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The Annual Report is published to record the activity of the International Center for Biotechnology (ICBiotech) and issued once in each fiscal year. It contains scientific articles, progress reports, letters, and announcement from the Center. This volume includes publications by the former participants in UNESCO courses. The editor welcomes the submission of appropriate articles from all persons who are concerned with the activity of the Center. All the contributions, however, will be reviewed by editors before their acceptance. The scientific paper herein should be treated as personal communications and not treated as original publications. The Annual Report is distributed upon request to the International Center for Biotechnology, Osaka University, 2-1 Yamadaoka, Suita, Osaka 565-0871, Japan (e-mail: info_icbio@icb.osaka-u.ac.jp).

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ACTIVITIES OF ICBiotech

ACTIVITIES OF INTERNATIONAL CENTER FOR BIOTECHNOLOGY FOR FY 2021

The International Center for Biotechnology (ICBiotech) was founded in April 1995 as an independent institute in Osaka University with a mission to pursue academic advancement and collaborative research in biotechnology. ICBiotech has its origin from the "International Center of Cooperative Research Center in Microbial Engineering Japan (ICME)" which was established in the Faculty of Engineering, Osaka University in April 1978, through renaming to "International Center of Cooperative Research in Biotechnology (ICBiotech)" in April 1985 with the recognition of the wide acceptance and success of ICME's activities and achievements.

ICBiotech is dedicated to promote international cooperation among Asian countries in the aspects of research and educational advancement in the field of Biotechnology by propelling academic interactions in Asian countries, and is committed to industrial biotechnology studies by means of microbial engineering and related sciences, focusing on the sustainable utilization of abundant natural resources in Southeast Asian countries.

ICBiotech serves as the seat of education and research in Asia, with the support of the Ministry of Education, Culture, Sports, Science and Technology (Monbu-kagaku-sho, MEXT), the Japan Science and Technology Agency (JST), the Japan Student Service Organization (JASSO) and the Japan International Cooperation Agency (JICA), in cooperation with the Department of Biotechnology, Graduate School of Engineering, Osaka University, as well as researchers from prestigious universities nationwide and abroad.

In 2002 Cooperative Research Station (CRS) in Southeast Asia and Mahidol University-Osaka University Collaborative Research Center for Bioscience and Biotechnology (MU-OU:CRC) were set up at Faculty of Science, Mahidol University in Thailand as a collaborative research center to accomplish multidisciplinary research in the field of Bioscience and Biotechnology.

The activities of the ICBiotech include:

1. Research and Education

The main area of research is industrial biotechnology rooted in microbial engineering, whilst centering on the sustainable use of agricultural and forest resources in bioresource-rich countries such as those in Southeast Asia. Research is underway in the field of cell engineering with the objectives of analyzing the cellular functions of bacteria, fungi and plants, and developing and using functions of these cells for management and rational use of biological resources that exist on our planet. ICBiotech covers three areas of Bio-technology:

1) Discovery of new functions from biological resources.
2) Bio-conversion and process engineering of biological resources.
3) Conservation of biological resources.

For under graduate and post graduate courses, ICBiotech is involved in the education activities of Department of Biotechnology, Graduate School of Engineering as collabo-rating laboratories and currently covers several fields of biotechnology in education and research: Applied Microbiology Laboratory chaired by Prof. FUJIYAMA Kazuhito and Molecular Microbiology laboratory chaired by Prof. HONDA Kohsuke.

2. Participating in FrontierLab@OsakaU 'Scientific Empowerment Program for International Students' which was created for international students to conduct thematic studies and achieve results under the guidance of supervisors while acquiring skills necessary for continuing research in one of Osaka University's internationally renowned science and technology laboratories for a period of up to 12 months.

3. Acting as collaborating laboratories with Department of Biotechnology, Graduate School of Engineering, Osaka University for 'Biotechnology Global Human Resource Development Program for Industry-University Co-Creation'. The aim of this program is to expose graduate students (privately financed as well as the Japanese Government Scholarship students) to state-of-the-art research skills and in-depth knowledge of advanced biology to harness the potential of biotechnology.

4. Having been administrating and implementing the "UNESCO Biotechnology School in Asia" (2012-2016) at Department of Biotechnology, Graduate School of Engineering, Osaka University, taking over the long-termed "International Post-Graduate University Course in Microbiology" (1972-2003) and Postgraduate Inter-University Course in Biotechnology (2004-2007) with total of 459 alumni spreading all over Asia.

5. Having been serving as the secretariat for the UNESCO Regional Network for Microbiology and Biotechnology in Southeast Asia in accordance with a proposed memorandum resulting from a Consortium Meeting of the Project "Tropical Bio-Resources and Green Chemistry Strategy" (Osaka 2003).

