form of a workshop for performers, playwrights, musicians and others, in which it was attempted through performance to bring about a common understanding between performers and audience of the particular musicality of Noh, mediated by voice.

The importance of Noh and Kyogen within Japanese culture is coming to be understood even more widely, and they have been designated by UNESCO as intangible properties which are part of the world heritage. Reflecting this heightened interest, the symposium brought together many people, non-specialists as well as specialists, and the venue was packed each day. As Anne Bogard said in the video interview, "Now indeed it is the time to read Zeami." All in all, the purposes of the symposium were amply fulfilled.

News in Brief (January to December, 2001)

January	01	Lux Sophiae functions carried out -lectures commemorating the changing of centuries, message from President Hasumi, Akamon (red gate) and University Auditorium lit up-
February	02	The first entrance examination for undergraduate students
March	03	The second entrance examination for undergraduate students Commencement for the 2000 academic year The degree conferral ceremony
April	04	Professor Takeshi Sasaki accepts appointment as the 27th President of the University of Tokyo A new (third) Vice-president post created The university's matriculation ceremony Graduate School of Information Sciences and Technology established
May	05	The 74th Students' May Festival
July	07	The Open Campus 2001 held The First Open Academic Lecture:"Summer Evenings:to a Fountain of Knowledge" Special exhibitions at the University Museum:"Wada Mineral Specimens","River Dolphins--from the Abyss of Extinction"
August	08	The AEARU (Association of East Asian Research Universities) Students'Summer Camp held
September	09	Ceremony and Celebration to open new In-Patient Wing at the University Hospital
October	10	Special exhibitions at the University Museum:"Between Original and Reproduction - The Art of Making Copies - from D(uchamp) to D(NA)"
November	11	The Opening of University Museum's Koishikawa Annex The Second Open Academic Lecture:"Midnight When the Pleiades Laugh Merrily-to a Forest of Speculation" Meeting in Hanoi of the CCC (Creation of Common Culture) Forum 2001 by Four Major Universities of East Asia
December	12	Special exhibition to commemorate the 100th Anniversary of the Historiographical Institute: "Tales beyond Time:Historiographical and Artistic Treasures"

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