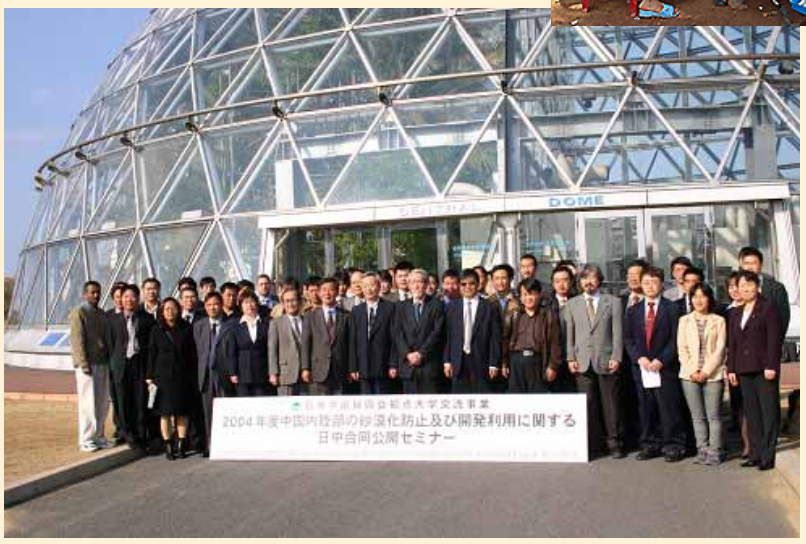
JSPS
Core University Programs
in ASIA



Japan Society for the Promotion of Science

JSPS carries out various international projects with countries all over the world. Among them, “the Core University Program” , one of our most important programs, is playing a significant role in promoting scientific exchanges with Asian countries. Under this program, a total of 27 projects are carried out with China, Korea, and Southeast Asian countries.

This booklet contains some reports from the Japanese universities and research institutes that are designated as the core universities and playing an active role in this program.

We hope this booklet can help you better understand our program.

September, 2005

Asian Program Division
Japan Society for the Promotion of Science

The Core University Programs are JSPS's largest scale projects of scientific exchange with Asian countries. This initiative was launched in 1978 based on a 1977 proposal by the Monbusho's Science Council, titled "Scientific Exchanges with Asian Countries." The program began with countries of Southeast Asia, and was subsequently expanded to China and Korea.

(1) Number of Projects

- Bilateral collaborations: 25 projects (Countries: China 4, Korea 6, Thailand 6, Indonesia 4, Philippines 2, Malaysia 1, and Vietnam 2)
- Multilateral collaborations: 2 projects (Countries: China・Korea 1,Asian countries 1)

Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
China			Plasma & Nuclear Fusion			→	→	→	→	→
				Arid Land R.		→	→	→	→	→
	Biosystem	→	→	→	→	→.	→	→	→	→
		Urban Environmental Engineering				→	→	→	→	→
Korea		Energy	→	→	→	→	→	→	→	→
		Semiconductor		→	→	→	→	→	→	→
			Ceramic	→	→	→	→	→	→	→
				Polymer	→	→	→	→	→	→
					Fisheries	→	→	→	→	→
							Internet	→	→	→
Thailand	Dentistry	→	→	→	→	→	→	→	→	→
	Microbial Resources		→	→	→	→	→	→	→	→
		Medical S.		→	→	→.	→	→	→	→
			Social S.	→	→	→	→	→	→	→
				Fisheries	→	→	→	→	→	→
				Pharmaceutical S.		→	→	→	→	→
Indonesia		Marine Transportation			→	→	→	→	→	→
		Bioscience	→	→	→	→	→	→	→	→
	Wood S.	→	→	→	→	→	→	→	→	→
		Environmental Earth S.			→	→	→	→	→	→
Philippines		Fisheries	→	→	→	→	→	→	→	→
		Environmental Engineering		→	→	→	→	→	→	→
Malaysia			Environmental S.		→	→	→	→	→	→
Vietnam	Environmental S&T for the Earth			→	→	→	→	→	→	→
				Medicine	→	→	→	→	→	→
Multilateral			Accelerator S.		→	→	→	→	→	→
			Coastal Oceanography			→	→	→	→	→

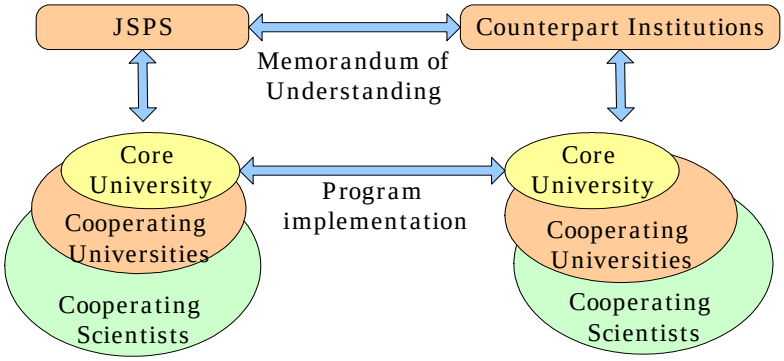
(2) Project duration

The majority of these projects are given a 10-year duration. This permits both the implementation of a relatively long-term research plan and the latitude to foster young researchers.

(3) Exchange system

Core university programs are implemented based on memoranda of understanding (MOUs) between JSPS and its counterpart agencies. Universities and individual scientists in the affiliated countries carry out the cooperative research activities.

Under each main research theme, four or five sharply focused research topics are established, and joint research, seminars, researcher exchanges are conducted with respect to them. In many of these projects, effort is made to support the fostering of young researchers in the counterpart countries or to promote exchange between young researchers in Japan and the counterpart countries.



In each program, a coordinator, responsible for overall coordination and liaison, is installed at each of the core universities; and in each project, a group leader is appointed.

(4) Program costs

JSPS covers an array of costs under the Core University Programs (e.g., international transportation, maintenance allowances, domestic travel costs, seminar costs (e.g., room rental, printing), research allowances (e.g., consumable supplies, printing) administrative costs (e.g., consumable supplies), and scientific information exchange (literature donations).

Concerning cost sharing with China and Korea, costs are basically covered equally, except for the maintenance allowances of Japanese researchers in the counterpart country, which are provided by JSPS. Accordingly, JSPS covers more of the program costs than the counterpart countries.

Concerning Southeast Asian countries, JSPS covers major parts of the program costs.

(5) Results of the Core University Programs

Bearing in mind that each core university program has its own objectives, the building of close and ongoing relationships between the counterpart agencies and affiliated universities in the participating countries is expected to produce the following results:

- Various papers and other fruits produced through joint research and seminar activities
- Exchanges among young researchers who will shoulder the future of their respective countries
- Contribution to the fostering of personnel and the promotion for basic research in the counterpart countries
- Internationalization of the research environment in Japanese universities
- Contribution to the solution of medical, developmental and environmental issues in the counterpart countries

Plasma and Nuclear Fusion

Study of Plasma Confinement for advanced reactors

WATARI Tetsuo　　WANG Kongjia

【Started from】FY2001

【Organization】

Japan		Counter country
Japan Society for the Promotion of Science	Funding Agency	Chinese Academy of Sciences
National Institute for Fusion Science	Core University	Institute of Plasma Physics,CAS
MOTOJIMA Osamu・Director-General・ National Institute for Fusion Science	Representative Director	LI Jiangang・Director・ Institute of Plasma Physics,CAS
WATARI Tetsuo・Professor・ National Institute for Fusion Science	Coordinator	WANG Kongjia・Assistant Director Institute of Plasma Physics,CAS
Hokkaido Univ.、Iwate Univ.、 Tohoku Univ.、Niigata Univ.、Tsukuba Univ.、Tokyo Univ.、 Univ of Electro communication.、Toyama Univ.、Shinshu Univ.、Gifu Univ.、Shizuoka Univ.、 Nagoya Univ.、Mie Univ.、Kyoto Univ.、Osaka Univ.、Hiroshima Univ.、Yamaguchi Univ.、Kyushu Univ.、Japan Atomic Energy Research Institute.、Keio Univ.、Sophia Univ.、 Chuo Univ.、Toho Univ.、Chubu Univ .、etc	Cooperative University	Univ.of Science and Technology of China、Institute of Modern Physics 、Southwestern Institute of Physics 、Chinese Institute of Atomic Energy、Institute of Applied Physics and Computational Mathematics 、National Laser Physics Laboratory、Tsinghua Univ. Northwest Normal Univ.、Fudan Univ.、Peking Univ.、Research Center for Laser Fusion, China Academy of Engineering Physics、Institute of Physics、etc

【Background & Object of Research】

Nuclear fusion is regarded as a clean energy source with fuel that can be extracted from the sea water limitlessly.

In the last decade, relevancy to a reactor has been demonstrated in tokamak devices by an achievement of the fusion out put power equals to the injected heating power. According to the progress made, construction of International Thermonuclear Experimental Reactor has been proposed. After three decades of intense investigation, acquired knowledge and technologies in this field are enormously large. However, realization of an economic attractive reactor will require still more dedications. Resources of fossil fuel are poor in Japan and the demand of energy is large in China according to their population. The purpose of this program is to contribute in establishment of an advanced reactor through tight collaborations in research between China and Japan.

【Research Subject】

This program aims to develop the physics and technology elements that are necessary for establishment of an advanced fusion reactor. The subject of this collaboration will cover three categories: 1) Improvement of Core Plasma Properties, where energy transport, steady state operation, and methods of plasma control are investigated to clarify the key physics. 2) Basic Research of Nuclear Fusion Reactor Engineering, where low activation structural materials, design of blanket, and reactor system integration are studied to give engineering foundations. 3) Theory and Simulation- Core Plasma Basic Research, where physics of MHD- and micro-instabilities, self-organization of the plasma, theoretical model of energy transport are studied to clarify the physics of non-equilibrium plasma. We expect the collaborating works between China and Japan stimulate the nuclear fusion research to give significant contributions in the world.

【The Result up to the Present】

Investigations of improving energy confinement were conducted in the National Institute for Fusion Science (NIFS), by use of the Large Helical Device (LHD), with many Chinese researchers participated. The EAST tokamak is under construction in the Institute of Plasma Physics in China (ASIPP) and technologies of super conductivity emerged as an urgent subject of collaboration. In the South West Institute of Physics, new device HL-2A has been constructed and diverter studies were started. According to such rapid progresses, the international board has approved participation of China to ITER.

The following is the summary of the academic results of collaborations achieved in the past 4 years.The statistic of the exchange of researchers during these year is given in the table.

		J→C	C→J	Total
FY2001	person(person-day)	47(329)	38(810)	85(1,139)
FY2002	person(person-day)	56(366)	55(843)	111(1,209)
FY2003	person(person-day)	66(443)	41(664)	107(1,107)
FY2004	person(person-day)	52(778)	69(421)	121(1,199)
TOTAL	person(person-day)	221(1,916)	203(2,738)	424(4,654)

I. Improvement of Core Plasma Properties

Long pulse operations of a plasma is set as one of the most important subjects of collaboration in CUP. In 2004, 30 minutes long pulse shots have been obtained in LHD by use of the ion cyclotron heating, and, 60 minutes shots - by electron cyclotron heating. In ASIPP, Ion Bernstein Wave heating has been addressed and synergetic effects were confirmed with improvement of the energy confinement. In LHD, the rolls of magnetic hill and well have been clarified. In Kyoto University, a spherical tokamak LATE has been constructed and non-inductive plasma start up has been investigated. Interaction of the plasma with plasma facing materials is another important factor determining the performance of the plasma. In ASIPP, a novel discharge cleaning and boronization methods were established utilizing the radio frequency. By using these methods, one minute long pulse shot was obtained in 2003 followed by the 4 minutes shot in 2004. Elementary processes of multiply ionized atoms have been studied. As to the ultra-high density plasma, superiority of fast ignition has been accepted and collaborations to develop high experimental techniques and simulations have begun.

II. Basic Research of Nuclear Fusion Reactor Engineering

Vanadium alloys gathered attention in both in Japan and China. Their properties have been examined in China in hydrogen blistering and examined in Japan in the creep characteristics at high temperature. The unique experimental equipments in Japan and China facilitated various specific experiments in combination. For example, SiC material was irradiated in China with ion beam at high temperature and was studied in Japan by use of the electron microscopes. Ion doped functional ceramics, developed in China, was studied in Japan by use of high-resolution microscopes observing rearrangement of atoms. The blankets based on hybrid reactor proposed in China and the tritium breeding blanket proposed in Japan were investigated and compared in their breeding ratio and fuel recovery properties.

III. Theory and Simulation

Theoretical investigations covers: analytic studies of MHD- and micro- instabilities, transport theories in torus plasma, physics of complexities in plasma and self-organization, and modeling of edge and diverter plasma. Since, micro-instabilities are suspected to degrade energy confinement, formulations were made in the form that the theoretical predictions could be compared with experimental results. Particularly, non-local effects of stabilities were included in order to predict the anomalous transport of electrons, where the behaviors at short wave length and finite beta effects were clarified. Also, progresses were made in understanding the interaction of plasma with high power laser and physics of self-organizations and complexities of the plasma.

The EAST device under construction in ASIPP and the HL2-A device in SWIP are now gathering attentions. Two-dimensional fluid analyses code （B2/EIRENE） has been developed for these urgent and practical interests.

(PHOTO) The 4th General Scientific Assembly of Asia Plasma & Fusion Association (APFA) Conference on New Development of Plasma Physics and Fusion Technology (October 13-16, 2003, Hangzhou, China)

Arid Land Research

Combating Desertification and Enhancing Rural Development in Inland of China

Atsushi Tsunekawa　　Junliang Tian

【Started from】 FY2001

【Organization】

Japan		Counter country
Japan Society for the Promotion of Science	Funding Agency	Chinese Academy of Science
ALRC, Tottori University	Core University	ISWC, CAS
Takayuki Nose・President・Tottori University	Representative Director	Rui Li・Institute of Soil and Water Conservation, CAS・Director
Atsushi Tsunekawa・Arid Land Research Center, Tottori University・Professor	Coordinator	Junliang Tian・Institute of Soil and Water Conservation, CAS・Professor
The University of Tokyo・Experimental Farm of the Graduate School of Agricultural and Life Sciences、National Institute for Environmental Studies・Office of International Coordination、Research Institute for Humanity and Nature・Research Department、Kyushu University・Research Institute of Kyushu University Forest、Kyoto University・Graduate School of Agriculture	Cooperative University	Shijiazhuang Institute of Agricultural Modernization, CAS、Department in WB's finance Project Office of Yanhe drainage area, Shanxi Province、Xian University of Technology、Shaanxi Desert Institute、Institute of Agricultural Modernization、Beijing Normal University、China Agricultural University、Xinjiang Agricultural University、Department of Water Resources, Shanxi Province

【Background & Object of Research】

About 1/4 of the world land surface and 1/6 of the world population are influenced by desertification. Desertification is land degradation in dry lands, and is one of the most serious environmental problems on the earth.

The desertification in China is especially serious, an area larger than Shikoku district disappears every year, and it has a great influence on environment of whole Asia, including our country.

Not only scientific research, but also society cooperation at various levels as the village, countries and continents are needed to combat desertification. There are individual measures against desertification, though, synthetic measures have not established yet. Arid Land Research Center is strengthening both domestic and international collaborations in arid land studies in line with the ratification of the UNCCD (United Nations Convention to Combat Desertification) and the Japanese Government in 1998. This program aims to construct a model for combating desertification and enhancing rural development, which is useful for all over the world.

【Research Subject】

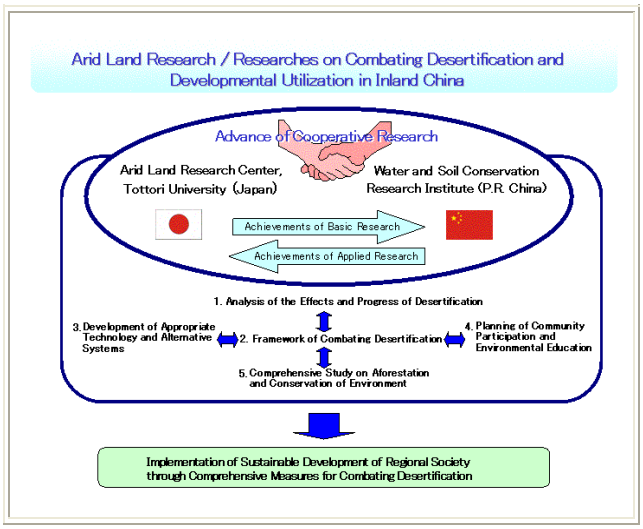
The ALRC has signed a 10-year joint project, Core University Program, with the Institute of Soil and Water Conservation, CAS in 2001. The Research title is 'Combating Desertification and Enhancing Rural Development in Inland of China'. Activities of this project are consisted of five subjects; ① Analysis on Process and Influence of Desertification, ②Study on Planning to Combat Desertification, ③ Development of Technologies for Combating Desertification, ④ Planning on Local Residences Participation and Environmental Education, ⑤ Comprehensive Research on Forestation Planning and Conservation of Environment.

The aim of this project is to establish comprehensive measures and models for combating desertification based on the results of these researches.

【The Result up to the Present】

This program has been successfully promoting international exchanges and research activities since 2001.

To promote international exchanges we are holding the Japan-China Joint Open Seminar every year, changing its place in turns between Japan and China. So far, the number of participants of the seminars amounts to 209 from Japan and 84 from China. As a result of such international exchanges, this program yields fruitful achievements such as producing co-authored articles by Chinese and Japanese researchers and obtaining PhD degree by Chinese students in Japan.



With regard to research activities, we obtained the following achievements in these four years.

Subject 1; 'Desertification Progress and Influence Analysis'. This study aims to clarify the progress of desertification and how it influences the natural environment. So far, we obtained achievements such as developing estimating methodology for precipitation distribution using meteorological satellite datasets and developing 3 layered soil model to predict soil moisture which influences the degree of wind erosion.

Subject 2; 'Study of Planning to Combat Desertification'. This study cooperates with the other four subjects and presents comprehensive measures for combating desertification by reviewing the countermeasures taken by Chinese government to combat desertification and producing regional classification map to show appropriate measures to be taken to each environmental region. Subject 2 pays attention to salt accumulation, one of the characteristics of desertification process, and aims to make a plan for combating desertification.

Subject 3; 'Technology Development for Combating Desertification'. This subject aims to improve the traditional agrotechnology and introduce modern agrotechnology in dry land so that a biologically sustainable production system can be established. We produce a technology package of desertification prevention measures which appropriately combines traditional knowledge and advanced technologies. As an example of traditional technology, we analyze the effect of *Yulinkeng* (water harvesting trenches for planting trees) , and as an example of advanced technology, we are creating drought-tolerant breeds by molecular breeding technology.

Subject 4; 'Planning on Local Residences Participation and Environmental Education'. We investigate several examples of advancing model projects in Shanxi, Hebei and Urumqi. It was found that villagers are not necessary implementing desertification prevention measures on a voluntary basis.

Loess Plateau in China: Desertification on Loess Plateau is characteristic of disappearance of vegetation, over-cultivation and soil erosion.

Subject 5; 'Comprehensive Research on Forestation Planting and Conservation of. Environment'. In this study, we set up long-term monitoring sites in both natural vegetation (*Quercus* forest) and planted vegetation (*Robinia* forest), and compare the structure and function (vegetation structure, biodiversity, water and nutrient cycling, eco-physiological characteristics of plants)

The results of this program are provided to Chinese authorities on desertification prevention and the research achievements are utilized in reality.

We are also trying to convey the results to the public by publishing a book of general interest and by other means.

Biosystem Studies

Establishment and Evaluation of biosystem with regional resource utilization/application for sustainable development

【Started from】FY1997

Takaaki Maekawa　Xiaoyan Tang

【Organization】

Japan		Counter country
Japan Society for the Promotion of Science	Funding Agency	Ministry of Education of People's Republic of china
University of Tsukuba	Core University	Peking University
Isao Inoue・Provost・University of Tsukuba	Representative Director	Xiaoyan Tang・Professor・College of Environmental Sciences
Takaaki Maekawa・University of Tsukuba・Professor	Coordinator	Xiaoyan Tang・Peking University・Professor
Tohoku University・Graduate School of Eng. Iwate University・Faculty of Agric.、Hirosaki Univrsity・Faculty of Agric. and Life Sci.、 Ibaraki University・Faculty of Agric.、 Chiba University・Marine Biosystems Research Center、 Niigata University・Faculty of Agric.、 Nihon University・College of Bioresource Sci.、Kobe University・Faculty of Agric.、Shimane University・life and Environ. Sci.	Cooperative University	Tsinghua University、China Agricultural University、Nankai University、Nanjing University、Ocean University of China、Fudan University、Northwest Sci-Tech University of Agriculture and Forestry、Jilin University、Shanghai Jiao Tong University

【Background & Object of Research】

Scientific research are carried out in the viewpoint of harmony of the sustainable development, and environmental preservation for orderly construction of a food production system indispensable to human-beings survival. Since China will increase to a population of 1.5 billion in the first half of the 21st century, food production may not be supplied enough. Construction of a food production system orderly for sustainable development is required. In order to prepare the order of food production, suitable management for preservation of water resources and forest resources is important. The new scientific research which biotechnology system study by introduction of the knowledge of biotechnology and life science, such as advanced scientific promotion, environmental preservation, and technical evaluation further based on the ethics for human-beings survival, proper technical selection, is aimed for establishment of a food system.

(see, http://www.geocities.jp/kyotentsukuba/)

【Research Subject】

1998 – 2000

a: Improvement of agriculture production by functionally improved plants
b: Amelioration of degradated soil and establishment of sustainable productivity
c: The reutilization of polluted water in food production system
d: Optimization of commercial activities and processing technologies for agricultural products
e: Amelioration of water resource and application of biological technique to water quality
f: Influence of atmospheric pollution on agricultural and forest production

2000 – 2004

1: Biotechnology for remediation of environment and food production
2: Development of sustainable and resource-preventive food production, processing and handling systems
3: Evaluation and improvement of soil environment on bio-production-system in arid land
4: Amelioration of water resource and application of technique to water quality
5: Evaluation and improvement of the effects of air pollution on agricultural and forest production and ecosystems

2005 –

1: Development of biotechnology, food production and post harvest technology
2: Amelioration of water sources and application of technique to water quality including water reuse
3: Evaluation and improvement of bio-production environment

【The Result up to the Present】

1.Outline of result of a joint research

The study results are published in Biosystem Studies(ISSN1344-7432). It is issued twice in the annual year and it reaches volume 7 (The total number is 14).The fruitful study results which will be able to see with the budget wining are produced after replacing a main purpose of core university program which made collaboration research a major pillar from the researcher exchanges. It integrated collaboration research into 3 fields from 2005 and it organized the contents of the specific cooperation result mainly in the Japanese and the Chinese sub-leader and it reviewed them about the 100 anniversary commemoration seminar (June 2005) of Fudan University in Shanghai.

