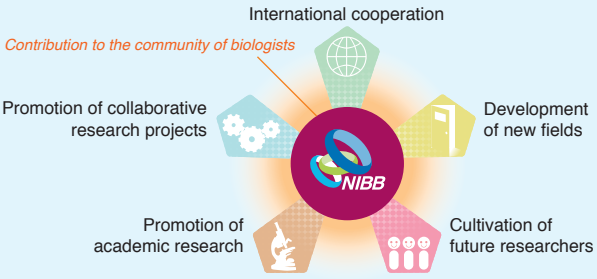
GOALS OF THE NATIONAL INSTITUTE FOR BASIC BIOLOGY

The National Institute for Basic Biology (NIBB) sets five goals for its activities in pursuing the progress of biology. We contribute to the world-wide community of biologists through our efforts to accomplish these goals. This chapter briefly explains four of these goals. The last goal, the promotion of academic research, is accomplished through our research activities, which are introduced throughout this brochure.



Promotion of Collaborative Research

Collaborative Research Support

Research activities that are conducted using NIBB's facilities and in collaboration with NIBB's divisions/laboratories are solicited from external researchers. "Individual Collaborative Research Projects" are a basic method of supporting collaborations which provide external researchers with travel and lodging expenses to visit NIBB's laboratories to conduct collaborative research. "Priority Collaborative Research Projects" are carried out as group research projects by internal and external researchers to develop pioneering research fields. "Collaborative Research Projects for Model Organism/Technology Development" and "Collaborative Research Projects for Bioresource Preservation Technology Development" are for developing and establishing new model organisms and new research technology. Research expenses in addition to travel expenses are provided for these projects. 'Collaborative Research Projects for Integrative Genomics' and 'Collaborative Research Projects for Integrative Bioimaging' are projects to facilitate more integrated use of the NIBB Core Research Facilities and to allow more intensive support through the planning, experimental, data analysis, and publication stages. Travel and lodging expenses are also provided for these projects.

year	2017	2018	2019
Priority collaborative research projects	2	1	1
Collaborative research projects for model organisms and technology development	2	2	2
Individual collaborative research projects	51	57	60
Collaborative research projects for integrative genomics	62	67	66
Collaborative research projects for integrative bioimaging	28	23	22
NIBB workshops	3	2	3
Collaborative experiments using the Large Spectrograph	9	9	9
Support for NIBB training courses	0	1	0
Collaborative research projects for bioresource preservation technology development	12	18	14
Total	169	180	177

NIBB Core Research Facilities

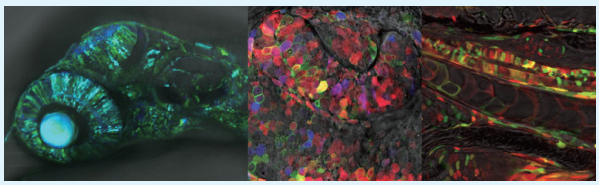
The NIBB Core Research Facilities support research at NIBB and also act as an intellectual hub to promote collaboration between NIBB and other academic institutions. They consist of three facilities that are developing and providing state-of-the-art technologies through functional genomics, bioimaging and bioinformatics (p. 82).

The Functional Genomics Facility maintains a wide array of core research equipment, including next generation DNA sequencers. The facility is dedicated to fostering NIBB's collaborative research by providing these tools as well as expertise. Its current focus is supporting functional genomics projects that utilize mass spectrometers and DNA sequencers, and holding events such as training courses to achieve this end (p. 106). The Spectrography and Bioimaging Facility manages research tools, such as confocal microscopes, DSLM and the large spectrograph, and provides technical support and scientific advice to researchers. These two facilities task professor and specially appointed associate professor, who are experts in their respective fields, with managing each facility as well as conducting their own academic research. The Data Integration and Analysis Facility supports the analysis of large-scale biological data, such as genomic sequence data, gene expression data, and imaging data. The facility maintains high-performance computers with large-capacity storage systems for this purpose.

NIBB BioResource Center

The NIBB BioResource Center supports research using model animals and plants at NIBB and other academic institutions. The center consists of three facilities, the model animal, the model plant, and the cell biology research facilities. The center has equipment, facilities, and staff to maintain model organisms, such as mice, medaka, zebrafish, Japanese morning glories, *Arabidopsis*, *Lotus japonicus*, and *Physcomitrella patens*, and provides technical support and advice for the appropriate use of these organisms (p. 87).

