



JST and BRIN (Indonesia) jointly to fund five research projects in the “Bioproduction” field under the NEXUS program

The Japan Science and Technology Agency (JST) has approved funding for five new international joint research projects under the framework of Networked Exchange, United Strength for Stronger Partnerships between Japan and ASEAN (NEXUS^{*1}), “Japan-Indonesia international joint research” in the field of Bioproduction (Attachment 1).

NEXUS is a flexible and multi-layered cooperative framework, leveraged by the long history of science and technology cooperation between Japan and ASEAN. It is aimed to further strengthen the cooperative research relationship between Japan and ASEAN as partners in co-creating innovations in science and technology.

One of the initiatives, “International Joint Research,” NEXUS supports international joint research in common priority challenges between both sides.

In collaboration with Badan Riset dan Inovasi Nasional (BRIN^{*2}), JST has conducted a call for proposals for international joint research projects (Attachment 2).

We received thirty-eight for this call, and after evaluation by experts from both countries and consultations between JST and BRIN, we have decided to select five projects for funding. The research period is planned for three years (36 months).

*1 NEXUS: <https://www.jst.go.jp/aspire/nexus/en/index.html>

*2 BRIN: <https://pendanaan-risnov.brin.go.id/>

Attachments

1. Abstracts of selected projects
2. Abstract of the joint call for proposal
3. Experts for the evaluation (JST side)

Contact

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Abstracts of selected projects

No.	Title	Principal Investigator (Japan side)	Research Abstract
		Principal Investigator (Indonesia side)	
1	Harnessing Fungal Bioengineering and Biomass Resources for Small-Molecule Therapeutic Innovation	TSUNEMATSU Yuta (Associate Professor, Graduate School of Bioagricultural Sciences, Nagoya University)	<p>This project aims to integrate Japan's advanced bioengineering-based natural product drug discovery technologies with Indonesia's rich and diverse microbial resources to develop novel small-molecule lead compounds for infectious disease treatment. Japan brings a strong history in natural product-based therapeutics, while Indonesia offers a vast, untapped reservoir of microbial diversity. By combining these strengths, the project will enable rational design and scalable biosynthesis of drug candidates through pathway engineering and structure-guided modification. The research targets tuberculosis, MRSA infections, and amoebiasis—diseases that are prevalent in low- and middle-income countries and urgently require new treatments. Existing therapies are often limited by toxicity, resistance, or poor pharmacokinetics. To address these issues, the project will generate non-natural-type natural products with enhanced activity and selectivity, using filamentous fungi as heterologous hosts for expressing biosynthetic genes. For sustainable implementation, the project develops practical, low-cost production methods using underused biomass—such as banana stems, palm residues, and cassava pulp—locally available in Indonesia. These agricultural wastes serve as carbon sources in fermentation, supporting low-</p>
		Arif NURKANTO (Principal Researcher, Research Center for Biosystematics and Evolution, Research Organization for Life Sciences and Environment, BRIN)	

			<p>cost drug production while promoting environmental sustainability. In addition, reciprocal exchange programs will train young researchers from both countries, fostering long-term collaboration and innovation. By uniting advanced biosynthesis, microbial biodiversity, and biomass-based production strategies, this project contributes to global health and provides a model of international cooperation aligned with the Sustainable Development Goals (SDGs).</p>
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No.	Title	Principal Investigator (Japan side)	Research Abstract
		Principal Investigator (Indonesia side)	
2	Ocean Positive Bioproduction of High-Value Chemicals from High-Salinity Waste Biomass by Halophilic Microbial Cell Factories	NAKAYAMA Hideki (Professor, Graduate School of Integrated Science and Technology, Nagasaki University)	This collaborative research aims to develop platform technologies that efficiently upcycle blue carbon for the ocean-positive production of high-value chemicals, using high-salinity seaweed residues, which are discarded in large quantities in Asia, as feedstocks. Specifically, the Japan team will establish a cell factory using the halophilic bacterium <i>Halomonas elongata</i> , which has been shown to produce ectoine (Ect) and polyhydroxybutyrate (PHB).
		Fahrurrozi (Director, Research Center for Freshwater Aquaculture, Research Organization for Agriculture and Food, BRIN)	The Indonesia team will select strains of the genus <i>Halomonas</i> with high production capabilities of Ect and PHB from Indonesia's own halophilic bacterial resources. Then, the research results from the Japan team will be applied to the selected <i>Halomonas</i> sp. strain, which will serve as a platform for developing <i>Halomonas</i> cell factories in Indonesia. The outcomes of this joint research will contribute to the achievement of SDGs 12 and 14.