2. The international student's participation in a collaboration research

The Chinese doctoral scholarship student reaches 16 students. Mr. Wei Bin(Tsukuba University) who accepted in 1998 fiscal year was admitted for Monbusho scholarship student who went on to the doctoral program, and to have an excellent research achievement as those who applied this Article 44 Clause 2. His doctoral degree was able to be acquired in 2001 fiscal year, and Mr. Ying Wang also was able to acquire the degree similarly in 2001 fiscal year. It is almost going well the other as many as 14 students and it keeps researching. It should be paid attention to be one of the results that the growth of the majority of the student who accepted as a foreign student at government expense in core university program surely like this.

3.Results of collaboration researches

1) Effect of water quality purification of soil trench method (photographs 1 and 2)

This research has been driven for three years from the design and construction in 2002 with Japanese University of Tsukuba , Peking University, China Institutes of Water Resources and Hydropower (Ministry of Water Resource s of China), Kunming City Institute for Environmental Studies. It becomes fiscal year 2005 afterwards, and four systems are designed, and they are now constructing. And their operation schedule at the end of August this year.

2) Performance of sunlight greenhouse and the analysis(photograph 3)

This research has been begun as a collaboration research of Japanese University of Tsukuba, China Agricultural University and Jilin University, and ties to the design criteria of a real model followed by the data acquisition, the numerical computer analysis and the scale-up for large-scale facilities.

Sunlight greenhouse

4. Award

1) Award of Journal of Water Treatment Biology, Sugiura, N., Intabon, K., Maekawa, T., 1999.11

2) Poster Award: The Society of Food Engineering, Zhang, Z., Maekawa, T., 2003.9

3) Academic Award: The Society of Arid Land Studies, Abe, Y., 2003.5

4) Award of Journal of Eco-Engineering, The Society of Eco-engineering, Sugiura, N., Utsumi, M., Maekaw, T., 2003.6

5)2004 Paper Award of The Society of Agricultural Structures, Japan, Yamaguchi,T., Kuroyanagi,T.,Chen,Q., 2004.8

6)2004 Poster Presentation Award of the Society of Agricultural Structures, Japan, Zha,S.,Yangun,T. et al.

5.Peer Review of Mid Term on Core University Program.

This program has been evaluated in 2001 fiscal year by peer reviewers, it last by now (2003 fiscal year)

URBAN ENVIRONMENT

Urban Environmental Engineering


Prof. TAKEDA


Prof. HAO

【Started from】 FY2001

【Organization】

Japan		Counter country
Japan Society for the Promotion of Science	Funding Agency	Ministry of Education, P. R. China
Kyoto University	Core University	Tsinghua University
Mitsuhiko ARAKI・Dean of Graduate School of Engineering・Kyoto University	Representative Director	
Nobuo TAKEDA ・Professor・Kyoto University	Coordinator	Prof. Jiming HAO ・Professor・Tsinghua University
Hokkaido Univ.・G.S.E.、Tohoku Univ.・G.S.E.、Tokyo Univ. of Agriculture and Technology・F.E.、Toyohashi Univ. of Technology・F.E.、Ryukoku Univ.・F. S.T.、Ritsumeikan Univ.・F.E.、Osaka Univ.・G.S.E.、Okayama Univ.・Research Inst. for Bioresources、Ehime Univ.・F.E.、Kochi Univ.・F.A.、Fukuoka Univ.・F.E.、Kyushu Univ.・G.S.E.、Yamaguchi Univ.・F.E.、Univ. of Ryukyus・F.E. etc. total 31 universities	Cooperative University	Peking Univ.、Nankai Univ.、Dalian Univ. of Technology、Tongji Univ.、Shanghai Jiao Tong Univ.、Kunming Univ. of Science & Technology、Chongqing Univ.、Harbin Institute of Technology、East China Univ. of Science and Technology、Southeast Univ.、Sichuan Univ.、Xi'an Univ. of Architecture & Technology、Wuhan Univ.、Hunan Univ.、Xi'an Jiaotong Univ.、Beijing Univ. of Technology

* G.S.E: Graduate School of Engineering, F.E.: Faculty of Engineering, F.S.T: Faculty of Science and Technology, F.A.: Faculty of Agriculture

【Background & Object of Research】

It is expected to establish a society of comfort and satisfaction with the name of "the era of environment", so that it is necessary to solve environmental issues which have been made as a result of human activities, and to make our life secure and sustainable. Through the solution of such environmental issues, we, the member of this program, ultimately are aiming at constructing the sustainable society in which resources are re-circulated, and people are strongly conscious of energy and resource saving.

China, our counterpart, is now in the rapid economical growth. We, Japanese, learned that environmental protection is indispensable along with economical growth, and think it is our mission to transmit our experience to the neighboring country. At the same time China has the environmental issues typically appeared in developing countries, it faces the issues of advanced countries such as air pollution from automobile exhaust fumes resulting from rapid growth. To this particular situation of China, we are seeking the solution through research exchange and collaborating researches originate from this program.

【Research Subject】

Four research fields have been made in this program. The research fields and group leaders are as follows:

G-1. Water Resources and Consumptions, Water Pollution Control (Prof. X. Huang of TU, Prof. H. Tsuno of KU)

G-2. Air Pollution Control and Innovation of Prevention Technology (Prof. J. Hao of TU, Prof. T. Kitada of TUT)

G-3. Management and Recycle System of Solid Wastes (Prof. W. Wang of TU, Prof. N. Takeda of Ku)

G-4. Development of Comprehensive Management and Design Manuals on Urban Infrastructure (Prof. K. He of TU, Prof. J. Munemoto of KU)

* TU: Tsinghua Univ., KU: Kyoto Univ., TUT: Toyohashi Univ. of Technology

【The Result up to the Present】

Groups 1 and 4 open seminar together once a year as well as groups 2 and 3 do. The seminar is to be held once in China, and once in Japan in a year, so that researchers visit the counterpart country for the seminar at least every two years. Around 50 researchers attend a seminar, where about 30 presentations are made. The main aim of the seminar was to know the research field or interest of researchers in the both countries so far, but now it is recognized to promote collaborative researches.

《 scene in a seminar 》

Around 10 researchers in Japan visit China for some days as research exchange, while 30 Chinese come to Japan for around 10 days. During the visit, researchers have small seminars or discussion with counterparts, or visit environmental facilities or companies to understand environmental condition and state-of-the-art technology. It is expected to let young researchers stay in the counterpart country for weeks to fuse research work in both countries.

This core university program supports research exchange within two countries. Based on the human network constructed in this program, we have started new projects:

(1) Establishment and practice of simultaneous common e-lectures among Asian universities

Graduate school of engineering, Kyoto University has another core university program with VCC of Malaysia (core university: Malaya Univ.). Collaborating with this program, we, Malaya University, Tsinghua University and Kyoto University have started a project since 2004 to open a long distance education program, in which a lecture will be opened simultaneously in the three universities via internet. This project is supported by MEXT Program for Modern Needs of Higher Education of The Japanese Ministry of Education, Culture, Sports, Science and Technology.

(2) Establishment of Kyoto University - Tsinghua University Cooperative Center for Environmental Engineering

We think a base is necessary to develop human resource and conduct on-site R&D for the expansion of environmental technology or further innovation. With the help from Tsinghua University, a new laboratory of Kyoto University will be opened in the Shenzhen campus of Tsinghua University in October, 2005. Staffs and students from the both universities work together in the new laboratory, conducting research and education. The laboratory is expected to be a base for academic exchange, technology diffusion, R&D and education.

Other than these two projects have been made some other projects and seminars such as technology transfer agreement between Tsinghua Univ., Fukuoka City and Fukuoka Univ., "Seminar on solid waste management and environmental protection" (Sep., 2003, Beijing), "Evaluation program on the contribution of Japanese ODA loan to the environmental protection in China" from JBIC, establishment of agreements for educational and scientific cooperation between faculties in both countries.

《 technical visit to a coal-fired power plant 》

《 scene in a seminar 》


Satoshi Konishi Il Soon Hwang

Energy Science and Engineering

R&D of Highly-Qualified Energy Sources & their Applications to Advanced Energy System

【Started from】 FY1998

【Organization】

Japan		Counter country
Japan Society for the Promotion of Science	Funding Agency	Korea Science and Engineering Foundation
Institute of Advanced Energy, Kyoto University	Core University	Seoul National University
Yoshikawa Kiyoshi・Professor・ Institute of Advanced Energy, Kyoto University	Representative Director	Chang Hyo Kim・ Professor ・Seoul National University
Konishi Satoshi・Professor・ Institute of Advanced Energy, Kyoto University	Coordinator	Il Soon Hwang・ Professor ・Seoul National University
Kyoto University ・ Faculty of Engineering・Graduate School of Energy Science ・ International Innovation Center・Research Reactor Institute、 Hokkaido University 、 Tohoku University、University of Tokyo、Nagoya University、 Osaka University、Kyoto Institute of Technology 、 Kyushu University、National Institute for Fusion Science	Cooperative University	Dong Eui University,、 Dong Eui Institute of Technology 、 Pohang University of Science and Technology、 Busan National University、 Yonsei University,、Korea Advanced Institute of Science and Technology、 Korea Atomic Energy Research Institute 、 Korea Basic Science Institute

【Background & Object of Research】

The purpose of the research on the Energy Science and Engineering of the Core University Program between Japan and Korea is to show the effective indicator towards the solution of the energy problem in Asia and the world with a mid- and long-term view by cooperating with each other such as exchanging people and information. We Japan and South Korea are neighboring countries and have the history of long exchange. We are energy advanced nations and both located in Asia where the pace of expansion of energy is the highest on the earth.

In this exchange plan, both the core Universities advance as the center of cooperate research by exchanging information as well as having active discussion in a wide spectrum concerning the Energy Science and Engineering. It is also aimed to support participating researchers' mutual exchange in order to build the foundation of the cooperate research in the area of the advanced energy material. The result of the cooperate research will be widely know by publishing in the annual report and by holding Japan Korea seminar.

【Research Subject】

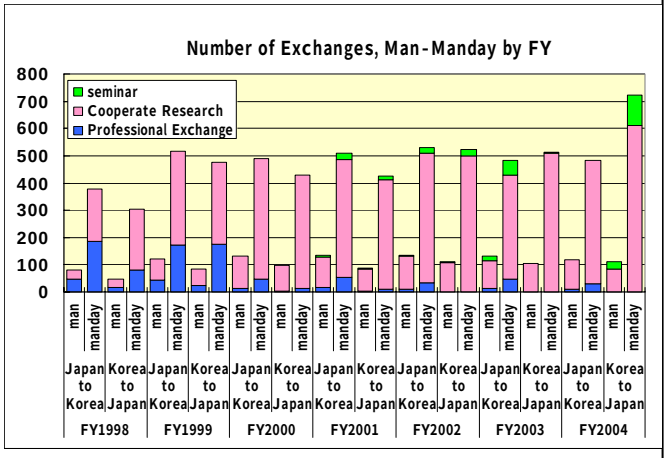
Our research subject has four major tasks in the field of 1) Physics, 2) Engineering, 3) Environment, and 4) Innovative Nuclear Technology. Each task is divided into more specific area of research into 13 sub tasks. They are; 1-1) Generation and application of high-brightness radiation from relativistic electron beams, 1-2) Radiation Processes in High Density Plasma, 1-3) Plasma Science and Technology, 2-1) Large scale application of superconductivity materials, 2-2) Advanced Infrastructure of Operation and Maintenance Technologies for Nuclear Power Plant, 2-3) Application of Advanced Electron Microscopy to Materials, 2-4) Environmentally Assisted Cracking, 2-5) Science and Engineering of Fusion Reactor Materials, 3-1) Research and Development for Environmentally Clean Renewable Energy Production Systems, 4-1) Advanced Fuel Cycle Initiative, 4-2) Materials and Engineering Validation for Innovative Nuclear Technology, 4-3) Hydrogen Production & Energy Conversion/ Storage , and 4-4) Advanced Reactor Concepts. By dividing into specialized theme, it enables us to research deeply and widely.

【The Result up to the Present】

This Core University Program (hereinafter referred as "CUP"), started in 1998 between the Kyoto University and the Seoul National University is actively implemented in its 7th year. The circumstances of the energy problem in both countries are similar, and we share our expectations and interests on the advanced energy technology as our motivation for cooperation. However the previous collaborations have not been active despite of the distance, because both emphasized exchanges with US or European countries. The direct exchanges under the CUP had to begin with mutual understanding, and establishing the network between researchers followed.

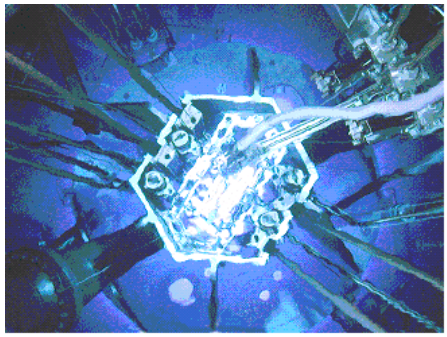
The information exchange between the two universities on some possible subjects was the first step. While some of the subtasks had difficulty in finding their partners with equal resource and capability, identification of the counterparts of each other, investigation of the research facility, features and human resources, and then actual collaborative activities were started.. With the progress of the activities, exchanges have been expanded to involve active research groups in each fields, and the member universities and institutes increased as many as some 70. Particularly in Korea side, nuclear technology and fusion technology are mainly pursued in research institutes such as Korea Advanced Institute of Science and Technology (KAIST), Korea Atomic Energy Research Institute (KAERI), and Korean Basic Science Institute (KBSI) that joined as major contributors in the program.

Table 1 summarizes the numbers of the exchanges and its trend. As seen in the figure, personnel exchanges took place in the early stage, and from the 4th year most of the activities were collaboration. Approximately 110-130 exchanges were implemented in each year, which may be the largest number among the similar programs under JSPS. Accomplishments of the collaboration have been published in the form of joint papers or conference proceedings of exceeding 1000 to date. Subjects are of 4 categories; Highly qualified energy sources, Advanced energy materials, Renewable energy production, and advanced nuclear energy, are studied by various forms of collaboration. Particularly in the material study, irradiation facilities of both countries are mutually used for collaboration (as seen in the figure), such as High voltage electron microscope combined with ion accelerator in Japan, or research reactor in Korea. In the fusion and plasma science area, facilities of both sides such as mirror machine of Hanbit in KBSI and Gamma-10 in Tsukuba, or Heiotron-J in Kyoto and KSTAR in PoSTech have collaborative activities, showing remarkable progress in Korean improvements, where this program must have contributed.



Exchanges under the program.

This program emphasized education of young students and researchers. Many joint seminars have been held by the member of the CUP with invited lectures from both sides. Particularly joint seminars with some 100 students in 2001 and 2005 provided opportunities for young researcher in this energy field. With such stimulations, many Korean students visited Japanese graduate schools where young researchers are needed. Some of them returned to Korea, lead research teams, and send students of next generation. Such a cycle takes long time to benefit both sides, but this is one of the significant accomplishments of the program. Such a contribution will eventually enhance the research standard and globalization of academic society in the Asia area.



Research reactor used for collaboration.

Collaborative efforts such as CUP require extremely long term strategy and support of resources. So far this program has been successful due to the cooperation of many people concerned, and as a result, activity is expanding to neighboring nations such as China. We strongly ask continued support for this successful program.

Semiconductor

Advanced Semiconductor Technology

Makoto Ishida　Kwang-Sun Kim

【Started from】FY1999

【Organization】

Japan		Counter country
Japan Society for the Promotion of Science	Funding Agency	Korea Science and Engineering Foundation
Toyohashi University of Technology	Core University	Korea Univ. of Technology & Education
Tatau Nishinaga・President・Toyohashi University of Technology	Representative Director	Kwang-Sun Kim・Professor・Korea Univ. of Technology & Education
Makoto Ishida・Professor・Toyohashi University of Technology	Coordinator	Kwang-Sun Kim・Professor・Korea Univ. of Technology & Education
Hokkaido Univ.、Tohoku Univ.、Univ. of Tokyo、Keio Univ.、Yamanashi Univ.、Nagoya Univ.、Meijo Univ.、Osaka Univ.、Kyoto Inst. of Technology.、Gifu Univ.、Ritsumeikan Univ.、Okayama Univ.、Hiroshima Univ.、National Inst. of Advanced Industrial Science and Technology、Institute for Molecular Science、etc	Cooperative University	Seoul National Univ.、Kyunpook Univ.、Andong National Univ.、Cheju National Univ.、Chonbuk Univ.、Chonnam National Univ.、Dankook Univ.、Dongseo Univ.、Gyeongsang National Univ.、Hanyang Univ.、Hoseo Univ.、Iksan National College、Inha Univ.、Kei-myung Univ.、Korea Advanced Inst. of Science & Tech.、Korea Electronics Tech. Inst.、Korea Inst. of Science Tech.、Korea Univ.、etc.

【Background & Object of Research】

Semiconductor electronics ought to stand as one of the pillars sustaining the high-level information society of the 21st Century. With the rapid advancement of information technology, semiconductor technology characterized by higher speeds and larger amounts of memory will be indispensable. For this development, huge amounts of research funding and proficient human resource are required, but overall, international cooperation will be a must as a way to solve the various problems emerging therefrom. The goal of this program is to contribute to the progress in research development and education on advanced semiconductor technology, and extend the cooperation framework between the two countries to broader areas. Furthermore, with the active transfer of technology involving the exchange of top class scientist and engineers, we attempt to lay the foundations for new industrial technologies, as well as the academic formation of new professionals in the field.

【Research Subject】

In this core university program, many institutions in both countries will participate mainly in the research and development of next generation semiconductor materials and related technologies to produce them. In particular, devices and processing technologies for hard electronics are most important and have been developed intensively in Project (A) under the leadership of both core universities. Furthermore, in order to extend the research cooperation to solve foreseeable future problems, we selected 4 themes in Project (B) of '" Study on Science and Technology for Semiconductor Device, Equipment and Materials", in the following;

1) Research and development for future semiconductor materials
2) Research and development of design and process for future semiconductors
3) Research and development of equipment's design and thin film process for next generation semiconductor devices
4) Research and development of key technology for the solution of ecological problems in semiconductor industry.

【The Result up to the Present】

Semiconductor electronics is one of the most fundamental industries sustaining the high-level information society of the 21st Century. As the information-related technologies are continuously advancing, new semiconductor materials and novel devices are indispensable for the new development in semiconductor electronics. Many prominent scientists and engineers from Japan and Korea were asked to join this core-university program, and we have continued very active investigation under their international cooperation between investigators from two countries for the next development of future semiconductor materials and devices. At the early stage of this project, most core-university members in this program were recommended to visit many institutions between Japan and Korea and exchange recent information on related topics in semiconductor electronics.

They tried to make promising collaborative plans and establish effective way to the goal. Since 2000, we organized the Japan-Korea Joint Workshop on "Advanced Semiconductor Processes and Equipments" with the rapid development of semiconductor materials and devices. This joint workshop was alternatively held in both countries, and core-university members met together and presented their recent results. In 2004, the 5th Joint Workshop was held in Unzen, Japan. 74 members (36 Japanese members and 38 Koreans) attended this workshop. In this workshop, a special session was planned to propose a new joint project based on the activities of this projects obtained in passed 5 years.

For presenting the activities in this project, a special session in the International Conference on Electrical Engineers (ICEE) was held in Kita-Kyushu(Japan), Jeju Island(Korea), Xi'an(China), and Sapporo (Japan, 2004). In this session, many activities of semiconductor materials, sensors and MEMS were presented and discussed with other participants. Also, we planned and carried out three seminars in both Japan and Korea to encourage a research project of young scientists and company researchers.

In addition to these workshops, a total number of 124 researchers visited mutually to carry out their collaborations. The researchers in this Project were joined into four important sub-groups, and promote Japan-Korea joint project. We encourage creating a collaborations over the sub-groups. In order to carry out the project of selected subject, several Korean scientists and/or Ph.D. students evaluated new materials which were developed in Japanese University, or designed new devices and fabricated with Japanese members, and brought them to evaluate in Korea. We have more than 12 Japan-Korea joint projects in 2004. The activities obtained these projects were published in international journals and conferences. Followings are one of the important results obtained in this Project.

Fig.1 The 5th Japan-Korea joint Workshop on “Advances Semiconductor Processes and Equipments”

Fig.2 Development of devices using CMOS/MEMS fabrication facilities installed at Toyohashi Univ. of Technology, Japan.

New type of sensors or MEMS devices, designed by Korean members, were fabricated by using CMOS/MEMS fabrication facilities installed at Toyohashi University of Technology. A new type image sensor, memories, and bio-sensors were developed through deep discussion with Japanese researchers.

Research on “(Bi,La)Ti_3O_{12} Ferroelectric Film Capacitors and Field effect Transistors for Nonvolatile Memory”, one of the joint work in this Project, was selected as The Excellent Research Output 30 in Year 2004 by KOSEF and MOST.

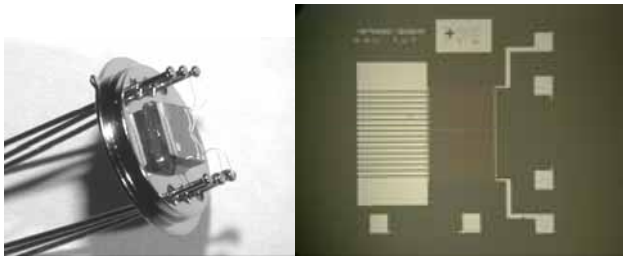


Fig.3 New type IR imaging sensor developed in this Project.

Ceramic Materials Technology

New Processing and Nanostructure/Property Relationship for Multi-functional Ceramic Materials

SEKINO, T.

SHIM, K.B.