The center also acts as a hub of the National BioResource Project (NBRP) which is a national project for the systematic accumulation, storage, and supply of nationally recognized bio-resources (experimental animals and plants, cells, DNA, and other genetic resources), which are widely used as materials in life science research. To promote this national project, NIBB has been selected as a center for research on medaka (*Oryzia latipes*), whose usefulness as a vertebrate model was first demonstrated by Japanese researchers. The usability of medaka as a research material in biology has drawn increasing attention since its full genome sequence recently became available. NIBB is also a sub-center for the NBRP's work with Japanese morning glories (p. 90).



An example of a medaka strain in NBRP, Gaudi strain, in which individual cells in the brain and the retina are fluorescently labelled using the Brainbow system.

NIBB Center of the Inter-University Bio-Backup Project (IBBP Center)

To prevent damage to important biological resources by natural disasters, NIBB established the IBBP Center in 2012 in collaboration with seven national universities for multiplicate preservation of genetic libraries and other invaluable bioresources used in cutting-edge research (p. 91).

Center for the Development of New Model Organisms

This center was established in 2013 and employs a cross-appointment researcher who developed and refined genome editing techniques in particular in *Pleurodeles waltl* (Iberian ribbed newt) (p. 93) and also taught these techniques in the training course (p. 108).

Advanced Bioimaging Support (ABiS)

ABiS provides an assistance for advanced imaging in research supported by Grants-in-Aid for Scientific Research. NIBB, together with NIPS, contribute as core institutes to the ABiS network of domestic partner organizations that own and operate multiple types of advanced specialized imaging equipment. In 2018, ABiS joined the Global Bioimaging (GBI) network representing the Japanese bioimaging community. ABiS also hosts imaging competitions and training courses (p. 108).

International Cooperation and Outreach

Collaborative Programs with Overseas Institutes

NIBB plays a leading role in the collaborative research programs between the European Molecular Biology Laboratory (EMBL) and the National Institutes of Natural Sciences (NINS) and promotes personal and technological exchange through joint meetings, exchange between researchers and graduate students, and the introduction of experimental equipment.

NIBB formed an agreement with the Temasek Life Sciences Laboratory (TLL) of Singapore and Princeton University to promote joint research projects, collaborative symposia, training courses and student exchange programs. The NIBB-Princeton Joint Symposium "Imaging and Quantitative Biology" was held in October, 2019 (p. 102).

NIBB Conference

The NIBB Conferences are international conferences on prominent topics in biology that are organized by NIBB's professors. Since the first conference in 1977 (the year of NIBB's foundation), NIBB Conferences have provided researchers in basic biology with valuable opportunities for international exchange. The 66th conference "Cutting Edge Techniques of Bioimaging" was held jointly with ABiS in February, 2019 (p. 100). The 67th conference "Quest for Orthologs" was hels in July, 2019 (p. 101).

International Practical Course

With the cooperation of researchers from Japan and abroad, the NIBB international practical course is held in a specifically prepared laboratory. The 10th course "Genome Editing and Imaging of Fish and Amphibians" was held jointly with ABiS in September, 2018 at NIBB. Graduate students and young researchers from various areas including the UK, Columbia, Nepal, Korea, China, Taiwan, and Japan, were provided with training in state-of-the-art research techniques. International conferences and courses are managed by the International Cooperation Group of the Research Enhancement Strategy Office.

Outreach

NIBB's outreach activities aim to present cutting edge research results to the public via mass media through press releases or directly through internet-based platforms, such as web pages, Facebook, and Twitter. Streaming live videos of the development of model organisms successfully attract many accesses. Our triannual open campus event was held in October, 2019 at which we welcomed nearly 3,000 local citizens (p. 111). NIBB also cooperates in the education of undergraduate and younger students through lectures and workshops. Outreach activities are mostly managed by the Public Relations Group of the Research Enhancement Strategy Office (p. 96).

Development of New Fields of Biology

Bioimaging

NIBB aims to maximize the application of modern light microscopes and biophotonic probes for real time visualization of biological phenomena and to develop new imaging techniques. As part of our collaborative work with EMBL, NIBB introduced a DSLM, which is effective for the three-dimensional observation of living organisms, and has developed an improved model using two-photon optics (p. 77). The Advisory Committee on Bioimaging, comprised of leading researchers in the bioimaging field in Japan, has been organized to formulate advice concerning NIBB's imaging research. The Bioimaging Forum provides an opportunity for researchers and company engineers to frankly discuss practical difficulties and their needs regarding imaging. The 13th Forum "Behavioral and Recognition Research upon the Platform of Vision and Color" was held in February, 2019 (p. 106). A training course in bioimage analysis was also held in December, 2019 (p. 107).