6. Working as a member of the global network "Microbiological Resource Centers" (MIRCENs) operated by UNEP, UNESCO and ICRO; and as an original member of the "Regional Network for Microbiology in Southeast Asia" operated under the auspices of UNESCO through the Fund-In-Trust of the Japanese Government (J-FIT).

7. Promoting international cooperative researches in biotechnology with the Southeast Asian countries related to Biotechnology, under the support of Monbu-kagaku-sho Grant-in-Aids for International Scientific Research. In addition, ICBiotech cooperates in developing international organization and conducting academic seminars related to biotechnology.

8. Implementing Student Exchange Support Program with the support of JASSO. Under the program, graduate students of Osaka University are sent to Thai four universities for a field study program named "Bio-resource & environment", and graduate students of Thailand and ASEAN countries are invited to Osaka University for lab study programs named "Bio-industry & bio-diversity" as well as "ASEAN Biotechnology School", all for about 5 weeks.

9. Inviting Asian students through Sakura Science Plan (SAKURA SCIENCE Exchange Program) of JST to introduce and offer experiences in Japanese science and techonology. By exchanging ideas among the participants, the Plan aims to support the development of talented people overseas who have the potential to contribute to innovation in science and technology and support continuous interaction between Japan and other countries; to

promote globalization of Japanese education and research institutes; to strengthen good relationship between Japan and other countries.

10. Accepting graduate students of JICA partner schools in Asian countries to provide an internship with the support of JICA Innovative Asia Program that aims to enhance the circulation of capable young personnel between Japan and Asian countries and to promote innovation in the whole Asia.

11. Implementing Plant Biotech Program with the University of California, Davis, that enhances cooperation between the two universities to promote healthy and sustainable planet by exploring the intersectionality of biology and engineering.

12. Promoting ASEAN Campus Project organized by Osaka University that aims at contributing to "Quality Growth" and the development of high-level global human resources for the next generation in ASEAN countries and Japan.

13. Periodical publishing of Annual Reports of ICBiotech.

STEERING COMMITTEE

Chairman	Prof. FUJIYAMA Kazuhito (Director of ICBiotech)
Committee Members	Prof. HONDA Kohsuke (International Center for Biotechnology)
	Prof. ARAI Masayoshi (Graduate School of Pharmaceutical Sciences)
	Prof. FUKUSAKI Eiichiro (Graduate School of Engineering)
	Prof. WATANABE Hajime (Graduate School of Engineering)
	Prof. TOBISU Mamoru (Graduate School of Engineering)
	Prof. UMAKOSHI Hiroshi (Graduate School of Engineering Science)
	Prof. IIDA Tetsuya (Research Institute for Microbial Diseases)
	Prof. KURISU Genji (Institute for Protein Research)

STAFF

Director/Professor	Dr. FUJIYAMA Kazuhito
Professor	Dr. HONDA Kohsuke
Adjunct Professor	Dr. IKE Michihiko (Division of Sustainable Energy and Environmental Engineering, Graduate School of Engineering, Osaka University)
Collaborative Professor	Dr. Watanalai PANBANGRED (Mahidol University, Thailand)
	Dr. Irfan Dwidya PRIJAMBADA (Universitas Gadjah Mada, Indonesia)
	Dr. Raymond L. RODRIGUEZ (University of California-Davis, USA)
	Dr. Choowong AUESUKAREE (Mahidol University, Thailand)
Guest Professor	Dr. YOSHIDA Toshiomi (Prof. Emer., Osaka University)
	Dr. SEKI Tatsuji (Prof. Emer., Osaka University)
	Mr. TAYAMA Junji (Osaka University)
	Mr. KANEKO Yoshinobu (Osaka University)
	Dr. NAKAYAMA Jiro (Kyushu University)
Associate Professor	Dr. KITANI Shigeru
	Dr. MISAKI Ryo
Adjunct Associate Professor	Dr. SUMIMURA Yoshinori (Center for Global Initiatives, Osaka University)
Guest Associate Professor	Dr. KATAOKA Masakazu (Shinshu University)
	Dr. OHASHI Takao (Setsunan University)
	Dr. YUMIOKA Hitomi (Osaka Seikei College)
Assistant Professor	Dr. KAJIURA Hiroyuki
	Dr. OKANO Kenji
Visiting Academic Staff	Dr. HO Phu Ha (Associate Professor, Hanoi University of Science and Technology, Vietnam) Specially Appointed Associate Professor under the Cross-appointment Agreement
	Dr. Marie Christine Merca OBUSAN (Assistant Professor, Institute of Biology, University of the Philippines Dilman, Philippines) Specially Appointed Assistant Professor under the Cross-appointment Agreement
Administrative Official	Ms. ARAKI Megumi
Administrative Assistant	Ms. TOMOMATSU Fumiko
	Ms. YAMASHITA Keiko
Technical Assistant	Ms. KAWAKAMI Shizuka
	Ms. KIKUCHI Terumi
	Ms. ITADANI Akiko