【Started from】 FY1999

【Organization】

Japan		Counter country
Japan Society for the Promotion of Science	Funding Agency	Korea Science and Engineering Foundation
Osaka University	Core University	Hanyang University
KAWAI, Tomoji・The Institute of Scientific and Industrial Research (ISIR), Osaka Univ.・Director	Representative Director	KIM, Chong Yang・Hanyang University・Professor・President
SEKINO, Tohru・ISIR, Osaka Univ.・Associate Professor	Coordinator	SHIM, Kwang Bo・CPRC, Hanyang Univ.・Associate Professor
Nagaoka Univ. of Technology、Kagoshima Univ.、Kyushu Univ.、Nagasaki Univ.、Osaka Prefecture Univ.、Yokohama National Univ.、Kyoto Univ.、Tohoku Univ.、Nagoya Univ.、Shinshu Univ.、Kanagawa Univ.、Univ. of Tokyo、Saga Univ.、Tokai Univ.、Shizuoka Univ.、Shimane Univ.、Ritsumeikan Univ.、Osaka Institute of Technology	Cooperative University	Sun Moon Univ.、Gyeongsang National Univ.、Dongshin Univ.、Inha Univ.、Korea Univ.、Sungkyunkwan Univ.、Hanseo Univ.、Hansung Univ.、Kangnung Univ.、Korea Maritaime Univ.、Kyonggi Univ.、Miryang National Univ.、Pusan National Univ.、Samchok National Univ.、Seoul Nat'l Univ.、Seoul National Univ. of Tech.、KICET、KIST、Korea Testing Lab.、Agency for Tech. and Standards、KAIST、Inst. of Geoscience & Mineral Resources、RISTs

【Background & Object of Research】

The environmental and energy problems are the most important R & D targets to solve in the 21st century. Of the ceramic materials, the nanocomposite materials, which were announced from Osaka University over ten years ago, are the most promising materials for this problem solutions. This design concept can be known to evolutionally improve the mechanical and thermal properties of ceramic materials. In addition, it is expected to play important roles in development of the multifunctional materials for the indispensable development of IT and Bio Techs in the 21st century. In this project, Japanese and Korean ceramists will closely cooperate on the correlation between nano & nanocomposite structure and mechanical/thermal properties and the strategy of next generation R & D. And we will develop various kinds of multifunctional ceramic-based nanocompositres. Quick and effective transfer of nanocomposite and multifunctional material technologies to the society is another important target of this program. Moreover, the establishment of the venture company based on the cooperative research results is strongly intended. To effectively break through the above-mentioned targets, we will organized every year the scientific symposiums in Japan and Korea for exchanging the information on nanocomposite technology and available equipments, and for discussing on the experimental results and the future R & D plan of this program.

【Research Subject】

New Processing and Nanostructure/Property Relationship for Multi-functional Ceramic Materials

Sub-title of Group 1: Development of structural nanocomposite ceramics with multiple functionality

Sub-title of Group 2: Nano and nanocomposite electronic ceramics with multiple functions

Sub-title of Group 3: Development of low cost processing for multi-functional micro/nano composites with Environmentally low load

Sub-title of Group 4: Mechanical Properties and Functionality Improvement of Ceramics

Sub-title of Group 5: Computer Simulation of Nanoceramics and Its Processings

【The Result up to the Present】

This program is composed of 78 Japanese and 75 Korean researches from respective Japanese 20 and Korean 17 research organizations. They participate the seminars and make strong efforts to have excellent results in the cooperative research by joining one of the above-mentioned 5 sub-research groups. In 2002 fiscal year, Korean 70 researchers visited Japan for total 461 days for the seminar and the cooperative research, and Japanese 39 researchers visited Korea for the seminar, the joint research and the information exchange.

Photo 1

To keep effective and successful international joint research for along term, it is very important to understand basically different culture and idea of the counterparts. Therefore, the majority of the researchers of two countries visited the counter part country every year to join the seminar to pile up the discussion and to have the cooperative research. In addition to the symposium at both countries to report and discuss the scientific results of the joint research, we organize every year a mini international symposium named as The International Symposium on Eco-Materials Processing & Design. (Photo 1)

All researchers who joined to this project have been making great effort to get important progresses in one of the 5 sub-groups of "New Processing and Nanostructure/Property Relationship for Multi-functional Ceramic Materials". The main results obtained in the past four years are as follows.

1) The nanocomposite concept was progressed, and various nanocomposites with multifunctionality having such as high strength, high toughness, good thermal shock fracture resistance, low friction coefficient, and high heat conductivity as well as excellent machinability like metals were developed in the Si_3N_4/BN, SiC/BN, AlN/BN, and Al_2O_3/BN composite systems.

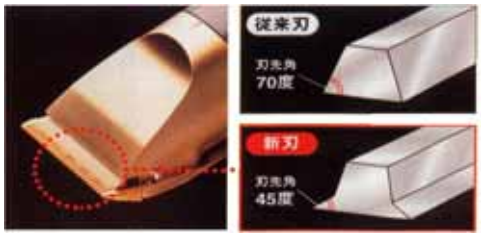


Fig.1 Hair clipper blade by a mutual nanocomposite

2) New mutual nanocomposite concept was proposed and ZrO_2 (CeO_2)/Al_2O_3 nanocomposite with high strength and toughness was developed. The material was industrialized as the clipper blade with the sharpness and lifetime of ten times or more better performance compared with common clipper blade made by metals (Fig. 1).

3) New ceramics/polymer pressure sensor with a similar function to human's finger tip was developed, and it was successfully applied as a sensor of intelligent robot. It was also applied as a part of the personal computer's writing pen. Due to this project results, new venture company has just established.

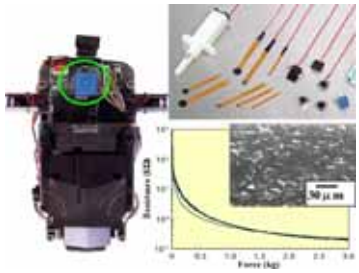


Fig.2 A head part of amusement robot with a novel pressure sensor and its properties developed in this project.

4) Mass production chemical process for single Ag nanoparticle was developed, and the venture company was founded based on this newly developed materials .

5) The manufacturing process of cylindrical porous ceramics was developed and it was applied to the plant for the environmental clean-up after development of coating process of nano-sized vanadium oxide particle into the pore.

6) The worldwide acknowledgment, that our Al_2O_3 and ZrO_2 based nanocomposites are the most suitable for the artificial bone materials from the research on the evaluation of the tribology, was obtained in the international meeting.

7) New design concept of grain boundary in nano level developed the ion and electron conductive Si_3N_4, AlN, and ZrO_2 ceramics without loosing their mechanical properties. This technology was successfully transferred to the industry.

8) The CeO_2/CuO nano/cluster composite with an excellent $CO \rightarrow CO_2$ catalyst characteristic was fabricated using a newly developed IGC process and this technology is going to transfer to the automobile company.

Science for Organic and Polymeric Materials

Preparation and Applications of Functional and Ecological Soft Materials

Masa-aki Kakimoto　Sung Chul Kim

【Started from】FY2000

【Organization】

Japan		Counter country
Japan Society for the Promotion of Science	Funding Agency	Korea Science & Engineering Foundation
Tokyo Institute of Technology	Core University	Korean Advanced Institute of Sci. & Tech.
Masuo Aizawa・President・Tokyo Institute of Technology	Representative Director	Robert B. Laughlin・President・Korean Advanced Institute of Sci. & Tech.
Masa-aki Kakimoto・Professor・Tokyo Institute of Technology	Coordinator	Sung Chul Kim・Professor・Korean Advanced Institute of Sci. & Tech.
Iwate University・School of Engineering、Tohoku University・Institute of Multidisciplinary Research for Advanced Materials、Ibaragi University・School of Engineering、Tokyo University of Agriculture and Technology・School of Engineering	Cooperative University	Sungkyunkwan University、Hannam University、Hanyang University、Pohang University of Science & Technology、Kwangju Institute of Science & Technology

【Background & Object of Research】

The material manufacturers in Japan are under good economic condition in the spring of 2005. Although the companies, which focus on fine organic materials mainly including organic polymeric materials, originally produce the basic chemicals such as rubber and polyolefines, they began to fight in the niche field. Restructuring was carried out resolutely for these several years, and in addition, special procurements of Korea and China occurred, after the companies had been finished up slimness and highly effective. On the other hand, for instance Samsung in Korea, Samsung can assemble parts made of soft materials and produce the world-biggest display, but they are not good at developing the materials from the fundamental research. Japanese companies can supply materials that Samsung requires because they have a history of development of the materials. Thus, Japan and Korea have a strong relationship as a supplier and an user in the soft materials area. Universities in both countries have almost the same level in research and education. Under such circumstance, in the present core university program aims to make the strong center of soft materials in the Far East area.

【Research Subject】

As mentioned above, high performance polymers are active in electronic industries. For instance, photo-reactive polymers have supported the LSI production, and the high temperature adhesives protect the heart of LSI from cosmic rays and moisture. Japan and Korea have technologies leading the world in this field. We classified the subjects of the soft materials program into five. 1) Synthesis of the soft materials, 2) functionalization of the soft materials, 3) physics of the soft materials, 4) processing of the soft materials, 5) bio-soft materials and recycling. First of all, new structural polymers are synthesized in 1). In 2), functions of the electro-conductive polymers, the liquid crystals, and the organic luminescence, etc. are pursued. The purpose of 3) is to characterize the soft materials. An important process is to make the material in shape. In 4), the research especially processing to the fiber is done. In 5), modification of DNA and artificial organs are researched. Moreover, biodegradable polymers are studied, and the problem of recycling is taken up.

【The Result up to the Present】

In the beginning, it should be better to note about the potential of TITech and KAIST in the field of soft materials. There are about forty full and associate professors in TITech who study about soft materials, including "Department of Organic and Polymeric Materials" having twenty five full and associate professors. This is one of the biggest groups in worldwide scale. In addition, TITech has a special organization named "International Research Center of Macromolecular Science (ICMS)". On the other hand, there are about ten full and associate professors in KAIST, and they also have "Center for Advanced Functional Polymers (CAFPoly)" that is an active organization including the industrial researchers. The activity in soft materials in KAIST is the highest level in Korea. Thus, two institutes concerning this core university program are the most active ones in each country.

We decided two large out puts. One of them is to achieve the collaborated research results, and the other is to promote activities of the young scientists. In the former out put, it is important to exchange the information frequently to understand each other and to achieve the good research results. The five groups above mentioned are divided into two large groups, and each group has one meeting at least in a year. Group leaders also have the group leader meeting to discuss the next year plans. As the results, some researchers have achieved good results in the collaborated research in laser amplification in the liquid crystalline and in the field of fiber processing. In 2004, we set a new project named "Star and Branched Macromolecules for IT, BT, & NT" to contribute technologies in Japan and Korea. Because there are some synthetic researchers concerning the branching polymers which is a new concept of polymer structure in both TITech and KAIST, researchers in other fields such as physics and processing can get unique samples easily.

Power of the graduate students is necessary to achieve such the collaborated researches. There are many things to do in the laboratory belonging. If they visit a new laboratory, it often occurs that the experiment proceeds more efficiently. Korean students stay in Japanese laboratory, and on the contrary, Japanese students spend days in Korea. This exchange program consists 90 days. As a result, 1) experimental data come out surely, 2) they can absorb the culture of the each foreign country, 3) the graduate students in each country become good friends. There is an exchange program for the young researchers who already have the degree. They can absorb new many things in a short time. Then, we prepare a unique exchange program where they visit three universities in the other country in about one week, and the seminars were held as a poster presentation at each university. The young scientists discuss the scientific problems in detail with a loud circumstance.

At the mid-term evaluation meeting held on June, 2004 at KAIS

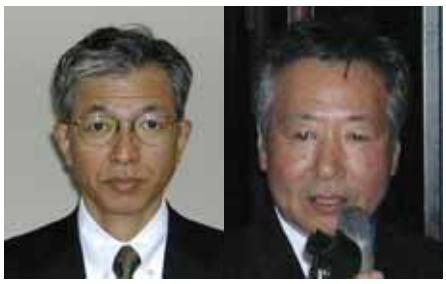
In 2003, the international conference was held in Kyonjgu in Korea to advertise the core university program. Not only invited speakers from USA and Germany, but over 350 researchers attended the meeting from Japan and Korea. In addition, we will hold another international conference concerning polyimides that are reliable materials for microelectronics in Pusan Korea in 2005.

We try to brush up the present core university program as a unique program standing on the special situation of Japan-Korea soft materials.

Group leader meeting held on February, 2005

FISHERIES

Elucidation of fish resource fluctuation and development of zero-emission fishery with low environmental burden



IIDA Kohji　　LEE Ju-Hee

【Started from】 FY2001

【Organization】

Japan		Counter country
Japan Society for the Promotion of Science	Funding Agency	Korea Science and Engineering Foundation
Hokkaido University	Core University	Pukyong National University
Kohei YAMAUCHI・Dean・Graduate School of Fisheries Sciences	Representative Director	Jong-Hwa CHOI・Dean・College of Fisheries Science
Kohji IIDA・Professor・Graduate School of Fisheries Sciences	Coordinator	Ju-Hee LEE・Professor・College of Fisheries Science
University of Tokyo・Ocean Research Institute、Tokyo University of Marine Science and Technology、University of Kyoto・Field Science Education and Research Center、University of Kyusyu・Research Institute for Applied Mechanics、Nagasaki University・Faculty of Fisheries、Kagoshima University・Faculty of Fisheries	Cooperative University	Cheju National University・College of Ocean Science、Yosu National University・College of Fisheries & Ocean Science、Kunsan National University・College of Ocean Science & Technology、Gyeongsang National University・College of Marine Science、Kangnung National University・College of Life Science

【Background & Object of Research】

Japan and Korea are surrounded by the Sea of Japan and the East China Sea, and have been used common marine resources under the same environmental conditions. However, fisheries resources in these areas have been remarkably decreased past decade due to the marine environmental change and the fisheries activities. In order to utilize the fisheries resources in these areas from now on, both countries must cooperate for environmental improvement, fish stock management, and their optimum utilization. There are many researchers study on fisheries science in the universities in both countries, hope to advance cooperative research in fisheries science between both countries, such as the exchange of coastal environmental data, measurement of target strength for common species, sampling of indigenous species in coastal waters, and collection of genetic information from viruses pathogenic to fishes.

【Research Subject】

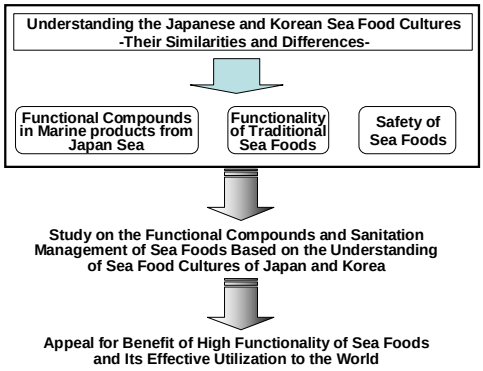
1. **Elucidation of the relationship between stock fluctuations and ocean environmental changes in the Sea of Japan and adjacent waters**: To conduct cooperative research on the marine resources and environmental changes in the Sea of Japan and adjacent waters using training ships from Japan and Korea.
2. **Development of efficient marine fishing technologies and promotion of resource assessment and conservation engineering**: To develop new fishing devices to prevent by-catch of juvenile and non-target fishes. To develop quantitative sampling gear for plankton and juvenile fishes for resource assessment. To improve acoustic methods for resource assessment.
3. **Improvement of aquaculture for producing healthy fish, shellfish and seaweed**: To develop new salt- and fresh-water aquaculture technology. To clarify defense mechanisms of fishes and diagnose fish diseases. To restore polluted aquaculture sites.
4. **Exploitation of new fisheries resources for food and medical supplies**: To use marine microorganisms, deep-sea animals and seaweeds as food and for development of medical supplies.

【Results to date】

Research Subject #1: In the Japan-Korea Joint Workshop and the International Symposium, we discussed and selected cooperative research issues to elucidate the cause of stock fluctuations in fisheries resources in Japanese and Korean waters. In 2003, we began joint research surveys to examine the reproductive and recruitment mechanisms of the Japanese common squid, which is a key species in both waters. This is the first time survey using training ships from both countries on the spawning grounds of the Japanese common squid. Also, taxonomic research was conducted on specimens deposited at universities in Korea, and fishes were collected at various places in Korea. The results of these studies include the discoveries of possible new species in 6 families and of new or rare fishes in 9 families.

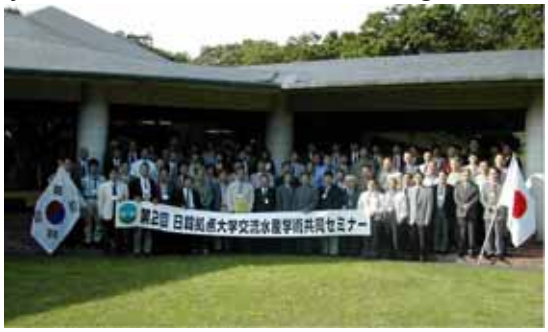
Research Subject #2: This group has conducted preliminary experiments to estimate biomass in the Sea of Japan and the East China Sea using acoustic techniques. Seven cooperative experiments (5 in Japan and 6 in Korea) have been conducted on targeted species in the waters of both countries. In addition, university training ships have started investigations on the stock sizes of key species. The next step of this study is to make a database of acoustic samples and develop methods for estimating biomass and stock size. Scientists have also discussed how to efficiency use fishery resources. These discussions include development of new fishing gears and methods for selective fishing and resource management for zero-emission fishery with low environmental burden.

Research Subject #3: Increased activity in aquaculture has resulted in the degradation of marine environments caused mainly by the feed used. This degradation causes increased fish disease and restricts the development the aquaculture. Fish-disease problems, health diagnosis and managements of aquatic organism were discussed at two workshops. The meetings revealed that there are many common diseases in Japan and Korea, and it was proposed that a common health diagnosis is needed in both countries following the detection of etiological causes.



Research Subject #4: In Japan and Korea, where marine products are consumed at very high levels, the incidence of cancer and cardiovascular disease is much lower than in countries where a lot of fat, especially animal fat, is eaten, such as in the UK and US. This is because marine products contain a number of beneficial bioactive components. So, we have investigated the characteristic functional properties of marine products of both countries by focusing on the following programs: 1) Functionality of Marine Resources and Their High Utilization. 2) Comparative Studies on Food Culture and Diet between Korea and Japan. 3) Utilization of Electrolyzed NaCl Solutions for Food Sanitation Management and Improvement of Food Functionality.

Seminar : To discuss fisheries sciences from diversified viewpoints, joint seminars have been held among scientists in each of the above subjects. The titles of these seminars are *Characteristics of food culture between Japan and Korea, and the role of fisheries sciences* (Pusan, 2001), *Marine environment and marine ecosystem in the Sea of Japan*. (Sapporo and Hakodate, 2002) and *The effective use and management of fisheries resources in the coastal region*. (Gyeongsang and Tongyoung, 2003) and *Natural disaster and crisis management to surround fisheries* (Sapporo, 2004).



Internet

Development and Operation of the NGI (Next Generation Internet) Technologies

Koji OKAMURA　　Dae Young KIM

【Started from】FY2003

【Organization】

Japan		Counter country
Japan Society for the Promotion of Science	Funding Agency	Korea Science and Engineering Foundation
Kyushu University	Core University	Chungnam National University
Setsuo ARIKAWA・Kyushu University・Vice President	Representative Director	Dae Young KIM・Chungnam National University・Professor
Koji OKAMURA・Kyushu University・Associate Professor	Coordinator	Dae Young KIM・Chungnam National University・Professor
Waseda University、Kyushu Sangyo University、Nagasaki University、Saga University、University of Miyazaki、Kyoto University、National Institute of Informatics、The University of Tokyo、Osaka University、Osaka University、Keio University、Kyushu Institute of Technology、Hiroshima University、Hiroshima City University、National Institute of Information and Communications Technology、Chikushi Women University、Hokkaido University、Kyushu Institute of Information Science、Nagasaki Institute of Applied Science	Cooperative University	Korea Advanced Institute of Science and Technology(KAIST)、Seoul National University、Korea University、Hanyang University、Kyungpook National University、Kyunghee University、Chonnam National University、Information and Communications University(ICU)、Gwangju Institute of Science and Technology(GIST)、Sungkyunkwan University、Ewha Woman's University、Konkuk University、Cheju National University、National Cancer Center、Korea Institute of Science and Technology(KIST)、Chungbuk National University、Soonchnhyang University、Kyungnam University、Advanced Network Forum（ANF）、Pukyung National University、Pusan National University、Chonbuk National University、Sejong University、Gyeongsang National University

【Background & Object of Research】

Internet has become one of very import infrastructure for our lives. For example, if Internet is stopped by some accidents, many worst effects against our lives would occur in the similar way when water and power service supplies are stopped. Many advanced technologies and equipment are used for maintenance of the current Internet. Unlike water and power service supplies, these technologies and equipments are always being researched and evolving to more advanced. These advanced Internet is called as "The Next Generation Internet, NGI" and researched in all over the world, US, Europe and Asia. We research these technologies and applications for NGI in cooperation between Japan and Korea. We aim that our research activities become one of bases of researches and developments of Internet technologies in Asia.

【Research Subject】

This program covers various area about the next generation Internet such as primary technologies and advanced applications and has following research themes.

1. Research on the Advanced Multimedia Communications and their Applications for e-Learning and distance learning
2. Research and Development of NGI Technologies
3. Research and Development of NGI Technologies for Digital Library
4. Development and clinical use of telemedicine with NGI Technologies
5. Research and Development of Information Security Technologies in Internet
6. Research and Development of VR Technologies for Collaborative Virtual Environments through the Internet
7. Research for Infrastructures and Applications of Grid

【The Result up to the Present】

The plenary seminars are held on both countries. Previously two seminars ware held at Chungnam National University, one seminar was held at Kyushu University (Fig. 1) and one seminar was held at Karuizawa to take care for Japanese researchers who don't live in Kyushu area. About 100 researchers attended to every seminars and various information about NGI technologies were exchanged and new collaboration and research themes were found in these seminars. In 2005, one of the plenary seminar will be schedules in APAN (Asia Pacific Advanced Network)'s plenary meeting. APAN is the most biggest organization about Asia Pacific Advanced Network community. In this seminar, our activities will be introduced to every other Asian countries. This program has been just begun but already accelerated at the same speed of growth of Internet and contributes for future Internet under cooperation of Japan and Korea.

Fig 1. Seminar at Kyushu University

In this program, some remote lectures of Graduate School of Japan and Korea and contents sharing experimentation between Japanese and Korean TV companies have been already accomplished. In this paper, the demonstration at Korea Medical Conference 2005 is introduced. Korea Medical Conference is one of the biggest conference in Korea and almost all of famous medical doctors inside Korea gather and attractive conference. During this variable conference, the venue (Hotel), Seoul National University, Ewha University and Kyushu University are connected via very high speed Internet and the panel discussion has been hold using DV (Digital Video) streaming which provides very high quality Audio and Video. The other demonstration which sends the surgery video using HDTV has also shown between the venue and Seoul National University. These demonstrations succeeded and KBS (which TV company is almost the same class of Japanese NHK) broadcasted about these demonstrations. In the broadcasting, the announcer said following.