No.	Title	Principal Investigator (Japan side)	Research Abstract
		Principal Investigator (Indonesia side)	
3	Establishment of an Organoid Panel Reflecting Liver Cancer Subtypes in Asia	HIPPO Yoshitaka (Director, Chiba Cancer Center Research Institute)	<p>This project aims to establish Asia's first drug discovery platform through the creation of an organoid panel of liver cancer with genetic mutations unique to the Asian region.</p> <p>Specifically, the Japanese side will first establish a large number of organoids derived from normal mouse cells and patient tumors to create a subtype-specific liver cancer organoid panel, and then screen a compound library to identify candidate compounds that exhibit subtype-specific drug efficacy. Meanwhile, the Indonesian side will simultaneously verify the versatility of the candidate compounds using human liver cancer cell lines and synthesize derivatives, aiming to identify highly effective compounds.</p> <p>By integrating these results, we will demonstrate the drug discovery utility of the Asian liver cancer organoid panel. Ultimately, we anticipate the development of a comprehensive drug discovery platform for cancer, with potential applications to other cancer types.</p>
		Riris Istighfari JENIE (Associate Professor, Faculty of Pharmacy, Universitas Gadjah Mada)	

No.	Title	Principal Investigator (Japan side)	Research Abstract
		Principal Investigator (Indonesia side)	
4	Development of Genetically Engineered Plants to address Environmental Pollution through Production of Transporter Proteins with Improved Metal Transport Properties	FUJIWARA Toru (Professor, Graduate School of Agricultural and Life Sciences, The University of Tokyo)	This collaborative research aims to modify the uptake and capacity of cadmium in rice and Jatropha. The Japanese team will focus on the molecular analysis and engineering of the NRAMP5 transporter in rice to suppress/enhance Cd uptake in Indonesian elite cultivar of rice. The Indonesian team works on Jatropha and by integrating the strengths of both research teams—crop-based phytoremediation (Japan) and synthetic biology-enhanced hyperaccumulators and bioproduction platforms (Indonesia)—this collaboration aims to deliver innovative, scalable, and sustainable solutions for environmental restoration of heavy metal-contaminated sites.
		Pratiwi PRANANINGRUM (Researcher, Research Center for Genetic Engineering, BRIN)	

No.	Title	Principal Investigator (Japan side)	Research Abstract
		Principal Investigator (Indonesia side)	
5	Japan-Indonesia Cryo-EM Initiative for Sustainable Bioproduction: Study of Key Enzymes and Transporters in Biodegradable Polymer Biosynthesis and Pollutant Bioremediation	YOSHIDA Shosuke (Professor, Graduate School of Science and Technology, Nara Institute of Science and Technology)	Aiming to develop microbial-based bioproduction and pollutant recovery technologies, this project seeks to elucidate the structural basis of key enzymes and transporters involved in these processes using cryo-electron microscopy (Cryo-EM), while expanding the range of Cryo-EM targets through the application of fusion tag technology. On the Japanese side, the Environmental Microbiology Laboratory, specializing in functional analysis of the enzymes, and the Structural Life Science Laboratory, specializing in structural analysis, will collaborate to lead protein expression and purification, improvement of 3D reconstruction methods, and structure determination and refinement. Meanwhile, the BRIN team will be responsible for operating state-of-the-art Cryo-EM instruments, conducting initial screening, and collecting data. Through this collaborative effort, we aim to optimize the Cryo-EM workflow, create new environment-related technologies based on structural biology, foster the next generation of researchers, and strengthen the international collaborative research framework.
		Yudhi NUGRAHA (Head of Scientific Committee of Cryo-EM Lab BRIN, Eijkman Research Center for Molecular Biology, BRIN)	

Abstract of the joint call for proposal

(1) Partner funding agency

Organization name: Badan Riset dan Inovasi Nasional (BRIN)

URL: <https://pendanaan-risnov.brin.go.id/>

(2) Research field

Bioproduction

(3) Researcher eligibility

Any independent researcher personally affiliated with a domestic Japanese research institution, including universities, independent administrative institutions, national/public testing and research institutions, specially authorized corporations, public-service corporations, and enterprises

(4) Research duration

Three years (36 months)

(5) Funding amount (by JST, per project)

- Direct expenses: up to 24 million Japanese Yen
- Indirect expenses: 30% of direct expenses

(6) Evaluation procedure

- Evaluation by independent committees consisting of experts from both countries.
- Discussion and decision by JST and BRIN based on evaluation result.

(7) Evaluation criteria

- Consistency with the research field of the call
- Capability of research leaders
- Expected scientific results of the joint research
- Synergy effects of international collaboration
- Validity of research plan
- Validity of exchange plan
- Expected economic and social impact of the joint research
- Feasibility of implementation (given proposed plan, participants, budget, facilities, means of cooperation, etc.)

Experts for the evaluation (JST side)

Name	Position and organization	Role
BAMBA Takeshi	Professor, Medical Institute of Bioregulation, Kyushu University	Program Officer
ATOMI Haruyuki	Professor, Graduate School of Engineering, Kyoto University	Advisor
TAKAGI Masahiro	Professor Emeritus, Japan Advanced Institute of Science and Technology	Advisor
TAMAKI Hideyuki	Deputy Director, Biomanufacturing Process Research Center, National Institute of Advanced Industrial Science and Technology	Advisor
TSUMOTO Kouhei	Professor, Graduate School of Engineering, The University of Tokyo	Advisor
FUKUSAKI Eiichiro	Professor, Graduate School of Engineering, The University of Osaka	Advisor
MATSUI Tomoko	Head of R&T, Research and Technology, Novozymes Japan	Advisor
MINAGAWA Jun	Vice Director-General, National Institute for Basic Biology, National Institutes of Natural Sciences	Advisor
MURANAKA Toshiya	Specially Appointed Professor, Institute for Open and Transdisciplinary Research Initiatives, The University of Osaka	Advisor
YOSHINO Tomoko	Professor, Institute of Engineering, Tokyo University of Agriculture and Technology	Advisor

(Advisors are listed in order of the Japanese syllabary.)
 (Position and organization are as of the time of evaluation.)