I. COOPERATIVE RESEARCH STATION (CRS) IN SOUTHEAST ASIA

The ICBiotech, Osaka University launched out the Cooperative Research Station (CRS) in Southeast Asia at Chalermprakiat Building, Faculty of Science, Mahidol University in 2002 through the generous support by Mahidol University. The CRS's space and equipments are made available for Southeast Asian and Japanese researchers to undertake cooperative onsite researches on the development of the abundant natural biological and genetic resources and their sustainable utilization in Southeast Asian countries through JSPS core university program (ended in 2005), JST Special Coordination Funds for Promoting Science and Technology (2006-2009) and JSPS Asian CORE Program (2009-2014). The CRS also functioned as a lecturing and research station of the UNESCO International Post-graduate Inter-University program, which Osaka University operated in coordination with Thai universities. The CRS is considering support to the alumni of Osaka University and provision of university information for recruitment of students for study in Osaka University. Moreover, the CRS has become the base for the research at the DDP program with Mahidol University.

Mahidol University (MU) and Osaka University (OU) together established the Mahidol University-Osaka University Collaborative Research Center (MU-OU:CRC) for Bioscience and Biotechnology at Faculty of Science, Mahidol University in 2002, to strengthen the research cooperation in these fields which are amongst the most active fields of study and research in both universities.

Currently, MU-OU:CRC has coordinated a research projects under the jointly support of National Research Council of Thailand (NRCT), National Center for Genetic Engineering and Biotechnology (BIOTEC) and The Japan Society for the Promotion of Science (JSPS). Researchers from Mahidol University, Chulalongkorn University, Kasetsart University, King Mongkut's University of Technology Thonburi and BIOTEC participate in this project.

CRS is conducting researches on:

1. Degrading enzymes.
2. Cell culture system for screening of bioactive compounds from Streptomycetes and environmental fungi.
3. Quorum sensing interference: Novel biocontrol strategies for pathogenic bacteria.

In addition to above, CRS has been taking care of graduate students of Osaka University sent to Thai universities and Thai graduate students sent to Osaka University under the JASSO Student Exchange Support Program (details in Chapter Ⅲ) from FY2011. (For FY2020 and FY2021, this program was canceld due to COVID-19).

II. WORKSHOP

“Job Search Seminar for Biotechnology Companies in Japan”

January 25th , 2022 (17:30 - 19:30)

International Center for Biotechnology, Osaka University

Organized by International Center for Biotechnology and Career Center, Osaka University
Co-organized by; Intelligent Agri-engineering Division, Osaka University, GSE-OU,

We, International Center for Biotechnology (ICBiotech) held "Job Search Seminar for Biotechnology Companies in Japan" online.

International students and young researchers who are studying biotechnology at Osaka University joined the seminar and learned about the R&D activity of Biotechnology Companies to consider about their career path in the relevant industrial field.

Five Biotechnology companies, Amano Enzyme Inc., Ezaki Glico Co., Ltd., ROHTO Pharmaceutical Co., Ltd., Saraya Co., Ltd., YAEGAKI Biotechnology, Inc., and 45 international students have joined the seminar.

17:30-17:35	Opening remark
17:35-17:40	Explanation.
17:40-18:05	Breakout Room Session 1
18:07-18:32	Breakout Room Session 1
18:34-18:59	Breakout Room Session 1
19:01-19:24	Breakout Room Session 1
19:25-19:30	Closing remark

III. JASSO STUDENT EXCHANGE SUPPORT PROGRAM
Scholarship for Short Stay/ Short Visit Program (SSSV)

(This program was canceled due to COVID-19.)

This is a field study program jointly operated with several universities in Thailand and 3 ASEAN countries. In 2021, 23 first year students of the master's course of Osaka University was supposed to visit 4 universities in Thailand between August 8 and September 11, and 11 postgraduate students from Thailand was supposed to visit Osaka University between November 8 and December 12, 2021, which enhanced mutual interactions.

IV. JST JAPAN-ASIA YOUTH EXCHANGE PROGRAM IN SCIENCE (SAKURA Exchange Program in Science)

(This program was held online.)

Purpose of the Program: Promoting science and technology is a key engine to materialize a bright future of Asia and it is vitally important to enhance the exchange of youths in Asian countries and Japan who will play a crucial role in the field of science and technology. Based on this concept, "Japan-Asia Youth Exchange Program in Science" (SAKURA Exchange Program in Science) is the program for enhancing exchanges between Asia and Japan of the youths who will play a crucial role in the future field of science and technology through the close collaboration of industry-academia-government by facilitating short-term visits of competent Asian youths to Japan. This program aims at raising the interest of Asian youths toward the leading Japanese science and technologies at Japanese universities, research institutions and private companies.