“Is it possible that I can have operation in my country with being supported by foreigner famous doctor? This dream comes true at last. Korean surgeon and staffs and Japanese skillful surgeon can discuss about the surgery via high quality video using the high speed Internet. This technologies can surely support remote surgery under cooperation with domestic medical staff and feigner many excellent medical doctors.”

In this experimentation, the equipment of DV streaming for panel discussion is located and managed by Kyushu University's staff. The team of "Development and clinical use of telemedicine with NGI Technologies" has remote conference such as this constantly for every week or month. And the team from "Research and Development of NGI Technologies" supports their technical part. This tightly relationship of application area and technology area can success this big event. This success of big event shows that our program surely goes very well with developing the technologies and human relationship.

Dentistry

1.Research and Development, and clinical study of dental biomaterials
2.Research on severe maxillofacial defects
3.Research on physiological and pathological state of oral diseases and hard tissues


Kazuhiro Eto　Mettachit Nawachinda

【Started from】 FY1996

【Organization】

Japan		Counter country
Japan Society for the Promotion of Science	Funding Agency	NRCT
Tokyo Medical and Dental University	Core University	Chulalongkorn University
Kazuhiro Eto・Dean・Professor・Tokyo Medical and Dental University	Representative Director	Mettachit Nawachinda・Assistant Professor・Chulalongkorn University
Kazuhiro Eto・Dean・Professor・Tokyo Medical and Dental University	Coordinator	Mettachit Nawachinda・Assistant Professor・Chulalongkorn University
Osaka University・Faculty of Dentistry、Niigata University・Faculty of Dentistry、Hiroshima University・Faculty of Dentistry、Nagasaki University・Faculty of Dentistry	Cooperative University	Mahidol University・Faculty of Dentistry、Khon Kaen University・Faculty of Dentistry

【Background & Object of Research】

The core university on the Japanese side of this Project, Tokyo Medical and Dental University (TMDU), Faculty of Dentistry, has focused on nurturing leaders in dental education and research in Asia as its basic policy in international exchange with Asian countries. Prior to the initiation of this Project in 1996, TMDU had engaged in academic exchange with major dental schools in Asia based on the academic collaboration agreements. Some of the examples of such academic exchange are training programs for Thai young faculty by TMDU faculty at Chulalongkorn University, Faculty of Dentistry (FY1992-FY1994), a symposium entitled “Recent development of dental biomaterials at TMDU, Faculty of Dentistry” (FY1993, in Chulalongkorn University), and a research project “Study of Severe Maxillofacial Defects” with an international academic research grant by the Japanese education ministry (MEXT) (FY1993-FY1995). To maximize the results gained by the above activities, this core university project was launched in 1996. Academic exchange between Japanese and Thai dental faculty, particularly young faculty, will become even more lively, and as a result dissemination of the achievements of Japanese dental education and research to Southeast Asia is expected to take place in the most effective way.

【Research Subject】

This Project has the following three main themes in joint research.

Joint Research Theme 1: Research and Development, and Clinical Study of Dental Biomaterials

Joint Research Theme 2: Research on Severe Maxillofacial Defects

Joint Research Theme 3: Research on Physiological and Pathological State of Oral Diseases and Hard Tissues

The above themes were chosen from the standpoints of both sides. In Thailand, there are growing needs for technical improvement in dental care to better address the increase of oral diseases in response to its economic growth, while Japanese dentistry has expertise and experience required for such improvement. Severe maxillofacial defects are also a concern in Thailand, and TMDU is well known for research in this area. The third theme was adopted to cover clinical and basic dental sciences, enabling young faculty of various specialties to share ideas and experiences.

【The Result up to the Present】

During the past 9 years (FY1996-FY2004), several joint research projects were conducted under the above-mentioned three main themes.

Joint Research Theme 1: Research and Development, and Clinical Study of Dental Biomaterials

Joint Research No.1 “Fundamental and Clinical Aspects of Biomaterials in Dentistry” covered a wide area of metallic materials used for dental treatment, while Joint Research No.3 “Fundamental Study and Clinical Application of Adhesive Dentistry” focused on various organic materials used in dental treatment. The joint research in this theme has been very active, and has made considerable achievement, among which are the increased interest not only in clinical dental science but also in basic dental science, initiating master's and Ph.D. courses, and establishment of a research institution in the Thai side. The Japanese side could reaffirm the significance of the role of Japanese researchers in the development of clinical and basic dental sciences in Asia. Based on these results, Joint Research No.8 “Application of Titanium Alloy to Removable Partial Dentures and Biomechanical Analysis of its Properties” and Joint Research No.9 “Biological and Mechanical Approach to Establish Minimal Invasive Tooth Color Restorations is currently producing even greater results.

Joint Research Theme 2: Research on Severe Maxillofacial Defects

Joint Research No.2 “Roles of Cranial Neural Crest Cells in Craniofacial Development and Anomalies” was conducted to lay the foundation for basic research in oral and maxillofacial regions in Thailand. To better serve the purpose of this joint research, Oral Biology Research Center was established in Faculty of Dentistry, Chulalongkorn University in 1996. Joint Research No.7 “The Study of Oral Tissue Regeneration” was conducted to build the base for future collaborative research on tissue regeneration. A seminar entitled “Regeneration of Oral Tissues” (FY2002, in Bangkok) attracted more than 200 participants, which seemed to reflect a growing interest in this topic in Thailand. Joint Research No.10 “Study on Rehabilitation of Severe Maxillofacial Deformities” and Joint Research No 13 “Clinical Application of Oral Tissue Engineering” have contributed to a further development in research on severe maxillofacial defects in both countries.

Joint Research Theme 3: Research on Physiological and Pathological State of Oral Diseases and Hard Tissues

Joint Research No.4 “Biochemical/Immunological Aspects and Treatment of Periodontal Disease” and Joint Research No.5 “Establishment of New Endodontic Treatment System” were implemented concurrently with a symposium on each research topic. Joint Research No.6 “Clinical Management of Hypertensive Patient in Oral and Maxillofacial Surgery, Sedative Aspect” confirmed a growing interest in dental care for the aged in Thailand where the population is also aging quite rapidly. Joint Research No.11 “Community-based Study of Oral Disease Prevention and Health Promotion” and Joint Research No.12 “Study on the Infection of Stomatological Pathogens to Child's Oral Cavity” were initiated in FY2003 with an emphasis on childhood caries prevention which becomes more important in Thailand.

In addition to joint research projects, scientists in various specialties have engaged in different types of exchange. In recent years, the number of Thai students studying in postgraduate courses of TMDU has rapidly increased (2 in FY1992, 10 in FY1996, and 23 in FY2004), which bodes well for even richer collaboration between young researchers of both countries in the future.

MICROBIAL RESOURCES

Development of Thermotolerant Microbial Resources and Their Applications

Kazunobu Matsushita

Napavarn Noparatnaraporn

【Started from】FY1998

【Organization】

Japan		Counter country
Japan Society for the Promotion of Science	Funding Agency	The National Research Council of Thailand
Yamaguchi University	Core University	Kasetsart University
Dr. Daizo Koga・Professor・Dean of Faculty of Agriculture	Representative Director	Dr. Napavarn Noparatnaraporn・Associate Professor・Faculty of Science
Dr. Kazunobu Matsushita・Professor・Faculty of Agriculture	Coordinator	Dr.Napavarn Noparatnaraporn・Associate Professor・Faculty of Science
Hokkaido University・Graduate School of Agriculture、The University of Tokyo・Graduate School of Agriculture and Life Science、Kyoto University・Graduate School of Agriculture／Graduate School of Biostudies ／ Research Institute for Sustainable Humanosphere 、 Kyoto Institute of Technology・Faculty of Textile Science、Kobe University・Faculty of Agriculture、The others	Cooperative University	Burapha University 、 Chiang Mai University、Chulalongkorn University、Khon Kaen University、King Mongkut's University of Technology Thonburi、King Mongkut's Institute of Technology Ladkrabang 、 Maejo University 、 Mahasarakarm University 、 Mahidol University、Naresuan University、Prince of Songkla University 、 Suranaree University、Srinakharinwirot University、The others

【Background & Object of Research】

The purpose of our Core University Program is to isolate novel “thermotolerant” microorganisms and to elucidate their specific ability at the molecular level, which is performed by collaborative research between Japanese microbiologists and Thai researchers. We are also aiming at the research and development study with the thermotolerant microorganisms having useful ability. Nowadays, although many institutions all over the world have tried to find out new useful microbes, almost all of them are seeking in novel *Archaea* from extreme nature such as hydrothermal vents. However, our program has a completely different point of view, in which we are looking for new ability “thermotolerance” in usual microbes that we have already used in our life or industry. If we can introduce successfully such thermotolerant microbes into microbial industry which has already been established, it turns out to be possible to repress deterioration of product fermentation due to higher temperature, and also reduce tremendous consumption of cooling energy for the industrial fermentation. Thus, our program may contribute such the microbial industry as well as basic science that “thermotolerant” microbes are established as a group of novel microorganisms.

【Research Subject】

We have been isolated diverse “thermotolerant” microorganisms from natural resources, especially from tropical Thailand, and been classifying and characterizing the isolated microbes. Furthermore, we have also elucidated their specific physiological functions of the isolated microbes at the genetic and protein level, in order to understand the thermotolerant mechanism and further to develop the properties and knowledge to practical applications. During the 7 years, we have explored several different “thermotolerant” microbes at the different points of view by performing collaborative works separately with 5 subgroups. However, since our activity enters into the last 3 years, we have to proceed our project more efficiently to adapt for more advanced stage, and thus we have changed our subgroups largely as follows. 1) Thermotolerant Microbial Cells and Applications. 2) Enzymes from Thermotolerant Microbial Resources and Applications. 3) Bioactive Substances from Thermotolerant

Microbial Resources and Applications. 4) Bioremediation and Biomass Utilization by Thermotolerant Microbial Resources.

【The Result up to the Present】

1) Results from the Academic Activities in the Last Fiscal Year

In the last fiscal year 2004, 19 Japanese researchers (total man/days of 135) have been to Thailand to advise Thai collaborators on their research and also to do research discussion, while 70 Thai researchers (total man/days of 1331) have come to do collaborative works at the several different Universities in Japan. As the results of the collaborative works, 19 research papers (and also 19 related papers) have published and 7 patent applications have been done. In order to present our progress on the collaborations and to discuss on our activities, we had the fourth joint seminar, "The 4th JSPS-NRCT Joint Seminar on Development of Thermotolerant Microbial Resources and Their Applications", in Kyushu University last November. This seminar included 34 oral presentations and 82 poster presentations. The participants were 84 from Japan, and 77 from Thai (see the following picture).

When compared the contents of the seminar presentations with those of the previous 2nd and 3rd seminars, as shown in the table below, you can realize in this time that the research activities on "isolation and classification" increased again as well as the activities on "biochemical and molecular biological study" and "application study". This is because of discovery of "higher" microorganisms adapted to higher growth temperature such as yeast, fungi, and actinomycetes, which is different from the first stage where many thermotolerant "lower" microorganisms, bacteria, had been found. The discovery of such thermotolerant higher microorganisms would be a great advance for the application study, because such microbes are useful for several fermentations and enzyme production. Whereas, last year, many collaborative works have been done with gene cloning of useful enzymes from thermotolerant microbes, which is related to the increase in "biochemical and molecular biological study". This is also a great progress to make an expression system for useful enzyme production in future. In addition to these collaborative works, we have increased numbers of several application studies such as "thermotolerant acetic acid bacteria producing useful chemicals for medicine or food additives", "thermotolerant lactic acid bacteria useful for probiotics of livestock", "Bacteriocins as antimicrobial food additives", and "Several thermotolerant microorganisms useful for bioremediation". Thus, we think our project is going well for moving into the final stage of our program by getting more substantial results.

Contents of Presentations	2nd Seminar (2000)	3rd Seminar (2002)	4th Seminar (2004)
Isolation and Classification	41%	9%	20%
Physiological Study	31%	42%	22%
Biochemical and Molecular Biological Study	16%	41%	41%
Application Study	12%	8%	18%

Poster presentation in the 4th Joint Seminar held in Kyushu Univ.

2) Results from Other Exchange Program and Some Problems to be Solved

In addition to the collaborative works, we should add the following items as one of our successful activity in our program. Last year, related to our Core University Program, we accepted 4 students as the Ph.D. or Master course student, and 9 exchange or short-term foreign students from Thailand in several Japanese Universities. Furthermore, two Ph.D. students left after acquired the degree and started to work as the members of our Core University Program. Thus, through our program, many young scientists on the field of microbiology are growing up to support future science in Thailand. In addition, based on our program, 7 new University treaties were concluded between Japanese and Thai universities, e.g. between Kyoto Institute of Technology and Chulalongkorn University, Faculty of Pharmaceutical Science. However, as indicated in organizing committee meeting and also in closing discussion of the 4th Seminar, we have several problems, one of which is many researchers not really working on this program because of the grogram becoming more deeper and moving to molecular level, and also is a grant (budget) that is required to do such collaborative work at the molecular level with many researchers.

Medicine

Infectious Diseases and Related Areas

Kazuhiko Yamamoto

Srisin Khusmith

【Started from】FY1999

【Organization】

Japan		Counter country
Japan Society for the Promotion of Science	Funding Agency	National Research Council of Thailand
The University of Tokyo	Core University	Mahidol University
Nobutaka Hirokawa・Dean・Graduate School of Med, The University of Tokyo	Representative Director	Pornchai Matangkasombut・President・Mahidol University
Kazuhiko Yamamoto・Head・Office of Int Acad Aff, Grad School of Med, U of Tokyo	Coordinator	Srisin Khusmith・Vice President for Research・Mahidol University
【2005】Kyoto U・Graduate School of Med、Kyorin U・Faculty of Med、Oita U・Faculty of Med、Tokyo Women's Medical U・Faculty of Med、U of the Ryukyus・Faculty of Med、Nagoya City U・Graduate School of Med Sciences、National Inst of Infectious Diseases AIDS Research Center、RIKEN SNP Research Center 【Finished】Juntendo U・Faculty of Med、etc.	Cooperative University	【2005】 Chulalongkorn University、Chiang Mai University、Prince of Songkla University、Khon Kaen University、Ministry of Public Health of the Royal Thai Government、National Center of Genetic Engineering and Biotechnology、Thai National Cancer Institute.

【Background & Object of Research】

For public health and also in clinical medicine, infectious diseases are a major concern both in Thailand and in Japan. This program supports collaboration between Thai and Japanese researchers whose aims are to understand infectious diseases more deeply and to develop practical methods for improving prevention, diagnosis, and treatment.

【Research Subject】

Since this program began in 1999, it has supported five research groups. They have studied

(1) how some bacteria resist antibiotic drugs (Finished in 2003)

(2) the role of viral infection in diseases of the blood;

(3) how genes influence people's susceptibility or resistance to malaria;

(4) how human and viral genes interact as infection with the HIV-1 virus develops into AIDS; and

(5) how to reduce the burden of viral infections in mothers and their children by using methods for rapid diagnosis and more effective treatment.

【The Result up to the Present】

Since this program began in 1999, it has supported more than 250 exchange visits by Thai and Japanese researchers. Results of their collaborative research have been published in more than 50 scholarly articles and reports. The activities of the five research groups are summarized below.

(1) Bacteria have evolved in response to the use of antibacterial drugs and many bacteria are now resistant almost all such drugs. These researchers studied how resistance to antibacterial drugs is spreading in Asia, and how it may be contained or overcome. Drug-resistant bacteria spread easily across national borders, so this research will benefit people throughout the world. (Finished in 2003.)

(2) The Epstein-Barr virus (EBV) is found worldwide, and it is known to cause cancer. These researchers developed new ways to use the DNA of this virus to detect this infection at an early stage, even before the disease is serious. Thai researchers were trained in Japan to use these new techniques, and they have begun applying what they learned to health care in Thailand. The researchers are now planning to establish an Asian network in this field, which may lead to better control of virus-related cancers in all countries.

(3) Malaria is one of the most serious infectious diseases in the developing world. Approximately 500 million people suffer from malaria and about 2.7 million of them die each year. These researchers aim to establish a new strategy for treating and preventing malaria. To do that, they study how certain genes in the organism that causes malaria allow it resist anti-malarial drugs. They also study how the host organism responds when it is infected with malaria.

This collaboration with Thai scientists also includes a search for human genes associated with susceptibility or resistance to malaria. The Thai-Japanese team has found one gene for susceptibility to severe malaria, two genes for resistance to serve malaria, two genes for susceptibility to cerebral malaria, and one gene for resistance to cerebral malaria. Their findings may lead to the development of new therapies, and to the establishment of personalized treatment of malaria infection.

Because global warming could spread malaria and other “tropical” diseases to many “non-tropical” parts of the world that are not now affected, the results of this research are expected to be important in many areas of global public health.

(4) Human and viral genes interact in people infected with HIV-1, and that interaction is related to the progression to AIDS. Thai and Japanese researchers are now collaborating in three areas:

a) collecting DNA samples and clinical information from people in Thailand infected with HIV-1,

b) building laboratory systems for identifying variations in the host genes, and for evaluating the functional consequences of those variations, and

c) developing a genetic database for the AIDS study.

This study started in April 2003 and it is still in its initial phase; accumulation of basic information of genetic polymorphisms in human immune-related genes by direct sequencing. As this research progresses, it may lead to new treatments for AIDS and other diseases caused by viral infections.

(5) Viral infections affect many mothers and their children in Asia. These researchers developed a single test that can be used to identify more than one type of viral infection. They also discovered a previously-unknown type of a virus that causes diarrhea (norovirus). They are now studying the relationships among body weight, nutrition, mental development, and viral diarrhea. The Thai researchers can already use these new findings and methods to improve clinical medicine in their home country.

At the University of Tokyo on February 8, 2005, Thai and Japanese researchers held a seminar on strategies for controlling emerging and re-emerging infectious diseases in Southeast Asia. In this seminar, the participants reviewed the progress made in this program to date; evaluated whether the program's objectives were being adequately met, and set directions for further research.

Left: Thai and Japanese researchers working with cell cultures
Right: Professor Pratap Singhasivanon of Mahidol University speaking at a meeting of Thai and Japanese researchers

SOCIAL SCIENCE
REGION MAKING IN EAST ASIA


Kosuke MIZUNO


Surapon NITIKRAIPOT

【Started from】FY1999

【Organization】

Japan		Counter country
Japan Society for the Promotion of Science	Funding Agency	National Research Council of Thailand
Kyoto University	Core University	Thammasat University
Koji TANAKA.・Director・Center for Southeast Asian Studies	Representative Director	Surapon NITIKRAIPOT・Rector・Thammasat University
Kosuke MIZUNO・Professor・Center for Southeast Asian Studies	Coordinator	Surapon NITIKRAIPOT・Rector・Thammasat University Supang Chantavanich Director, Institute of Asian Studies, Chulalongkorn University
University of Tokyo・Institute for Oriental Studies/ Institute of Social Science、Nagoya University・Graduate School of International Development、Kyoto University・Graduate School of Asian and African Area Studies、National Institutes for the Humanities、National Museum of Ethnology・The Japan Center for Area Studies、Doshisha University・Faculty of Political Studies、National Graduate Institute for Policy Studies	Cooperative University	Chulalongkorn University、Mahidol University、Silapakorn University、Chiang Mai University、National Institute of Development Administration

【Background & Object of Research】

With East Asian regionalization increasingly becoming a reality, and the further refinement of Japan's East Asia policy as shown by the increase in the number of economic partnership initiatives Japan has taken, this program aims to understand better these developments through a series of intellectual and academic exchanges between Japanese and Southeast Asian scholars and researchers. These exchanges will take the form of joint research projects, with Kyoto University (Center for Southeast Asian Studies) in Japan and Thammasat University and Chulalongkorn University in Thailand as main hubs.

Unlike in Europe, this regional integration has not been promoted by political will or active government involvement. Instead, East Asian regional formation relies principally on market power which seeks to expand informal networking and production and marketing integration of production and marketing.

In this regional economic development, middle classes have also emerged in each country, and have played instrumental roles in increasing the flow of people, goods, money and information across the region. How this rise in the scale and volume in human, commodity and information flows has affected national and regional transformation of East Asia is the issue that this interdisciplinary joint research projects will focus on.

【Research Subject】

Project 6 "Market and Economic Partnership"

Asian economies have rapidly intensified their economic cooperation since the Asian crisis in 1997. More bilateral, multi-lateral free trade agreements (FTA) and Economic Partnership Arrangements (EPA) have been

signed between countries in the region. Discussions in regard to cooperation in international financial markets, (for example, the idea of an Asian Bonds Market) have also increased. The objective of this project is to find out what kinds of economic partnership would bring the maximum efficiency via market mechanism, and what effects such arrangements will bring to each Asian country. More concretely, the research aims to clarify the impact of projects like international technological cooperation, ASEAN's competitiveness vis-à-vis China, globalization and local economies, production linkage across and within countries, multinational enterprises, small and medium enterprises, etc. We will also try to broaden the dissemination of research results by contributing to a public opinion discussion of these issues both in Japan and in Southeast Asia.

Project 7 "Entrepreneurship in East Asia -Political, Economic, Cultural and Social: Establishing a New Model of East Asian Political Economy"

Even though the East Asian economy is still afflicted by weak institutions (particularly in the legal and financial sectors), we also cannot deny that the economy has been recovering in the past years. The important point here is that some economic entrepreneurs not only survived the economic turbulence in the last decade, but have also successfully preserved their capital and even made most of the uncertain situation to expand their wealth and resources. The question is, then, what initiatives did these entrepreneurs employ to deal with the ebbs and flows of the East Asian economy? What styles of leadership and management and the institutions and network did they establish to support such initiatives amidst a socio-economic-political-administrative environment that often hinders their progress? This study seeks to answer these questions by focusing on political, cultural and social entrepreneurship as a new style of leadership. It will examine how this entrepreneurship has created new cultural commodities, and supplied new social leadership among national and local elites as well as among farmers, laborers and local people, especially after the collapse of authoritarian developmentalist regime.

Project 8 'The Changing "Family"'

Southeast Asia is experiencing rapid structural and socio-economic changes in their economies under globalization, and these have not excluded the post- socialist countries. This research project will focus on one particular fundamental change: that of the Southeast Asian family. What kinds of changes have we seen in the "family" in these Southeast Asian societies from the past to present, and what sort of "new family" can we foresee in the future? This project will examine how the Southeast Asian "family" evolved legally, ideologically, and in the dynamism of on-the-ground practices. It seeks to pay attention to the diversities in this "family," based on locality, ethnicity, and class. We also hope to contextualize our investigations on a comparison of the past, present and future.

【The Result up to the Present】

We will invite 20 or more Thai scholars plus a dozen other Asian Scholars to the Center for Southeast Asian Studies, Kyoto University. We have so far held such three such workshops at Thammasat University and Kyoto University, including a number of special seminars where individual participants have been asked to give talks on their topics. One such workshop was recently held in October 2004 .

The most important achievement of this program is the fact that a new field of study – the East Asian regional system and its formation – was born and that a community devoted to the study of this regional system has evolved based on the close collaboration between academics and intellectuals. This network of academics and intellectuals working is continuously expanding from the original formation (Japan and Thailand) to include scholars from China, Indonesia, Malaysia, Taiwan, and the Philippines.

This academic network has published the outcomes of its previous research. The book titled *After the Crisis, Hegemony, Technocracy and Governance in Southeast Asian* from Kyoto University Press came out in March 2005, and we have also published the proceedings of four international workshops on "State, Market, Society, and Economic Cooperation in Asia", "Middle Classes in East Asia", "Flows and Movements in East Asia" and "Hegemony, Technocracy, Networks", from Center for Southeast Asian Studies, Kyoto University. We plan to come out with more publications with the conclusion of the above research projects.

Fisheries

Productivity techniques and effective utilization of aquatic animal resources into the new century

Takashi Aoki

Yont Musig

【Started from】 FY2000

【Organization】

Japan		Counter country
Japan Society for the Promotion of Science	Funding Agency	National Research Council of Thailand
Tokyo University of Marine Science and Technology	Core University	Kasetsart University
Rikuo Takai・President・Tokyo University of Marine Science and Technology	Representative Director	Viroch Impithuksa・President・Kasetsart University
Takashi Aoki・Professor・Tokyo University of Marine Science and Technology	Coordinator	Yont Musig・Dean・Kasetsart University
Hokkaido University・Graduate School of Fisheries、Tohoku University・Graduate School of Agricultural Science、The University of Tokyo・Graduate School of Agricultural and Life Science、Mie University・Faculty of Bioresources、Hiroshima University・Faculty of Applied Biological Science、University of Miyazaki・Faculty of Agriculture、Nippon Veterinary and Animal Science University、other 7 Universities	Cooperative University	Chulalongkorn University、Mahidol University、Prince of Songkla University、Maejo University、Chiang Mai University、Khon Kaen University、Ubon-Ratchathani University、Institute of Fisheries Agency、SEAFDEC

【Background & Object of Research】

Japan is one of the biggest seafood consuming countries in the world and it imports a lot of its seafood requirement including its by-products from Thailand. This international trade is good not only for the industry of Thailand but for Japanese consumers as well. Hence, there is a need to support and expand such beneficial relationship. Also it is imperative to produce more seafood supply to support present and future populations. To do this, it is necessary to develop new scientific technologies that are more efficient than that of present day methods. Fishing and aquaculture are envisioned to be useful technologies for this purpose. However, there is a need to develop some technologies for stable and high performance fishing and for the production of fish and shellfish having high quality traits for cultivation such as disease resistance, fast growth, and efficient adaptive capabilities in response to environment. The objective of our research is to develop productivity techniques for the effective and efficient utilization of aquatic animal resources into the new century. This research will be able to provide innovative technologies for high performance production system, which will be of great use to the fishing and, fish and shellfish cultivation industries and other related industrial sectors.

【Research Subject】

The cooperative research projects entitled "Productivity techniques and effective utilization of aquatic animal resources into the new century" will include aquaculture, fisheries science and technology, and food science and technology. The core university system in this program is divided into three terms, the first term being 2000-2003, 2nd term from 2004-2006, and third term inclusive of 2007-2009. There are three major scientific projects: (1) Development of new technology for aquaculture using molecular biological techniques to produce genetically improved or selected fish and shellfish to in turn, produce high quality food animals. This study will identify prevention methods and to combat infectious diseases in aquaculture using histopathological and molecular biology techniques, and will also target the renovation of deteriorated aquaculture farming areas. (2) Comparative studies on fishing technology, from the perspective of environmental impact and the gear selectivity for optimum development on a sustainable base, through technical improvements by transferable management tools from responsible fishing operations. (3) Improvement of seafood quality and value-added utilization of fishery products and by products. This study will focus on the improvement of fish and shellfish meat quality being utilized as seafood and, development of high value utilization of aquaculture wastes for industries.

【The Result up to the Present】

(1) Development of new technology for aquaculture

We have isolated many DNA sequence information from flounder, shrimp and abalone, and currently we are studying and characterizing the development, maturation, biodefence and immune systems of fish and shellfish at the molecular level. In addition, we have developed transgenic techniques for marine fish and shrimp to characterize the function of scientifically and industrially important genes. Based on our results, we are now able to develop new food resources with high-value traits such as fast-growth, disease resistance, etc. by using genetic engineering.

We have developed a technique for gene transfer to shrimp embryo using gene gun and we have discovered multiple shrimp gene promoters for expression of foreign gene in shrimp. These findings will allow us to develop a high potential for shrimp as a food resource in aquaculture.

We also found several DNA markers for over 10 different fishes that are important in the fishing industry in Thailand. These markers can be used for analysis of population genetic analysis and could be used possibly to obtain information about environmental and genetic conditions of freshwater fishes in Thailand.

We have developed a diagnostic method using monoclonal antibody and DNA of fish pathogens for white spot syndrome virus of shrimp, several fish pathogenic fungi and bacteria.

(2) Comparative studies on fishing technology

Regarding the field on fishing technology, two research topics on light fishing and fishing gear selectivity were conducted. On the topic of fishing gear selectivity, several experts from Japan and Thailand exchanged and discussed technical solutions toward the establishment of responsible fishing technology in Southeast Asia. On the topic of light fishing technology, Thai scientists were invited to Japan, for information exchange on the present technical condition in Thailand and Japan, as well as for the discussion methods to analyze underwater light intensity, according to the onboard arrangement of electric bulbs for attracting fish and squid. Concerning the field of fisheries biology, Japanese scientists were dispatched to Thailand to conduct field inspection and intensive discussion of the Crab fisheries with experts from Kasetsart University and the Fisheries Research Centers.

(3) Improvement of seafood quality and value-added utilization of fishery products and by products

In order to understand the differences in gel forming ability of different fish species, the characteristics of fish muscle and gelation mechanisms were studied. It was found out that actomyosin gel from bigeye snapper *P.riacanthus tayenus* rendered more three-dimensional structure conformation than that of bigeye snapper *P. macracanthus*. The results obtained in this study indicated that *P. tayenus* actomyosin possessed superior gelling characteristic than *P. macracanthus* actomyosin due to the higher aggregation of protein caused by both hydrophobic interaction and disulfide bonding.

Due to the lack of fresh fish in the Gulf of Thailand, there is an increasing interest in using frozen fish as a raw material for surimi production. The effect of frozen storage on chemical and gel-forming ability of four fish species was investigated. The effect of the quality of surimi on the mechanical properties of edible surimi films was studied in detail. The collagen from tropical fish, particularly from surimi processing waste was isolated and their characteristics were investigated.

Every year, we published the annual report of this project in English. In addition, from 2001, we organized the joint symposium of this project and published its proceedings in English.

Annual reports

Symposium proceedings

Pharmaceutical Science
Natural Medicines


Masao Hattori


Boonyong Tantisira


Somsak Ruchirawat

【Started from】FY2001

【Organization】

Japan		Counter country
Japan Society for the Promotion of Science	Funding Agency	National Research Council of Thailand
Institute of Natural Medicine・Toyama Medical and Pharmaceutical University	Core University	Chulalongkorn University、Chulabhorn Research Institute
Taketoshi Ono・President・Toyama Medical and Pharmaceutical University	Representative Director	
Masao Hattori・Director・Toyama Medical and Pharmaceutical University	Coordinator	Boonyong Tantisira•Dean•Chulalongkorn University、Somsak Ruchirawat・Associate Vice-President・Chulabhorn Research Institute
Chiba Univ. ・Graduate School of Pharm. Sciences、The Univ. of Tokyo ・Graduate School of Pharm. Sciences、Nagoya Univ. ・Graduate School of Bioagricultural Sciences、Hiroshima Univ. ・Graduate School of Biomedical Sciences、Kyushu Univ.・Graduate School of Pharm. Sciences、Gifu Pharm. Univ.、Kitasato Univ. ・Kitasato Institute for Life Sciences、Meiji Pharm. Univ.	Cooperative University	Chiang Mai University、Kasetsart University、Khon kaen University、Mahasarakham University、Mahidol University、Naresuan University、Prince of Songkla University、Silpakorn University、Srinakharinwirot University、Ubon Ratchatani University、Viet Nam Institute of Traditional Medicine、National Institute of Materia Medica

【Background & Object of Research】

Traditional medicines have a certain role to treat many patients with diseases which are difficult to be cured by Western medicines and also those who are scared by adverse reactions of these medicines. Therefore, we need the scientific backup on the efficacy of traditional medicines. Further, we have big problems on the traditional medicines. The first one is on the natural resources. Most of of Kampo medicines are imported from China, but the country recently restricted collection of *Ephedra* spp. and *Glycyrrhiza* spp. due to the prevention of deserted land. If the import of those plants is stopped, it is a serious problem to patients who are taking traditional medicines. The second one is on dietary supplements. The supplements include various medicinal herbs and natural products, whereas the origin and the quality of which are not necessarily guaranteed. No toxicity study of these supplements was done with chronic intake of such supplements. Thailand and other Asian countries have the same problems as ours. They also have traditional medicines and medicinal resources which have not been studied yet. Thus, our research collaboration through the exchange program produces fruitful results to solve those problems.

【Research Subject】

The collaborative research on natural medicines includes medicinal plants and marine products. The research task covers from the identification of medicinal resources to the clarification of action mechanisms of the medicine. (1) We have a problem on the rate of increase in the population with an advanced age in Japan and also Asian countries. Therefore, the first aim is to study on natural medicines which are useful to treat and/or prevent diseases in aged people such as dementia and osteoporosis. (2) The study on natural medicines which have activities on virus-derived serious diseases, AIDS and hepatitis, and on malaria as well. At the same time, we try to clarify the active constituent(s), chemical structure, how to synthesize the isolated compound, and action mechanisms of those medicines. The development of the methodology and the clarification of the mechanism on the route of biosynsethis of the active constituents using cultured plants are very interesting tasks. The information on medicinal resources and researches are accumulated as the database in our computer program.

【The Result up to the Present】

This exchange program started from April, 2001 and this is the fifth year. Japanese scientists (116 persons) visited research laboratories at Thai universities and institutes, and spent 701 days there, similarly, Thai scientist (111 persons) visited the laboratories at universities in Japan, staying for one to three months each, during these four years. On December 7 to 9 in 2004, we held the workshop on the molecular analysis of medicinal plants at Chulalongkorn University as a memorial event for the 19th anniversary of the university, and had lectures and practical training (see two photographs). Since many scientists in both countries have much experiences already on collaborative research works at both sides, the program started very actively.

A part of the collaborative researches is as follows.

(1) The yellow powder, which is made from the rhizome of *Curcuma longa* (Zingiberaceae), has been used as a yellow dye and as one of the ingradients of curry. The rhizome has also been utilized as traditional medicine such as an aromatic stomachic, a secretagogue of the bile, anti-inflammatory, etc. (1-A) In the present study, gene analysis was made on 4 species of Curcuma genus (Latin name is not fixed yet) which were purchased in Thailand. The gene of *Curcuma longa* was corresponded with Japanese and Chinese ones, while *C. zedoaria* was a little bit different from Japanese and Indian ones and *C. aromatica* was completely different from Japanese one. Thus, we need to confirm these results comparing the standard plants which have been identified correctly in Curcuma genus (Toyama/Mahidol U). (1-B) Several compounds which were synthesized to modify the chemical structure of curcumin showed the efficacy to prevent the transient ischemia-induced deficit of the spatial learning behavior in mice (Mahidol U/Toyama). The anti-cancer effects of curcumin and three other constituents which were isolated from *Curcuma aromatica* were examined using colon 26-L5 carcinoma cells. One of those constituents inhibited the invasion of cancer cells into the basement membrane and their motilities stronger than curcumin (Toyama/Cancer RI).

(2) Chemically unstable alkaline compounds were isolated from sea organisms which were collected near Phuket island of Thailand. The compounds with purified and identified as ecteinascidines, which are now candidates of anti-cancer agents in America and Europe. Several isoquinoline alkaloids were found and isolated on small scale from the blue sponge which is collected at the east coast of Bangkok, and were named Renieramycin J-L. Since these alkaloids contain chemically unstable structures, chemical modification processes were carried on ecteinascidines and afforded renieramycin M efficiently from the sponge. The cellular toxicity study indicated strong anti-cancer activity of renieramycin M (Meiji Pharmaceutical U/ Chulalongkorn U).

(3) Recently, *Pueraria mirifica* (Pueraria genus) has been utilized as a dietary supplement in Asian countries. The present study succeeded to make a plant-culture system and produce a callus of Pueraria *in vitro*. The next step is to clarify the route of synthesis of a series of isoflavonoids (including miroestrol, a strong estrogenic), which are constituents of *P. mirifica* (U Tokyo/Chulalongkorn U).

In Thailand, there are ten national universities, which have Faculty of Pharmaceutical Sciences. The faculty staffs expect to pursue collaborative researches with Japanese scientists through the exchange program. We are pleased to cooperate with Thai scientists in the field of pharmaceutical sciences, though we have to mind the intellectual proprietary rights on the collaborative research results.


Kuniji Kose


A.A. Masroeri

Study on Marine Transportation Engineering

(1) Study on River Transportation System in Asian Countries
(2) Network Study on Asian Marine Transportation Development
(3) Study on Collection of Wave Data and Safety of Ships Operating In Indonesian Domestic Sea
(4) Studies on Promotion of maritime Industries and Technology
(5) Investigation on Marine Incidents and Development of Management System for Rescue/Salvage/Ship Repair in Indonesia

【Started from】 FY1997

【Organization】

Japan		Counter country
Japan Society for the Promotion of Science	Funding Agency	DGHE
Hiroshima University	Core University	Institute of Technology Surabaya (ITS)
Yasuo Yamane・Hiroshima University・Dean	Representative Director	Soegiono・ITS・Professor
Kuniji Kose・Hiroshima University・Professor	Coordinator	A. A. Masroeri・ITS・Associate Professor
Hokkaido University・Graduate School of Fisheries Sciences、 The University of Tokyo・Graduate School of Frontier Sciences、 Yokohama National University・Faculty of Engineering、 Osaka University・Graduate School of Engineering、 Kyushu University・Graduate School of Engineering／ Research Institute of Applied Mechanics、 etc.	Cooperative University	Institute Technology of Bandung、 University of Hasanuddin、 UPN “Veteran” Jakarta、 University of Darma Persada、 Bogor Agricultural University

【Background & Object of Research】

Several problems in the present state of Asian marine transportation exist, such as difficulties in technology transfer in shipbuilding, inefficient transportation systems in shipping and inadequate ship safety, among others. For example, technology transfer seems easier in the assembling industry that performs simple works than the shipbuilding industry, where each worker must have full understanding of their own function and must have full attention to each work. As a result, there are very few success stories concerning technology transfer in the shipbuilding industry. Also, provision of an efficient network system in shipping is quite underdeveloped in the Asian region. In addition, the construction of safe and efficient river transportation system is a matter of great urgency as big rivers are normally used for transportation.

Under this background, the main aim of this program is to explore problems and to carry out technical investigations on marine transportation in Indonesia, and other Asian countries as well. This is performed through joint cooperative efforts of experts consisting of Japanese, Indonesian and other Asian researchers.

【Research Subject】

Previous studies have essentially clarified the background of each problem. The following studies are carried out in the present stage in an attempt to find out reasonable solutions to these problems.

1) Investigation of ship safety management to develop appropriate ship operation support systems.
2) Study on ship operation in shallow restricted waters to determine suitable transportation system in

rivers.

3) Network study on Asian maritime transportation to establish an efficient network system.
4) Study on collection of wave data and safety of ships operating in the Indonesian domestic sea to develop proper ship design criteria from the view point of improving ship safety.
5) Study on the promotion of maritime industries and technology to suggest sound policies for promoting the maritime industry.

【The Result up to the Present】

To promote better understanding of the issues and concerns on marine transport, active discussions between Asian researchers and around 30 Japanese researchers are regularly held annually in Japan and other participating countries. The seminar on marine transportation engineering is also regularly scheduled every year, in which the main Asian members are invited to present the progress of their individual researches. Presentations are held in the seminar to assist members to have better understanding of the main issues of the research cooperation and to encourage suggestions on how to improve individual researches. The results of each study and the contents of the seminar are published on a regular basis and distributed to all the members to inform them of the progress of the program and update them on new developments and information concerning the research. The Group has established a communication network where the coordinators of each study group from the Japanese side and from the participating countries distribute accurate information to all the members without delay. This communication network is open, not only to the members, but also to interested researchers who wish to inquire about the program, thus helping to expand researcher's link. Likewise, the acquisition of scientific journals from Japanese societies was quite difficult for Indonesian universities in the past. Through this cooperative research program, these journals are donated to Indonesian Universities without trouble to augment their library collection and to increase research motivation. In addition, since there is no organized society in Indonesia, universities have not experienced research collaboration before. One of the accomplishments of the program is the realization of active collaborative efforts between Japanese and Asian universities.

Thus far, we have analyzed problems and have suggested improvements concerning Asian marine transportation to Indonesian and Asian researchers through our program. Our efforts have been noticed by several researchers and government officers of other countries, thus helping promote and develop new and practical policies. For example, the results of our research were used for the analysis of Indonesian shipping and investigation of its promotion that eventually became the basis for the drafting of a master plan by the Directorate General of Sea Communication (DGSC) in Indonesia. Our program also plays an important role in activating the existing facilities in the Indonesian Hydrodynamic Laboratory (LHI), belonging to the Agency for the Assessment and Application of Technology (BPPT) in Indonesia, which is considered as one of the most excellent in Asia. Contractual researches have been continuously performed in LHI by Indonesian researchers under the cooperation of Japanese researchers. A capsizing test, which was the first experience in Indonesia, was carried out in 2001. The motivation of Indonesian researchers improved with this event, and a growing tendency towards the development and operation of their own technology was observed. Furthermore, we have suggested that the pusher-barge system is the most suitable system in river transportation and that investigations and experiments to realize this are being carried out in LHI – thus making them improved their consciousness as independent researchers. As a result, the JSPS Seminar on River Transportation arranged by the Indonesian researchers was held in Jakarta in 2004, thereby improving the research motivation for all of the members.

APPLIED BIOSCIENCES

HARMONIZATION BETWEEN DEVELOPMENT AND ENVIRONMENTAL CONSERVATION IN BIOLOGICAL PRODUCTION

Katsumi Aida　　Syafrida Manuwoto

【Started from】FY1998

【Organization】

Japan		Counter country
Japan Society for the Promotion of Science	Funding Agency	Directorate General of Higher Education
The University of Tokyo・Graduate School of Agricultural and Life Sciences	Core University	Bogor Agricultural University
Katsumi Aida・Dean・Graduate School of Agricultural and Life Sciences, The University of Tokyo	Representative Director	Ir. A. A. Mattjik・Rector・Bogor Agricultural University
Katsumi Aida・Dean・Graduate School of Agricultural and Life Sciences, The University of Tokyo	Coordinator	Syafrida Manuwoto・Professor・Bogor Agricultural University
Tohoku University、Utsunomiya University、Kyoto University、Okayama University、Kyushu University、Kobe University、Tsukuba University	Cooperative University	Gadja Mada University、Padjadjaran University、Bandung Institute of Technology、Udayana University、National Atomic Energy

【Background & Object of Research】

Solving food and environmental problems simultaneously has become major and urgent global concerns. The objective of this research is to examine the potential solutions for maintaining and enhancing biological production systems while conserving natural resources and environment in Indonesia where these problems are remarkably observed. Aiming at this goal, it is essential to promote field studies to investigate scientifically the issues of sustainability in the present biological production system both at local and regional levels. There is also a need to develop a cooperative relationship with the counter country to promote the cooperative research. Based on long-term perspective, it is very important to foster junior researchers of both countries through the collaborative research program to contribute to developing further advanced scientific achievements.

【Research Subject】

The followings are the subjects of this collaborative research:

○ Studies on environmental changes and sustainable development (Group leader: Prof. Sho Shiozawa)
○ Studies on sustainable utilization of botanical resources in arable lands（Group leader: Prof. Nobuo Sugiyama）
○ Socio-economic studies on sustainable development in rural Indonesia（Group leader: Prof. Noriaki Iwamoto）
○ Landscape-ecological studies on sustainable bioresources management systems in rural Indonesia（Group leader: Prof. Kazuhiko Takeuchi）

Environmental changes caused by land use/cover changes are investigated through macro-scale analysis in the first subject to propose sustainable land use systems. In the second subject, traditional utilization of botanical resource is reevaluated and innovative use of this resource is examined by adopting biotechnology. The third subject addresses environment-conscious rural development strategy by looking at the socio-economic factors of biological production. Integrating above-described three subjects, the fourth subject aims at restructuring rural ecosystems by adopting newly proposed sustainable bioresources management system appropriate to communities in rural Indonesia.

【The Result up to the Present】

Seven years have passed since this project started. We have successfully progressed in each research subject. During the past seven years, we dispatched Japanese researchers to Indonesia to conduct field survey, and also invited Indonesian researchers to Japan for the discussion on research subject, data analysis, and preparing scientific papers. In dispatching Japanese researchers, we selectively arranged long-term stay in Indonesia for junior researchers to provide sufficient time for collecting adequate amount of data. Similarly, in invitation of Indonesian researchers, long-term stay in Japan was also preferentially arranged for researchers who were involved in the preparation of scientific papers in Japan to produce substantial research achievement. Consequently, substantial research results in the form of scientific articles have been submitted to international/domestic scientific journals, some have been accepted and published while others are still being reviewed. Some of the junior researchers from both Japan and Indonesia have already completed their Ph.D.