List of Countries and Number of Participants

(Online Lecture) Dates: November 15 and 16				(Student Meetup) Date: November 16			
Brunei	31	Mongolia	30	Brunei	14	Mongolia	7
Cambodia	9	Laos	3	Cambodia	9	Laos	8
Indonesia	30	Taiwan	3	Indonesia	30	Taiwan	3
Malaysia	9	Total	115	Malaysia	7	Total	78

V. SCIENTIST EXCHANGES

Record of Scientist Exchange (FY2021)

NO SCIENTIST EXCHANGES in FY2021 due to COVID-19.

From ICBiotech to counterpart countries / From counterpart countries to ICBiotech

VI. GUESTS/VISITORS

*Please contact us for more information.

VII. ONLINE SEMINARS AND SYMPOSIUMS

Date	Title	Lecturer/University
21.6.16	Symposium: Development of Green Technology for a Sustainable Society	Universitas Brawijaya
21.7.15	Seminar: Heredity and Environment This seminar is held in Japanese only.	Dr. TAKAGI Atsuko, a visiting researcher of ICBiotech
21.11.10	Symposium: Plant Cell Bioprocessing of Human Growth Factors and Other Bioactive Proteins	University of California, Davis Kirin Holdings Co. Ltd.
21.12.3	Symposium: THE 2nd GREEN SYMPOSIUM ENZYMATIC FOR BIOMASS DEGRADATION, IMMOBILIZATION AND APPLICATIONS	Universitas Airlangga
21.12.14	Seminar: Structure and function of gut microbiome of Asians associated with foods and host health	Prof. NAKAYAMA Jiro (Kyushu University, Guest Professor/ICBiotech)
21.12.15	Seminar: Life dynamics: New insight through intracellular pH	Assoc. Prof. KATAOKA Masakazu (Shinshu University, Guest Associate Professor/ICBiotech)
22.1.20	Seminar: Bridging the macro and micro: microbial interactions of earthworms and marine mammals of the Philippines	Assit. Prof. Marie Christine Merca OBUSAN (University of the Philippines Dilman, Philippines), Specially Appointed Assistant Professor under the Cross-appointment Agreement
22.1.25	Seminar: Purification, antibody productions of disease-related enzymes, and clinical application of their antibodies	Dr. IKEDA Yasuyuki, a visiting researcher of ICBiotech
22.2.7	Online symposium	RWTH Aachen

VIII. STEERING COMMITTEE MEETING 2021

Steering Committee Meetings of ICBiotech were convened as follows:

・February 18, 2022 Report on:

*Exchange of professors and students
*Retirement of professors of ICBiotch
Dr. KITANI Shigeru (Associate Prof.)
Dr. OKANO Kenji (Assistant Prof.)
*Commission about adjunct professors of ICBiotech
*Online workshop “Job Search Seminar for Biotechnology Companies in Japan”
*Concluding MOU: University of California Davis, U.S.A.
*Visiting of Senior Executive Vice President

Discussion on:
*Promotion of Associate Professor of the Laboratory of Applied Microbiology
Dr. MISAKI Ryo

*Employment of Specially Appointed Professor of the Laboratory of Molecular Microbiology
Dr. MIYAZAKI Kentaro
*The change of accepting term of two full-time specially appointed associate professor under the Cross appointment Agreements
Dr. Ho Phu Ha (December 01, 2020 - March 31, 2023)
Dr. Marie Christine Merca OBUSAN (May 01, 2021 - March 31, 2023)
*Concluding two cross appointment agreements to employ a full-time specially appointed associate professor
*Conferring the title of Collaborative Professors from abroad for FY2022
Prof. Watanalai PANBANGRED
Prof. Irfan Dwidya PRIJAMBADA
Emer. Prof. Raymond L. RODRIGUEZ
Assoc. Prof. Choowong AUESUKAREE
*Inviting Visiting Professors from Japanese universities for FY2022
Emer. Prof. YOSHIDA Toshiomi
Emer. Prof. SEKI Tatsuji
Mr. TAYAMA Junji
Prof. ISHII Massharu
Prof. KIMURA Yoshinobu
Prof. SUZUKI Nobuaki
Prof. KITANI Shigeru
Assoc. Prof. OHASHI Takao
Assoc. Prof. OKANO Kenji
*Research systems about new organization

・March 18, 2022 Discussion on:
*Establishment of Regulations of ICBiotech Industry-Academia-Government Cooperation Committee.
*Election of above Committee members