As a measure of academic achievement and progress, the research project had organized three seminars where research results were scholarly presented.. The first seminar was held at The University of Tokyo on February 21-23, 2001 to present and evaluate research results of the early stage of the project. Not only researchers from Japan and Indonesia but also scientists from other countries who were and are involved in related research field were invited to expose our research achievement to evaluation on an international basis. Furthermore, this provided good opportunity to establish an international academic network among the participants over the whole Southeast Asian countries. The second seminar was held at The University of Tokyo on February 15-16, 2003 to present and evaluate research achievements of the middle stage of the project. Scientists from Japan, Indonesia and the third countries were invited as members of an external evaluation committee which was organized for this seminar. Researchers who produced excellent research achievement were awarded to encourage and motivate research activities of each research group and individual researchers. Expectedly, this would develop competitive environment based on friendly rivalry in producing high quality academic achievements. The third seminar was held at Cilegon, Banten Province, Indonesia on December 3-5, 2004. In this seminar, strategy to integrate individual research results was discussed in order to produce final output of this project. In addition, strategy to disseminate our scientific achievements to the rural society and its applicability was also discussed.

Research achievements of this project have been published as scientific papers in international and domestic scientific journals. Aside from these published scientific papers, a book entitled “Sustainable Agriculture in rural Indonesia” (Photo 1) was published by Gadja Mada University Press in May, 2003. This is the major output of this project as a means of disseminating academic achievement to the world. This book is composed of selected papers from each research group which have already been published in scientific journals. In Japan, a some of the academic achievements of this project were featured in Science Journal KAGAKU Vol. 73, Nov. 7 (Photo 2) published by Iwanami Shoten in July, which is intended for the common reader. It is our ardent hope that our research achievements will be accessible not only to scientists but also to general public.

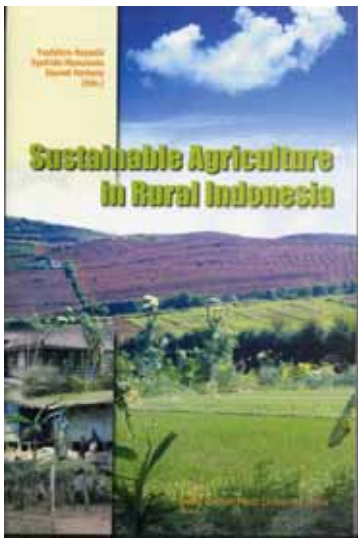


Photo 1. Sustainable Agriculture in Rural Indonesia
（Gadja Mada University press, 2003 May）

Photo 2. KAGAKU
(Iwanami Shoten, 2003 July)

Wood Science

Science for Sustainable Utilization of Forest Resources in the Tropics

Yuji Imamura

Endang Sukara

【Started from】 FY1996

【Organization】

Japan		Counter country
Japan Society for the Promotion of Science	Funding Agency	Indonesian Institute of Sciences (LIPI)
Research Institute for Sustainable Humanosphere (RISH), Kyoto University	Core University	Research & Development Unit for Biomaterials, LIPI
Hiroshi Matsumoto・RISH, Kyoto University・Director	Representative Director	Luckman Hakim・Vice Chairman, LIPI
Yuji Imamura・RISH, Kyoto University・Professor	Coordinator	Endang Sukara・Deputy Chairman for Life Sciences , LIPI
Faculty of Agriculture・Hokkaido University、Institute of Wood Technology・Akita Prefecture University、Graduate School of Agricultural and Life Sciences・The University of Tokyo、Graduate School of Bio-Agricultural Science・Nagoya University、Graduate School of Agriculture・Kyoto University、Faculty of Science and Engineering・Shimane University、Faculty of Agriculture・Kyushu University、Others(12)	Cooperative University	Research Center for Physics／Research Center for Chemistry／Research Center for Biology／Research Center for Biotechnology、LIPI、Bogor Agricultural University、R&D Center for Forest Products Technology、Mulawarman University、Winaya Mukti University、The University of North Sumatera、The State University of Papua、Gadjah Mada University、Hasanuddin University、Others(16)

【Background & Object of Research】

Our fossil resource-based industrial society has provided us prosperity, especially in the developed countries. However, it also has brought serious negative impacts on the global environment, especially the decrease in tropical forest resources. Therefore, it is becoming more and more important to establish systems and strategies for sustainable production and utilization of tropical forest resources, so that a sustainable, recycling-based society can be established.

In this context, we have been conducting the JSPS-LIPI Core University Program in the Field of Wood Science with the aim of establishment of basic science and technology dealing with the lignocellulosic materials, including fast growing trees, low quality wood and even forest and agricultural residues. This is also indispensable for promotion of the wood industries of Japan and Indonesia, as well as other Southeast Asian countries.

【Research Subject】

We have set up four major research areas for collaborative research subjects in the Core University Program in the Field of Wood Science: 1) Wood material science, 2) Wood biomass chemistry, 3) Wood bioscience, and 4) Wood and environment science. Since 1996, 26 collaborative research projects have been conducted. The duration of each project is set, in principle, up to three years, and 10 projects are now ongoing. In 2003, we launched a new collaborative project, Sustainable production and utilization of tropical forest resources for the establishment of a recycling-based society, so that we overview the program and propose the future research directions to be pursued.

【The Result up to the Present】

International exchange of scientists and collaborative research and development

First of all, we conducted the exchange of scientists to identify our counterparts for the international collaborative research and development projects. The exchange of scientists represented by total days of visit has decreased gradually since the start of the program, because the participants have found their counterparts more smoothly over the years. International collaborative research and development, which are classified into four categories (Wood material science, Wood biomass chemistry, Wood bioscience, and Wood and environment science) have been activated with progress in the program.

Termite investigation in Indonesia

International Wood Science Symposium

Another important academic activity is the organization of the international wood science seminar/symposium (IWSS). The first IWSS was held in Kyoto, Japan, in 1996, and since then, four symposia have been held every two years in Serpong and Kyoto, in turn. This year, which is the last year of the program, the 6th IWSS will be held in Bali, Indonesia. The scope of the meeting will be to summarize the program and propose future collaborations. In addition, a special international symposium on sustainable production and utilization of *Acacia mangium* was held in Kyoto on October 21 and 22, 2003.

Publications

As a result of the cooperative research projects, 69 original papers (relating directly to the program) have been published in major international and domestic journals (e.g. Proceedings of National Academy of Sciences, USA, Journal of Wood Science, etc.) since 1996. In addition, we have presented 64 papers at international meetings other than the IWSS.

Man-power

Through the Core University Program, many Indonesian scientists entered the Graduate School of Agricultural Science, Kyoto University. Also, some Indonesian scientists have been supported by the JSPS Ronpaku system. After the start of the Core University Program, five Indonesian scientists who are members of the program have graduated from Kyoto University and received their PhD degrees either on the PhD course of study or through the Ronpaku system: Drs. Dede Hermawan, Erman Munir, Musrizal Muin, Subyakto, and Yanni Sudiyani. In addition, Dr. Erman Munir was honored by LIPI due to his outstanding scientific achievement during his PhD course in Kyoto University.

Establishment of a satellite office in Indonesia

We have established a satellite office of RISH, Kyoto University, by courtesy of LIPI. The opening ceremony was held on February 25, 2005, at RDUB, LIPI, with the attendance of Professor Umar Anggara Jenie, the chairman of LIPI. The office is being used as an information center for the program and as an on-site laboratory of the collaborating research.

Memorial address by the Chairman of LIPI,Prof. Umar Anggara Jenie in the opening ceremony

Supporting the establishment of Indonesian Wood Research Society and LIPI Research and Development Unit for Biomaterials

It is noteworthy that the Core University Program contributed significantly to the establishment of the Indonesian Wood Research Society in 1996. Also, it should be noted that a research center for biomaterials has just been started. Thus, when the Core University Program started, the core in Indonesia was the Laboratory of Composite Materials of the R & D Center for Applied Physics. In the reorganization of LIPI in 2001, the establishment of a biomaterial research center was proposed, based on the successful results of the Core University Program, and the laboratory has become independent and expanded to become the Research and Development Unit for Biomaterials (RDUB).

Environmental Earth Science

Environmental conservation and land use management of wetland ecosystem in Southeast Asia


Motoyoshi Ikeda


Dedy Darnaedi

【Started from】FY1997

【Organization】

Japan		Counter country
Japan Society for the Promotion of Science	Funding Agency	Indonesian institute of Sciences (LIPI)
Hokkaido University	Core University	Research Center for Biology・LIPI
Motoyoshi Ikeda・Dean・Fac. of Environ. Earth Science・Hokkaido University	Representative Director	Dedy Darnaedi・Head・Research Center for Biology・LIPI
Motoyoshi Ikeda・Dean・Fac. of Environ. Earth Science・Hokkaido University	Coordinator	Dedy Darnaedi, Head, Research Center for Biology, LIPI
Hokkaido Institute of Technology・Fac. of Engineering 、 Hokkaido Univ. of Education・Asahikawa Campus／Sapporo Campus／Kushiro Campus、Tokyo Univ. of Agric. and Technol.・Inst. of Symbiotic Sci. & Technol.、Kanazawa Univ.・Inst. of Nature Environ. Technol.、Kyoto Univ.・Center for Southeast Asian Stud.／Grad. Sch. of Asian and African Area Stud.、Kagoshima Univ.・Fac. of Science	Cooperative University	Recearch Center for Geotechnology, LIPI、Recearch Center for Limnology, LIPI、Bogor Agricultural University、Bandung Institute of Technology 、 University of Palangkaraya・

【Background & Object of Research】

The vast tropical peatland is distributed over Southeast Asia including Indonesia. Rich water resources together with the rich tropical swamp forest developing stably on the peatland have been playing an important role in the accumulation of the carbon that is the chief culprit of global warming and in offering habitats for diverse plants and animals. However, under a worldwide industrial development and population explosion, deforestation and large-scale land development have been practiced even for this tropical peatland. Recent frequent forest and land fires not only have damaged the land and rich ecosystems but also have elevated atmospheric carbon dioxide concentration by releasing stored carbon from peatland. The purposes of the present study are to break disorderly use and development of tropical peatland that is important from the viewpoint of global environment, to develop a method of land use with minimum load to the environment, and to contribute to the improvement of local people's life and welfare. The program also aims at fostering young researchers of the next generation.

【Research Subject】

The main research site is the tropical peatland with 2.5 million hectares of extent developed from the coastline to inland of Central Kalimantan. There are forests with various plant species, natural land inhabited by diverse animals including orangutans, abandoned waste land where deforestation and inappropriate development of farmland were practiced, the agricultural area depending on thin layer of peat, inland fisheries area supported by rich water resources, and the city and village area of center of economic activity. The studies are conducted in five groups aiming at conservation and restoration of the natural environments, the improvement in productivity of agriculture, forestry and fisheries, and improvement of the living environment in city and villages: (1) Ecosystem function and genetic diversity in wetland forests, (2) Rehabilitation of peatlands and establishment of sustainable agro-systems, (3) Sustainable infrastructure development harmonized with nature of tropical peatland, (4) Aquatic environments of lowland wetlands, and (5) Society, life and economics in Central Kalimantan.

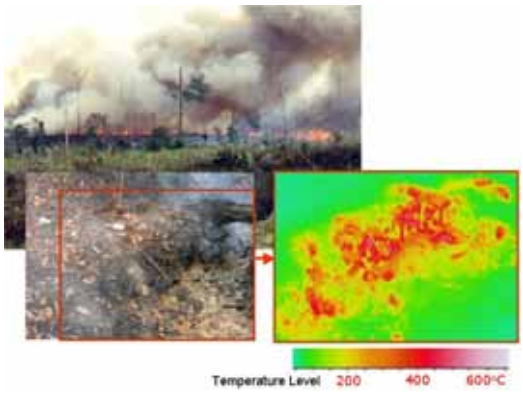
【The Result up to the Present】

The program has been conducted in three terms, namely, the basic research term (1997-1999), the research development term (2000-2004), and the research application term (2005-2006). During the basic research term, we established four research groups of terrestrial ecology, bio-production, peatland technology, and freshwater ecology. The research was continued in the research development term, aiming at obtaining the concrete results, which can be returned to the local community. About 270 researchers participate in the program and research exchange of more than 70 is performed annually. Many young Indonesian researchers study at Hokkaido University, and six persons acquired the doctor's degree by March 2005. An Indonesian researcher has acquired the doctor's degree from Hokkaido University supported by the JSPS RONPAKU (Dissertation Doctor) program, and several others will follow. Research results by Japanese students have been accumulated and since 2000 thereafter, one or more students are awarded the doctor's degree every year.

Since the present program deal with the global environmental issues, it is carried out by releasing and exchanging latest information internationally such as hosting international seminars, publishing English reports, and so on. So far five international seminars (workshops and symposia) were held under this program. Based on the discussion at the international symposium in 2002, socio-economical research group was started. At the international workshop on “Human Dimension of Tropical Peatland under Global Environmental Changes” in 2004, many studies were presented on scientific reappraisals of traditional management techniques of farmland and water resources, on the examples of applying up to date techniques to the agroforestry and fishery management, and on environmental education. These new methods and concepts on sustainable use of tropical peatland are tested and applied in harmony with the local community during the research application term.

(1) Ecosystem function and genetic diversity: Indonesia is the treasury of species diversity of parrots. Their molecular phylogenetic study is currently carried out for their conservation.

(2) Peatland rehabilitation and sustainable agro-systems: This native peat-swamp tree is adapted to dry environment and is experimentally planted for the reforestation of the fire-damaged peatland.



(3) Sustainable infrastructure development: Wild fire occurs frequently on the deforested peatland. Haze, smoke from imperfect peat combustion, causes various problems of health, traffic and agriculture.

(4) Aquatic environments: Various functions of tropical humic substances are studied such as impacts on aquatic organisms and absorption of pollutants with special reference to the chemical and biological restoration of damaged environments.

Fisheries

Development, Management and Conservation of Fisheries Resources and Aquatic Environment of The Philippines

Shunsuke Koshio

Romeo Fortes

【Started from】 FY1998

【Organization】

Japan		Counter country
Japan Society for the Promotion of Science	Funding Agency	DOST
Kagoshima University, Faculty of Fisheries	Core University	University of Philippines, ・Visayas
Matsuoka Tatsuro・Faculty of Fisheries ・Kagoshima University・Dean	Representative Director	Romeo Fortes・University of Philippines・Visayas・Dean
Shunsuke Koshio・Faculty of Fisheries・Kagoshima University・Professor	Coordinator	Romeo Fortes・University of Philippines・Visayas・Dean
Hokkaido University・Faculty of Fisheries、Tohoku University・Faculty of Agriculture、Nippon University・Faculty of Biological Resources Sciences、Tokyo University of Fisheries・Faculty of Fisheries、University of Tokyo・Faculty of Agriculture、Kinki University・Faculty of Agriculture、Kyoto University・Faculty of Agriculture、Hiroshima University・Faculty of Biological Production	Cooperative University	Don Mariano Marcos Memorial State University、 Mariano Marcos State University、 State Polytechnic College of Palawan、 Zamboanga State College of Marine Sciences and Technology、 Mindanao State University、 loilo State College of Fisheries、 Bicol University、 Central Luzon State University、 Cagayan State University、 Panay State Polytechnic College

【Background & Object of Research】

There is a tight linkage between the South-east Asia and Japan associated with the fisheries. Philippines is one of the countries, which has a high potential for collaborative project with Japan. Kagoshima University, Faculty of Fisheries, has been conducting many researches on the tropical or sub-tropical aquatic areas with the positive way for a long time. The core university research cooperation program between the Faculty of Fisheries, Kagoshima University and the University of the Philippines in the Visayas, which is currently under its mid-term evaluation is entitled as the “Research Cooperation Project on Development, Management and Conservation of Fisheries Resources and Aquatic Environment of the Philippines”. The objectives of the project are promoting and contributing to the researchers in all the aspects of fisheries science and technology in both Japan and the Philippines through the international exchanges to consolidate effective and sustainable development of fisheries in the Philippines, which is the super-goal of the project..

【Research Subject】

The program is composed of two research fields together with five teams as follows: Field-1: Utilization and Management of Fishery Resources in the Coastal Water in the Philippines (teams 1 to 3), and Field-2: Production and Utilization of Fishery Resources in the Philippines (teams 4 to 5). The five research teams aim at the following subjects respectively; Team-1 Aquatic environment and resources: Fishery resource-related scientific studies on conservation of the fishing grounds and environment in the Philippines, Team-2 Capture fisheries: Fishing techniques and capture-related engineering in the Philippines and application of technology for resource and environmental conservation, Team-3 Fisheries social sciences: Socio-economics for fisheries development and resource management in the Philippines, Team-4 Aquaculture: Methodological development for production of seed and propagation of organisms in the Philippines, Team-5 Post-harvest and feed sciences: Rational utilization of fishery resources and development of seafood in the Philippines

【The Result up to the Present】

The followings are the research topics and outcomes from each area:

Team-1 (Aquatic environment and resources); The field surveys have been conducted by cooperative researchers from both countries in Panay and Leite Islands for water quality researchers and in Palawan for marine algae researches. Distribution of prawns and shelled mollusks were surveyed and their physiology under aquaculture conditions was studied in laboratories in Kagoshima University. Toxic and bioactive substances of algae were laboratory-analyzed in Kagoshima and Saga Universities.

Team-2 (Capture Fisheries); The findings are gathered at the international seminar jointly convened by the two core universities in Miyagao, the Philippines in September, 2001 as; 'the International Seminar on Responsible Capture Fisheries in Costal Waters of Asia'.

Team-3 (Fisheries Social Science); The followings are research topics that have been conducted by the team;

1) Global and regional fishery development policy in relation to the Philippines, 2) Strategic management toward rational utilisation of coastal fishery resources, 3) Co-management of fisheries by community and institutional organisations,

4) Function and formation of fishermen's cooperatives,

5) Marketing of fishery productsand involvement of merchandise sector in fisheries, 6) Gender issue in fishing communities,

7) Development of aquaculture and environmental issues, and 8) Eco-tourism.Team-4 (Aquaculture); Researches focused on the four topics are conducted as; 1) it has been clarified that some plankton species are suitable to be reproduced under artificial aquatic conditions in the Philippines from which papers on live feed production techniques have been published, 2) Potential utilization of alternative proteins available in the Philippines are studied for the purpose of developing environment-harmonic artificial feeds, consequently, those for tilapia and other fish species are continued, 3) Studies on aquaculture in lagoon waters and ecosystem are being conducted, and 4) Researches on shrimp and fish disease are recently introduced with high demand and some new findings are being reported

Team-5 (Post-harvest and food science); Since Year 2001, more specific studies were started. Feasibility of some Philippine-characteristic species to be processed into fish-paste products was studied for the purpose of establishing a new processing technique which is different from the conventional method. Some species of a good nutritional character, preferable smell and fine texture were found. Preferable chemical contents such as EPA and DHA of the head, eyes and red-muscles were analysed for the purpose of utilisation of those remains in *sashimi* fillet processing.

As a part of the program, the third seminar on "Sustainable Aquaculture and Environment" was held at Inamori Convention Hall, Kagoshima University on October 16 and 17 in 2004. The objective of the seminar was to develop the sustainable aquaculture in Asia and to determine the future direction of our collaboration in the field of aquaculture and environment between two universities. The seminar has been held every 3 years and there were 28 presentations based on our collaboration researches this time on the following fields: new technology, immunostimulants, disease, larval development, nutrition, live feeds for the species such as grouper, milkfish, rabbit fish, tilapia, mud crab, shrimp. There are almost 80 participants in the seminar including many international students who are studying in the Kagoshima University. In the last discussion, we exchanged information on the possible publication for papers that were presented in the seminar.

Environmental Engineering

Environmental Issues Related to Infrastructure Development

Osaumu Kusakabe　　Ricardo Sigua

【Started from】 FY1999

【Organization】

Japan		Counter country
Japan Society for the Promotion of Science	Funding Agency	Department of Science and Technology
Tokyo Institute of Technology	Core University	University of the Philippines
Dr. Masuo Aizawa・President・Tokyo Institute of Technology	Representative Director	Dr. Emerlinda R. Roman President, University of the Philippines
Dr. Osamu Kusakabe・Professor・Graduate School of Sci. & Eng.・Tokyo Institute of Technology	Coordinator	Dr. Ricardo Sigua・Professor・College of Engineering・UPD
Hokkaido Univ.、 Muroran Inst. of Tech.、Tohoku Univ.、 Utsumoniya Univ、Tsukuba Univ.、 Saitama Univ.、 The Univ. of Tokyo、 Tokyo Maritime Univ.、Hitotsubashi Univ.、 Yokohama National Univ.、Yamanashi Univ.、Nagaoka Univ. of Tech.、 Nagoya Univ.、 Gifu Univ.、Fukui Univ.、 Kyoto Univ.、 Kobe Univ.、Okayama Univ.、 Hiroshima Univ.、Tottori Univ.、Ehime Univ.、Kochi Univ.、Yamaguchi Univ.、 Kyushu Inst. of Tech.、Saga Univ.、Nagasaki Univ.、Kumamoto Univ.、 Ryukyu Univ.、 etc.	Cooperative University	De La Salle University、 Technological University of the Philippines、 University of San Carlos、 Polytechnic University of the Philippines、 University of Northern Philippines 、 Mapua Institute of Technology 、 Central Luzon State University 、 Xavier University 、 University of St. Tomas 、 Adamson University 、 St. Louis University 、 Ateneo-de Naga Universit、 Mindanao State University、 Far Eastern University

【Background & Object of Research】

The natural environment and the various levels of development in the global-, regional-, and city-scale are intertwined in a complicated manner. Development efforts that disregard environmental issues bring about undesirable results and fatal impacts on our future. This research project focuses on the balance and harmony between the environment and infrastructure improvement/upgrade needed for national and urban development. This is a wide field and would involve an interdisciplinary approach and a wide, general and holistic study is essential. This new research field is indispensable and is urgently needed for the further development of Asia, including Japan.

【Research Subject】

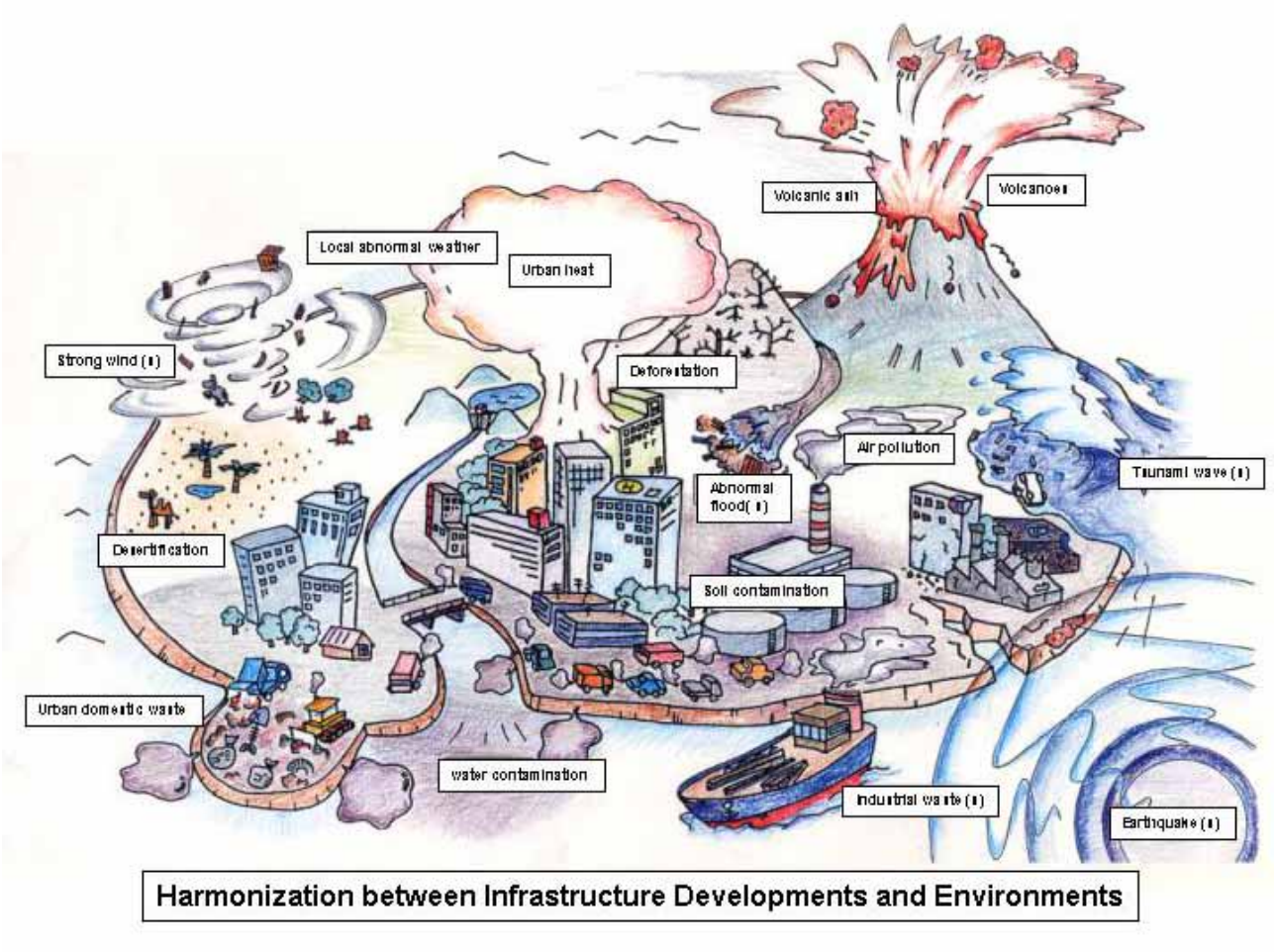
The natural environment and the various levels of development in the global-, regional-, and city-scale are intertwined in a complicated manner. Development efforts that disregard environmental issues bring about undesirable results and fatal impacts on our future. This research project focuses on the balance and harmony between the environment and infrastructure improvement/upgrade needed for national and urban development. This is a wide field and would involve an interdisciplinary approach and a wide, general and holistic study is essential. This new research field is indispensable and is urgently needed for the further development of Asia, including Japan.

【The Result up to the present】

This JSPS core university program is based on the research oriented exchange of researchers and all of exchange plans have to be reviewed by the steering committee and approved. The exchange researchers from Philippines either stay for 3 months (short stay) or 10 months (long stay). This program has already established collaborative research systems and many research projects are going on under this program. The following are some examples.

S-1: Water Pollution in Manila Bay and Laguna Lake system, modeling of Manila Bay and Laguna Lake system, contaminant transport from waste disposal site through clay deposits and simulation of mudflow.
S-2: Impact of transportation policies on air pollution, traffic flow and air pollution, monitoring of NOx and application of GIS in urban ecosystem management,
S-3:Reliability of bridges in Philippine, seismic performance of RC bridge column, slope stabilizing and piles and soil/water coupled resonance to dynamic load
S-4: Light weight concrete using volcano ash of Mt.Pinatubo, application of coal combustion waste in concrete products, integrity evaluation of existing infrastructures and detection of internal defects by various NDE methods

The group S-5, Balance/Harmony Between the Environment and Infrastructure Maintenance/Upgrade will start to integrate all the results obtained by forgoing groups in the fiscal year of 2006.



Harmonization between Infrastructure Developments and Environments

Hiroshi Tsuno Alias Daud

Environmental Science

Establishment of Society Aiming at Zero Discharge and Zero Emission

【Started from】FY2000

【Organization】

Japan		Counter country
Japan Society for the Promotion of Science	Funding Agency	Vice-Chancellors' Council of National Universities in Malaysia
Kyoto University	Core University	University of Malaya
Mituhiko Araki・Dean・Graduate School of Engineering	Representative Director	
Hiroshi Tsuno・Professor・Graduate School of Engineering	Coordinator	Alias Daud ・ Professor ・ Deputy Vice Chancellor
Hokkaido Univ.・grad sch. of eng.、Toyohashi Univ. of Technology・faculty of Eng.、Tottori Univ.・faculty of Eng.、Okayama Univ・research institute of bioresources/ faculty of environmental Sci. and Tech.、Hiroshima Univ.・grad sch. of eng./faculty of economics、Ehime Univ・faculty of eng.、Univ. of Shiga Prefecture・sch. of environmental sci.、Ryukoku Univ・faculty of sci. and tech.、Setsunan Univ・faculty of eng.、Osaka Sangyo Univ.・faculty of Eng.、prefectural Univ. of Kumamoto・faculty of environmental and symbiotic sci. etc.	Cooperative University	University Sains Malaysia、University Putra Malaysia、University Kebangsaan Malaysia 、University Technology Malaysia、University Utara Malaysia、University Malaysia Sarawak、University Malaysia Sabah、International Islamic University、University Technology Mara

【Background & Object of Research】

It becomes a global-scale assignment to establish zero-discharge and zero-emission society for sustainable development and ecological protection as a solution to recent serious global environmental problems. The establishment of this society needs developments of advanced technologies against the environmental problems and proposals of new concept and standards in ethics and economic activities under overcoming differences in developing state, progress levels of science and technology, nature environments and cultures.

Malaysia is located right on the equator and in tropical climates, influenced by Islamic religion and has ethnic diversity. The industries are developing rapidly and people want to enjoy a high quality of life with trying to overcome environmental problems.

The objective of this program is to investigate what would be needed for sustainable development societies and methods and possibilities to establish the society, with collaborating with scientists in Malaysia that is a country with a society totally different from Japan.

【Research Subject】

This program started with 16 research themes in fiscal year 2000. Through focusing and integrating the research topics, the program has been concentrated to 10 research themes as follows now: (1) Environmental Ethics, Regulation and Economy, (2) Water Environmental Planning, (3) Environmental Planning, (4) Environmental Risk management, (5)Water and Wastewater Management and Technologies, (6) Study on the Planning Urban Energy System to Minimize of CO2 and Other Air Pollution in Cities under Different Climate Conditions, (7) Basic Environmental Technology for Zero Discharge (denoted by BETZD)- Solid Waste Management and Incineration, (8) BETZD- Geotechnical and Ecological Environment Management, (9) BETZD- Natural Resources and Energy Management, and (10) BETZD- Development of Passive Design and Technology in Tropical Climate.

【The Result up to the Present】

The major subprograms included in this core university program are cooperative research program, scientist exchange program and seminar program. In the cooperative research program, scientists visit the universities of their cooperative scientists and deliver lectures, exchange their knowledge, and have a meeting to discuss their cooperative researches. About 20 Japanese scientists visited Malaysia for each 6 days and almost the same number of Malaysian scientists visited Japan for each 10 days every year. In scientist exchange program, the representatives, who are the coordinators, the program leaders and the officers of Japanese and Malaysian sides, have meetings and discuss the circumstances, problems and plans to proceed this program smoothly. At the seminars, the cooperative research achievements are presented and discussed. The outcomes of the seminar have been and will be reflected in the next research plans. No seminars were held in FY2000, which was the first year of this program and was spent to know scientists each other. Afterward about 3 seminars were held every year. In FY2003, the 4th year of this program, a comprehensive seminar was held besides a group seminar. The leaders and scientists of all the groups, in total number of around hundred, participated in the seminar, reviewed the circumstances of this program and discussed research achievements in order to encourage new development of research.

In FY2003, booklets introducing the scientists were prepared and delivered to encourage research activities. As ripple effects, some seminars associated with activities of this program were held by the other fund, and Malaysian students are studying in Japanese universities and supervised by the scientists of this program. And construction and establishment of an e-learning system has been started on the base of the activities of this core-universities program.

Prospective achievements are (1) to exemplify environmental ethics and standards of conduct and regulation in the 21st century, (2) to investigate appropriate recycle of resources and reputation system of environmental economics, (3) to clarify process and method of environment-oriented urban design and environmental scheme, (4) to propose image of zero-discharge society and significance of environmental facility, (5) to investigate construction of cyclical use system of resources, (6) to investigate construction of cyclical use system of energy from broad perspective, and (7) to investigate development and practical application of environmental technology in tropical climate.

Table 1 Past Record of Seminars

F.Y.	Seminar Theme	Venue
2001	Water resources Management Development of Passive Design and Technology in Tropical Climate Environmental Ethics and Regulation	Univ. Malaysia Sabah Univ. Sains Malaysia Univ. of Malaya
2002	Integrated Environmental Planning and Management Appropriate Waste Management for Establishing Zero-Discharge System Comparative Health and Eco-systems Risk-Evaluation due to the Micro-Pollutants in an Environment	Univ. Islam Antarabangsa Malaysia Kyoto Univ. Univ. Kebangsaan Malaysia
2003	Planning Urban Energy Comprehensive Seminar	Univ. Teknologi Malaysia Kyoto Univ.
2004	Malaysian-Japanese Workshop on Environmental Education for Sustainability Water & Wastewater Management and Technologies Malaysia-Japan Symposium on Geohazards and Geoenvirommental Engineering : Recent Advance Natural Resources & Energy Environment	Univ. of Malaya Kyoto Univ. Malaysia Bangi Kyoto Univ.

Environmental Science and Technology for the Earth

Environmental Total Technologies for Environmental Creation and Conservation

Michihiko IKE

Pham Hung VIET

【Started from】FY1999

【Organization】

Japan		Counter country
Japan Society for the Promotion of Science	Funding Agency	Vietnamese Academy of Science and Technology
Osaka University	Core University	Vietnam National University, Hanoi
Masao Toyoda・Dean・Graduate School of Engineering	Representative Director	Dao Trong Thi・President・Vietnam National University, Hanoi
Michihiko Ike・Associate Professor・Graduate School of Engineering	Coordinator	Pham Hung Viet・Director・Research Center for Environmental Technology and Sustainable Development
Hokkaido University・Graduate School of Engineering、University of Tokyo・Graduate School of Engineering、Osaka Prefectural University・Graduate School of Engineering、Ehime University・Center for Marine Environmental Studies、Kumamoto University・School of Engineering	Cooperative University	Vietnam National University, HCMC、Hanoi University of Civil Engineering、Hue University、Vietnamese Academy of Science and Technology、Vietnamese Academy of Science and Technology, HCMC、Nong Lam University

【Background & Object of Research】

The purpose of this project is to contribute our fruitful results obtained from cooperative researches to environmental conservation of Asia. The cooperative researches have been conducted by the researchers of the two countries, Japan and Vietnam, who have focused on the development of “Environmental Total Technologies” in order for the people of the area to pursue sustainable development in harmony with nature.

The three main topics, Environmental Monitoring and Assessment, Environmental Creation and Conservation, and Development of Total Environmental Technology, have been selected, and the researches have been established on the topics and been performed for the purposes.

As the structure of the project, Osaka University as the Core University and Hokkaido University, the University of Tokyo, Osaka Prefecture University, Ehime University, and Kumamoto University as cooperative universities join the project from Japan. From Vietnam, Vietnam National University, Hanoi as the Core University and Vietnam National University-HCMC, National Centre for Natural Sciences and Technology, Hue University, and Hanoi University of Civil Engineering join and strengthen the project. In the both countries, the networks of the universities cover the entire lands.

【Research Subject】

Approximately ten researches have been conducted simultaneously all the time, but they have always received reviews, the demand of the society to be reflected. Some, for example, were terminated or revised because the original purposes were achieved. The similar researches that had at the same time were merged, and the researches derived from the existing ones became separate and independent. Nearly 270 researchers have been exchanged under the researches since FY1999. Performing the researches brings merits to the both countries. In

Vietnam, highly accurate and effective researches could be implemented with sophisticated technologies transferred from Japan. For Japanese scientists, it is valuable experiences to feel a spirit of challenge by facing up the environmental problems which are never found in Japan and to feel interests in accumulating “know-how” of transferring technologies overseas.

Photo 1　All the participants to the seminar

【The Result up to the Present】

The major achievements are as follows: “Development and establishment of analytical methods for environmental contaminants”, “Monitoring the POPs, endocrine disrupters and heavy metals to understand the current situation of the pollution and the behavior of these compounds”, “Monitoring the atmospheric pollutants to understand the current situation of the pollution and to construct the risk assessment model”, “Investigation on the current situation of land use, noise problem, change of coastal zone including mangrove forest, groundwater pollution”, “Water treatment technology for nitrogen removal from groundwater”, “Development of the composting process for organic wastes”, “Development of the advanced landfill leachate treatment processes”, “Development of endocrine disrupters treatment technology” and “Isolation and characterization of useful microorganisms for environmental restoration”. These fruitful results contribute to the establishment of precious database on environmental pollution, city planning project, and countermeasure technology for sustainable development.

平成16年（2004年）11月29日（月曜日）　静岡新聞

県立大大学院のトンさん

母国ベトナム 汚染除去に光

澱粉廃液、菌で分解

学会論文賞を受賞

Photo 2　Newspaper article on Dr. Trung Quy Tung's awarded the prize.

We hold general seminar for the exchange and presentation on our research project every other year. In 2004, the 4th general seminar was held at Halong Bay, Vietnam, for the reconfirmation of our whole project to respond to the mid-term evaluation by JSPS (Photo 1). On an individual basis exchanges for the information gathering and planning of the cooperative research have been also actively performed that about 60 researchers have come and gone. Especially exchange of young researchers should be emphasized in its frequency and its fruitful results. Dr. Trung Quy Tung, who had been studying at University of Shizuoka as a Japanese Government Scholar in relation to this project, was awarded the best research paper prize by Japanese Society of Water Treatment Biology in 2004 (Photo 2).

Photo 3　Conferring Ceremony of Vietnamese Government Friendship Medal (Left: Prof. Fujita, Right: Prof. Tanabe)

In 2003, Professor Dr. Masanori Fujita, the previous Japanese side coordinator of this project and Professor Dr. Shinsuke Tanabe, were awarded Vietnamese Government Friendship Medal, in relation to this project (Photo 3). This means that this project is not only the exchange of researchers but is the attention of the whole country.

Tropical Medicine

Analysis of various factors on emergence and re-emergence of tropical infectious diseases and their control strategy


Takagi Masahiro　Nguyen Tran Hien

【Started from】FY2000

【Organization】

Japan		Counter country
Japan Society for the Promotion of Science	Funding Agency	Vietnamese Academy of Science and Technology
Institute of Tropical Medicine, Nagasaki University	Core University	National Institute of Hygiene and Epidemiology (NIHE)
Aoki Yoshiki・Institute of Tropical Medicine・Nagasaki University・Dean & Professor	Representative Director	Nguyen Tran Hien・Director General・NIHE
Takagi Masahiro・Institute of Tropical medicine, Nagasaki University・Professor	Coordinator	Nguyen Tran Hien・Director General・NIHE
Hokkaido Univ.・Graduate School of Medicine／Graduate School of Veterinary Medicine、Univ. of the Ryukyus・Graduate School of Medicine、Kagoshima Univ.・Research Center for the Pacific Islands、Oita Univ.・School of Medicine、Kobe Univ.・Faculty of Health Sciences、National Institute of Infectious Diseases・Dept. of Virology Ⅰ、International Medical Center of Japan・Faculty of Research Institute、Shizuoka Univ.・the Pharmaceutical Department、Niigata Univ.・Graduate School of Medicine	Cooperative University	Pasteur Institute of Ho Chi Minh City、Pasteur Institute of Nhatrang、Institute of Health in Taynguyen、National Institute for Clinical Research & Tropical Medicine、National Institute of Pediatrics、National Institute of Malariology、Parasitology & Entomology、Institute of Geography VAST、Bach Mai Hospital、National Institute of Nutrition、Sub. Department of Animal Health of Ho Chi Minh City

【Background & Object of Research】

Expansion and change of mode of epidemic in various infectious diseases mainly by both of newly emerging pathogens such as SARS and re-emerging ones such as malaria, dengue fever, and so on, have become serious global threat in these days. Large scale changes in natural and social environment such as the global warmth, fast and frequent traveling and trading, and drastic development in countries, which are especially conspicuous in Asia, are likely due to the recent epidemic. Therefore it is undoubtedly necessary to have a collaborative epidemiological study on emerging and re-emerging infectious diseases between developed and developing, and temperate and tropical countries to find out and to establish a global strategy to find new solution for the diseases.

【Research Subject】

Under the main title, “Analysis of various factors on emergence and re-emergence of tropical infectious diseases and their control strategy”, we organized four study groups. The first group is “the mosquito-borne infectious diseases study group”, which focuses on dengue/dengue hemorrhagic fever, Japanese B encephalitis and malaria. The second group is “the acute respiratory infectious diseases group”. The third group, “the intestinal infectious diseases group”, highlights on various soil transmitted helminthes and cholera. The forth group, “the zoonotic infectious diseases group” studies on Hanta virus, Nipah virus, and rabies. All study groups are firstly trying to detect variations in pathogenic agents, intermediate hosts and vectors. Then they search causative environmental factors aiming to establish an effective control strategy against the diseases studied.

【The Result up to the Present】

After the first international seminar held in Nagasaki and preliminary approaches in the first fiscal year in 2000, most research subjects have launched into real productive stage in the second year. Selected results yielded until 2003 are as follows. **Japanese encephalitis:** Virus surveillance has been completed using sentinel pigs in northern Viet Nam from November 2000 to December 2002. It was found that JE virus was circulating year around in the area and the most period was from April to June. Human JE cases also peaked during the period, suggesting that pig sentinel surveillance could provide reliable information on JE virus activities and could be a part of JE surveillance system in northern Vietnam. Another compelling discovery in JE research is the molecular epidemiology on JE virus strains isolated the above sentinel pigs and field-caught mosquitoes. All JE virus isolated during the above period was classified in Genotype I, while old Vietnamese JE viruses were classified in Genotype III. This strongly suggests that virus shift has happened in Viet Nam recently. Further JE virus surveillance is indispensable to clarify the effect of this genotype shift and pathogenesity of the virus in humans. A two years ecological survey on mosquitoes revealed that *Culex gelidus* might be underestimated as a vector. **Dengue/dengue hemorrhagic fever:** A number of dengue virus strains were isolated in southern and northern Vietnam and analyzed using high performance gene analyzers in Institute of Tropical Medicine by Vietnamese researchers from NIHE and Ho Chi Minh Pasteur Institute during year 2002. It turned out that dengue virus strains circulating in Vietnam were locally maintained strains, e.g. dengue 4 viruses isolated in Ho Chi Ming City and a province near Hanoi were classified into new genotype, which is unique only in the country. These results suggested that epidemic dengue virus strains were not transferred for long distance by international transportation such as aircraft as previously expected. It was also noteworthy that dengue virus infected B cells were demonstrated in a child case in Ho Chi Minh Pasteur. This may give us a clue to discover dengue virus target cells in humans. Further analysis of the dengue virus from the case is now underway using virological and cell-biological methods. Seasonal and geographical variations were detected in dorsal scale pattern of Aedes aegypti collected from 8 provinces in Vietnam **Malaria:** An intensive field survey has been conducted in Phurieng village (1) to begin epidemiological study of malaria infection based on the questionnaire related to demography, history of malaria and livelihood of the people in the research area, (2) to begin drug resistant test of malaria parasites, and (3) to collect both the microscopic positive and negative blood samples. Mapping out of houses was successfully completed. Results suggests that this approach is promising to find new aspects of malaria infection in Phurieng. **Acute respiratory infections (ARI):** The group enrolled 95 patients with ARI (mean age: 10.5~10.8 months) and 44 age-matched control patients without ARI. A chest radiograph was taken and bronchial secretion was obtained from each patient by nasopharyngeal swab, and the quantitative culture of bronchial secretion was done. The isolation rate of bacterial pathogens was 51.0% in patients with community-acquired pneumonia (CAP), 34.8% in patients with acute bronchitis (AB) and 20.5% in control (CT) patients, respectively. The isolation rate in CAP, but not in AB, was higher than that in CT. Major pathogens isolated were *S. pneumoniae* and *H. influenzae*. A very high rate of penicillin-resistant *S.pn* was detected. Of forty four strains of *H. influenzae*, 62.8 % were resistant to ampicillin (MIC> 4.0 μg/ml). Most (76.7%) of ampicillin-resistant strains of *H. influenzae* possessed TEM-1 type β-lactamase gene (*bla*). A few strains had *pbp3*-1 mutation, but no pbp3-2 mutation was found. Our data suggest a quantitative culture method using bronchial secretion is a useful tool for the bacterial diagnosis of CAP in pediatric patients, and a high rate of β-lactam antibiotic resistance in major bacterial pathogens of pediatric patients of ARI in Vietnam. Introduction of cost-effective vaccines for children against major bacterial pathogens is required in developing countries as well as industrialized countries. **Cholera** *Vibrio Cholerae* 01 isolated in Vietnam was compared with ones previously collected. Different mechanism in antibiotic resistance was confirmed.

Accelerator Science

(1)Study on Electron Accelerators
(2)Study on elementary particle physics
(3)Study on Synchrotron Radiation Science


Shin-ichi Kurokawa


Zhang Chuang


In Soo Ko

【Started from】 FY2000

【Organization】

Japan		Counter country
Japan Society for the Promotion of Science	Funding Agency	Chinese Academy of Science
High Energy Accelerator Research Organization	Core University	Institute of High Energy Physics
Yoji TOTSUKA・Director・High Energy Accelerator Research Organization	Representative Director	CHEN Hesheng・Director・Institute of High Energy Physics
Shin-ichi KUROKAWA・Professor・High Energy Accelerator Research Organization	Coordinator	ZHANG Chuang・Vice Director・Institute of High Energy Physics
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Counter country		Counter country
	Funding Agency	
Pohang Univ. of Science and Technology・Accelerator Laboratory	Core University	
In Soo Ko・Director・Pohang Univ. of Science and Technology・Accelerator Laboratory	Representative Director	
In Soo Ko・Director・Pohang Univ. of Science and Technology・Accelerator Laboratory	Coordinator	
Pohang Univ. of Science and Technology、Seoul National University、Kyungpook National University、Korea University、YonSei University、Chonnam National University、Chonpook National University、Ewha Womens University、Sungkyunkwan University、Gyeongsang National University、Korea Institute for Advanced study	Cooperative University	

【Background & Object of Research】

Study on electron accelerators and researches using electron accelerators have been making rapid progresses in recent years. In the Asian region, the most advanced studies are done in Japan and China. This Core-University Collaboration started in 2000 between Japan and China to advance accelerator sciences (studies on accelerators itself and researches by the use of accelerators) in both countries by exchange researchers between institutes and by conducting collaborative studies by researchers of both countries. We have witnessed a steady progress and maturity of collaboration during last five years. Notable fact is that we have trained young researchers in the region by having them participate actively in the program.

On the basis of last five-year activities, this Core-University Collaboration has been expended from JFY2005 by including Korea as a partner. We are also preparing to add India as one of our partners. Accelerator sciences are actively pursued in these countries in Asia, namely, Japan, China, Korea, and India. By expanding this Core-University Collaboration including these four countries, we expect to build up a sound foundation for whole Asian collaboration on accelerator sciences.

An electron accelerator is a machine that accelerates electrons up to a high energy. This program deals with electron accelerators with an energy between 1 GeV to a few hundred GeV. Incidentally 1 GeV is a unit of energy that corresponds to the energy that an electron gains when it is accelerated between a gap where a voltage of 1 GV is applied. There exist two types of electron machines: namely, linear accelerators and circular accelerators.

Research fields that use electron accelerators cover a wide range, from elementary particle physics that studies the fundamental constituents of mater and forces between them, to synchrotron radiation science that uses synchrotron light from circular electron accelerators to study matter in the level of atoms and molecules. Usually elementary particle physics study uses electron-positron colliders where high-energy electrons and positrons collide head on.

In 2004 elementary-particle physics society has passed a very important mile stone. In Summer 2004 it was agreed upon among physicists that we would construct an international linear collider (ILC) by world-wide collaboration and that the basic technology we would adopt for the ILC be superconducting cavities. This Core-University Collaboration between Japan, China, Korea , and India will play an important role for the ILC related activities in Asia.

【Research Subject】

The fields of research are categorized into two: the first one is study on electron accelerators themselves, and the other researches using an electron accelerator as a tool. In this program the latter consists of elementary particle physics and synchrotron radiation science. These fields are described below:

(1) Study on Electron Accelerators: We study on the methods how to improve performances of electron accelerators; namely, linear electron-positron colliders (linear collider), ring-type electron-positron colliders, and circular electron storage rings for synchrotron radiation.

(2) Study on elementary particle physics: We make theoretical studies on elementary particle physics for linear colliders and R&D for detectors used in linear colliders. We also perform experimental studies on elementary particles by using circular electron-positron colliders such as B-factory and TauCharm-factory.

(3) Study on Synchrotron Radiation Science: We study structures and functions of matters by using synchrotron light from circular electron accelerators.

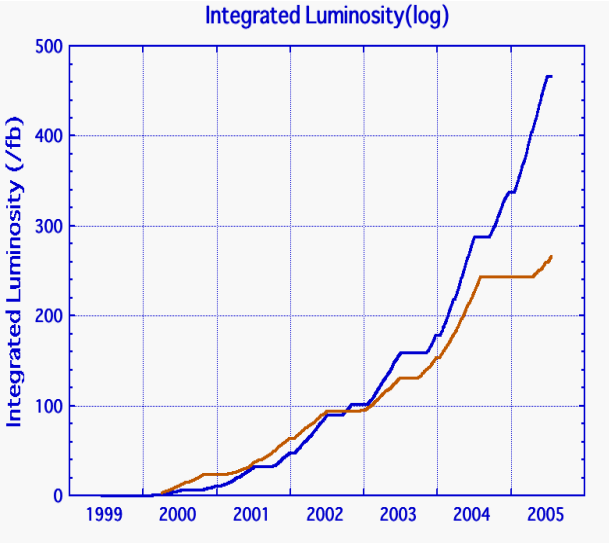

Fig. 1 Increase of the Integrated luminosities of KEKB and PEP-II.

【The Result up to the Present】

This collaborative work is going well and has already produced a lot of results. Below we show some highlights of our achievements.

(1) Study on Electron Accelerators

(1-1) Study on B-factory and TauCharm-factory

In KEK a two-ring, asymmetric-energy, electron-positron collider called KEKB is in operation. This machine produces B-mesons and its anti-particle anti B-mesons copiously like a factory; thus called B-factory. In Beijing at Institute of High Energy Physics there exists a singe-ring, electron-positron collider named BEPC. At KEKB studies on physics of 5th quark (bottom quark) are going on, while at BEPC studies on 4th quark (charm quark) and tau leptons are being performed. In May 2003 B-factory at KEKB has surpassed its design luminosity (luminosity is a measure of performances of colliders) of 10^{34}cm^{-2}s^{-1}. Many Chinese researchers have been participating in improvement and operation of KEKB. Now the peak luminosity of KEKB has reached 1.58 x 10^{34}cm^{-2}s^{-1}, and the accumulated luminosity of BELLE (the experiment of KEKB) has surpassed 467/fb. These numbers are by 1.7 times as large as those at PEP-II and its experiment BaBar at Stanford Linear Accelerator Center. Figure 1 summarizes the integrated increase of the luminosity of KEKB and PEP-II.

Studies on electron cloud instabilities that are the most serious instabilities for B-factory have been continuously done as Japan-China collaboration. This collaboration has made great achievements and showed that a) these electron cloud instabilities are easily excited in positron storage rings by experiments using BEPC, and b) solenoid field superimposed on vacuum ducts of positron rings can suppress these instabilities effectively by experiments at KEKB.

Fig. 2 R&D work on superconducting cavity conducted by Chinese researchers at KEK

From 2003 IHEP has started construction of BEPC-II, which modifies the present BEPC into two-ring colliders. This machine can produce copious charm quarks and tau leptons; thus called Tau Charm Factory. Various collaborative works such as development of superconducting cavities for BEPC-II are going on. Two superconducting cavities made by Japanese companies have been already delivered to IHEP. During the fabrication of these cavities Chinese researchers checked every step of fabrication and also measured the performances of the cavities at KEK as one of the collaboration under this Core-University Collaboration program. By this way superconducting cavity technology has been successfully transferred to China. (see Fig. 2)

(1-2) Study on Linear Collider

KEK has a facility called ATF (Accelerator Test Facility), where study on realization of ultra-small emittance is being performed by an international collaboration with many Chinese participants. This ultra-small emittance is of vital importance to achieve design luminosity at linear colliders. The ATF collaboration has already achieved the emittance to the level necessary for linear colliders. Incidentally the emittance is a measure of the beam size in an acclerartor, and small emittance means a sharp beam.

In this field whole-Asian wide collaboration on ATF-II (upgrade plan of ATF) and superconducting cavity technology will become vigorously activated.

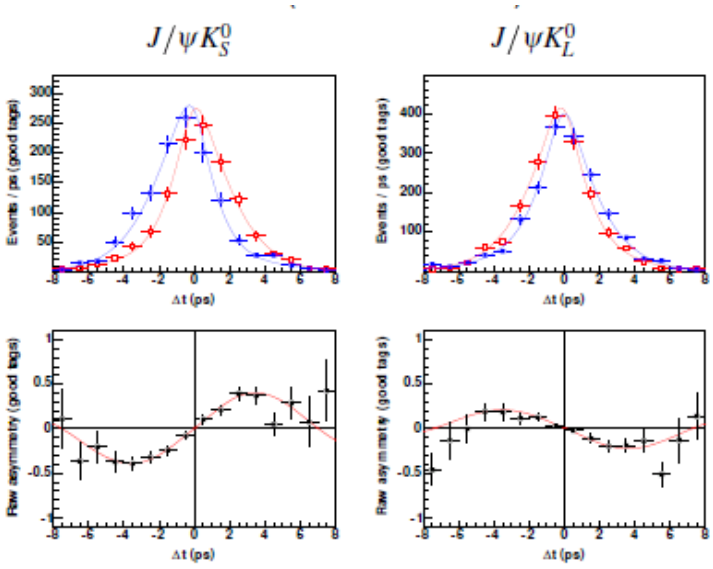

Fig. 3 The most recent result of the CP-violation result of BELLE $\sin 2\phi_1 = 0.652 \pm 0.039 \pm 0.020$

(2) Study on Elementary Particle Physics

At KEKB an experiment called BELLE is running. The main theme of this experiment is to discover and measure the CP-violation at bottom quarks. The CP-violation is a subtle difference of the behavior between particle and anti-particle. When our universe was created it is believed that the equal number of particles and anti-particles existed. During the evolution of the universe anti-particles have disappeared by the effect of the CP-violation. The BELLE experiment, therefore, tries to make it clear why our universe only consists of particles, one of the most important problems of elementary particle physics.

In 2001 BELLE succeeded in detecting the CP-violation at bottom quarks. The first discovery of the CP-violation was made in 1964 at K-mesons. After this discovery many physicists tried to find the CP-violation in other place in vain for nearly 40 years. Indeed the discovery by BELLE is a one of the greatest achievements in elementary particle physics in these 10 years.

The measured value of the CP-violation is quite close to that predicted by Kobayashi-Masukawa theory. Many Asian physicists including many Chinese participate in BELLE. It is notable a few Chinese graduate students are doing their PhD study at BELLE. Fig.3 shows the most recent result of the CP-violation..

Chinese group is not only actively participating in the above-mentioned CP-violation study but also pursuing their own physics theme. One example is a search for D^0 anti-D^0 mixing which is a phenomenon where a charm quark changes into an anti-charm quark in vacuum and thought to be very rare in the frame work of the standard model.

If this mixing is detected, it will give us a good clue to new physics. Another example is a search for $B \rightarrow J/\psi \Lambda p$ decay, which is an important subject to search for glueballs conjectured in QCD(Quantum Chromodynamics Theory).

The elementary physics study in this Core-University Collaboration is not limited in BELLE but study is going on at BES (Beijing Spectrometer) of BEPC. BES has already accumulated enormous amount of J/ψ data (58 M). By using data of BES, Japanese group has first identified σ particle, and then κ particle in $K\pi$ resonance. The latter was so difficult and has denied world-wide efforts of physicists during these 40 years. Japanese group together with Chinese group found that the difficulty came from the cancellation of resonance amplitude and other background amplitudes and developed a new method of analysis. This has lead to the identification of κ and determination of its mass and width. This achievement is highly appreciated as a remarkable result by China-Japan joint collaboration.

(3) Study on Synchrotron Radiation Science

There exist two running synchrotron radiation accelerators in China: the first one is 800 MeV Hefei Light Source and the other 2.5 GeV BSRF (Beijing Synnchrotron Radiation Facility). When BEPC is operated in synchrotron radiation mode it is called BSRF. Exchange of researchers are active between these facilities and Japanese facilities.

The 3rd generation synchrotron light source project called Shanghai Light Source has started its construction in 2005. Collaborative study on detectors and beamlines for Shanghai Light Source is going on..

At BSRF, two in-vacuum undulators were fabricated and installed in the ring with a strong help from KEK. These undulators are working well and have become strong tools of the BSRF. In addition to these undulators KEK helped IHEP to construct an X-ray beamline for protein structure analysis. One of the remarkable result of this beamline is the structure analysis of SARS virus, the photo of its structure was shown in Fig. 4.

Fig. 4 Structure of SARS virus determined by light source experiment

COASTAL OCEANOGRAPHY

1. Water circulation and the material transport process in the coastal areas and marginal seas of the East and Southeast Asia
2. Ecology and Oceanography of Harmful Marine Microalgae
3. Biodiversity studies in the coastal waters of the eastern and the southeastern Asia
4. Pollution of hazardous chemicals in the coastal marine environment and their ecological effect






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【Started from】FY2001

【Organization】

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Japan Society for the Promotion of Science	Funding Agency	Indonesian Institute of Science
Ocean Research Institute・The University of Tokyo	Core University	Research and Development Center for Oceanology・Indonesian Institute of Sciences (LIPI)
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Katsumi Tsukamoto・Director/Professor, Center for International Cooperation, Ocean Research Institute・The University of Tokyo	Coordinator	Ono Kurnaen Sumadhiharga・Director・Research and Development Center for Oceanology・LIPI
Kyushu University、Asian Natural Environmental Science Center、National Science Museum、Kitazato University、Kyoto University	Cooperative University	Sam Ratulangi University、Bogor Agricultural University、Diponegoro University

Counter country		Counter country
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Counter country		Counter country
Department of Science and Technology	Funding Agency	National Centre for Natural Science and Technology
University of the Philippines	Core University	Institute of Marine Environment and Resources
	Representative Director	
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【Background & Object of Research】

More than three billion people live in the East Asia and South East Asia region and 70 percent of the population inhabits the coastal areas, which gives a serious impact on ecosystem and biodiversity in these areas. The living resources of these coastal areas are an extremely important source of food throughout the region. Therefore, the sustainable development and utilization of the coastal zone is one of the most important socio-economic issues which this part of the world faces now.

Recently, the rapid development of industry and the tendency of the population to move into the urban areas along the coast have had a devastating impact on the environmental conditions in the coastal zone. This has also caused Red Tides, which are related to eutrophication and pollution by hazardous chemicals such as heavy metals, organochlorines , and organotins. Mangrove areas, coral reefs and sea grass beds in these coastal areas are essential habitats for many important marine organisms such as fish, shrimp and their larvae, and these habitats can be easily destroyed by sedimentation and land-based pollution. The populations of many marine species including sea turtles, dugongs, and corals are also decreasing year by year throughout the South East Asian waters, which are famous for having the richest biodiversity in the world. Therefore, comprehensive research on the ecology of coastal areas including interdisciplinary studies on physical and chemical oceanography, and on the biology of the marine organisms found there are indispensable.

This five-year research program on the following four projects, which have attracted a great deal of attention among all IOC/WESTPAC programs, has been carried out since the fiscal year 2001, by Japanese scientists, playing a central role, and their counterparts in Indonesia, Malaysia, Thailand, Philippines and Vietnam.

【Research Subject】

Project 1: *Water circulation and the process of material transport in the coastal areas and marginal seas of the East and Southeast Asia*

Marine pollution is a serious social problem caused by the rapid development of industry in the wide coastal waters of the South East region (from Philippines to Indonesia). We intend to develop a new system to investigate oceanic conditions in wide coastal areas by utilizing satellite images under the close cooperation among all scientists concerned in member countries. We also make observations along the main coastal areas using research vessels and by analyzing both data collected from the satellite and those vessels, we try to develop the ecosystem models in order to analyze quantitatively the process of material transport in the coastal waters of each country.

Project 2: *Ecology and Oceanography of Harmful Marine Microalgae*

Frequent occurrence of Red Tide phenomena caused by the eutrophication of coastal waters was a serious social problem in Japan in the 1970's. Recently, the same phenomena were observed in coastal waters of other Asian nations in line with the progress of the eutrophication and those countries have asked Japan to make a joint research on this issue. It was reported that many harmful microalgae involved food poisoning and occasionally deaths of human beings in these regions. Ecological study and toxic analyses of harmful microalgae including environmental surveys, is very important for the prediction and prevention of Red Tide and food poisoning.

Project 3: *Biodiversity Studies in the coastal waters of the East and Southeast Asia*

The South East Asian waters are famous for having the richest biodiversity in the world. But the habitats of many marine organisms are shrinking year by year as results of the environmental destroy and pollutions caused by the rapid development of coastal zone. Geographical distribution of biodiversity in this region has been studied by Asian and Japanese scientists. Long-term variation of diversity has also been traced to compare the future condition with the present one.

Project 4: *Pollution of hazardous chemicals in the coastal marine environment and their ecological effect*

Recently, marine coastal ecosystem was damaged seriously by the pollutions of hazardous chemicals which were caused by rapid development of industry and tendency of the population movement into the urban areas along the coast. Furthermore, toxic materials including dioxin were produced through incineration of waste and

garbage in the big cities, which have given a seriously harmful impact on health of people who live there. In accordance with a continuous technical training of analytical methods for hazardous chemicals, pollution survey in the coastal waters of each country is carried out and basic data related to the pollution are also gathered. Long-term monitoring systems of the environment are to be established to prevent the pollution.

【The Result up to the Present】

The Ocean Research Institute of Tokyo Univ. has carried out a lot of joint researches with Indonesia, Thailand and Malaysia under the Core University Program since 1988. This project was integrated into one Multilateral Cooperative Program titled "Coastal Oceanography"and it has been working since 2001 with two new member nations, Philippines and Vietnam. Scientists of the member countries have been operating four above-mentioned important projects to prevent further environmental destroy in close cooperation with each other. Since the beginning of this program, field surveys, workshops to establish effective research methods and international standard for analyzing methods and seminars to report the research results and to exchange information were conducted and achieved a big success. The followings are the outline of each project.

＜Project-1＞

New methodology to investigate complex coastal water masses by utilizing satellite image analyzing system was developed by Asian and Japanese scientists at annual workshops held at Fukuoka(2001-2004). In these workshops, we have developed fundamental mathematical model and ecological model by also using observation data collected on research vessels.

<Project-2>

The life history of Red Tide plankton in the Gulf of Thailand was clarified. We succeeded in making up ELISA kit to detect shellfish poison and the analyses of poison volume were carried out in each member country. Toxic elements that caused food poisoning by harmful algae were found out. A guidebook concerning harmful algae was published and distributed to each member country for the education of young scientists. In order to achieve a technical standardization of monitoring of paralytic shellfish poison and shellfish poison causing memory loss、a workshop was held in Vietnam(2004). In particular, diatom similar to *Nitzschia* was collected as a sample from the coastal areas around the Manila Bay and physiological and ecological research is currently proceeding in order to find out the mechanism of production of shellfish poison causing memory loss.

<Project-3>

Field surveys for the biodiversity of marine organisms were carried out in the Sulu Sea (2002) and in the Indonesian waters(2001-2004) by Asian and Japanese scientists during joint research cruises using the Japanese and Indonesian research ships. Workshops on sampling methods, preservation of samples, and the taxonomy of the major marine taxa for the advance of biodiversity research in the South East regions, were carried out in Tokyo (2001), Malaysia(2002), Thailand(2003) and Philippines(2004) and at the same time field surveys were carried out. Field guidebooks on algae and on fish taxonomy were published and distributed to relevant organizations of member nations.

<Project-4>

A workshop on the analytical methods for measuring heavy metals, organochlorines, and organotins in water and sediment was carried out in Thailand in 2002 and at that time the unified international analytical standard was established. Since then the joint research has been made in the Thailand Bay (2003) and the Manila Bay(2004) in order to analyze the seasonal change of toxic chemicals in the coastal areas, making a careful reference to the analytical data of each chemical collected by scientists specialized in the respective field. Investigations on pollution caused by mercury which is used in the process of refining at the gold mine in Manado, Indonesia and dioxin pollution in the garbage incineration facilities in such big cities as Bangkok and Manila are now proceeding. At the same time, data and information are being collected in view of the impact of these pollutions on human bodies.

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Maketab Mohamed and Shigeo Fujii	Measurements of critical parameters in water quality modeling	Proc. of the 2nd Seminar on Water & Wastewater Management and Technologies	111-116	Dec. 2004
Rakmi Abdul Rahman, Hiroshi Tsuno and Khor Mey Chea	Removal of nutrients and recalcitrant organics in river water treatment	ditto	33-40	Dec. 2004
Hidehiko NISHIMURA, Masahiro TSUJI, Shuichi HOKOI and Toshiaki NISHIOKA	A Survey on Energy Consumption and Thermal Environment and Analysis of Thermal Environment in a Densely Populated Urban Area	Proc. of Development of Passive Solar Design and Technology in Tropical Climates Seminar	71-85	Nov. 2001
Saburo Matusi and M. Watanabe	A Practical approach of Precautionary Principle in the Communication between Industries and Environment, Cosumer Organizations in Japan	Proc. of JSPS-VCC Workshop Environmental Education for Sustainablility		Sept. 2004
Norio OKADA	A new Research Perspective Integrated Management for Disaster and Environmental Risk	Proceedings of seminar on Water Environmental Planning	31-43	Oct 2002
Ryouichi Kitamura, Akira Kikuchk, Satoshi Fujii and Toshiyuki Yamamoto	Micro-simulation System: Its Development, Extension and Application to Demand Forecasting	ditto	47-66	Oct 2002
Satoshi MIZUTANI, Nobuhisa WATANABE, and Hiroshi TAKATSUKI	Stabilization/Solidification of Heavy Metals in MSWI Fly Ash in Japan	Proc. of Seminar on Appropriate Waste Management for Establishing Zero Discharge System	17-21	Oct. 2002
Masashi Kamon,	Waste containment and remediation of contaminated sites	Proc. of the Malaysian-Japan Symposium on Geohazards and Geoenvironmental Engineering Recent Advances	1-12	Dec. 2004
Ichirou Oonishi, Aki Nakayama and Shinsuke Morisawa	Benzene Metabolites Using Human Lymphoblast Cells	Proc. of Environmental Toxicity Evaluation and Risk Management Seminar	20-28	Nov. 2002
Yuzuru MATSUOKA and Hiromi Nishimoto	Evaluation of the Influence on Japanese Economy by Carbon Taxes	Proc. of seminar on planning of urban energy system	1-10	Sept. 2003
A. Mohammadi, M. Shioji, T.Ishiyama and M. Kitazaki	Utilization of Low-Calorific Gaseous Fuelin a Direct-Injection Diesel Engine	Proc. Natural Resources & Energy Environment	183-190	Sept. 2004

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