Okazaki Biology Conferences

NIBB holds Okazaki Biology Conferences (OBC) that aim to explore new research fields in biology and support the formation of international communities in these fields. Dozens of top-level researchers from Japan and abroad spend nearly one week together for intensive discussions that seek strategies for addressing critical future issues in biology. Past Conferences have promoted the formation of international researcher communities.

Cultivation of Future Researchers

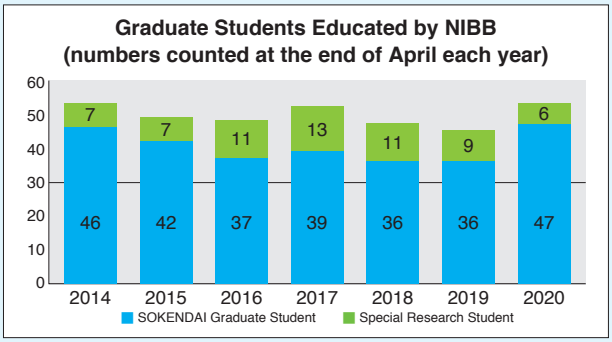
NIBB constitutes the Department of Basic Biology in the School of Life Science of SOKENDAI (Graduate University for Advanced Studies). The department provides a five-year course for university graduates and a three-year doctoral course for graduate students with a master's degree. Graduate students enrolled in other universities and institutions can apply to be special research students eligible to conduct research under the supervision of NIBB professors.

In both cases above, graduate students can receive financial support from NIBB based on the research assistant (RA) system from the beginning of the five-year course.

Due to the international collaboration with EMBL, graduate students are encouraged to attend PhD student symposia held at EMBL at least once during their master's and doctoral program, where they are provided with an opportunity to give oral and poster presentations.

Students from Japan and abroad can also come to NIBB through our Internship Program. Internships give students an excellent opportunity to build international connections while experiencing hands on research in a world class research institute (p. 110).

Support for young researchers is managed by the Young Researcher Support Group of the Research Enhancement Strategy Office (p. 98).



Personnel changes from January 2019 to March 2020*

Newly assigned to NIBB

Name	Position	Research Unit	Date
AGATA, Kiyokazu	Director General	Laratory of Regeneration Biology	April 1, 2019
SHIGENOBU, Shuji	Professor	Laboratory of Evolutionary Genomics	April 1, 2019
TANIMOTO, Masashi	Assistant Professor	Division of Behavioral Neurobiology	April 1, 2019
SHIKATA, Hiromasa	Assistant Professor	Division of Plant Environmental Responses	April 1, 2019
KOBAYASHI, Taisuke	NIBB Research Fellow#	Laboratory of Neurophysiology	April 1, 2019
YOKE, Hiroshi	NIBB Research Fellow#	Laboratory for Spatiotemporal Regulations	April 1, 2019
SHINOZUKA, Takuma	NIBB Research Fellow#	Division of Molecular and Developmental Biology	April 1, 2019
LIU, Meng	NIBB Research Fellow#	Division of Symbiotic Systems	October 1, 2019
GOTO, Yuhei	Assistant Professor	Division of Quantitative Biology	November 1, 2019
MANO, Hiroaki	Specially Appointed Assistant Professor	Division of Evolutionary Biology	November 1, 2019
KANAI, Masatake	Specially Appointed Assistant Professor	Laboratory of Organelle Regulation	February 1, 2020

Newly affiliated with other universities and institutes

Name	New Affiliation	Position	Date
NODA, Masaharu	Tokyo Institute of Technology	Specially Appointed Professor	April 1, 2019
SHINTANI, Takafumi	Tokyo Institute of Technology	Specially Appointed Associate Professor	April 1, 2019
MATSUDA, Takashi	Tokyo Institute of Technology	Specially Appointed Assistant Professor	April 1, 2019
HIYAMA, Takeshi	Okayama University	Lecturer	April 1, 2019
SUZUKI, Makoto	Hiroshima University	Assistant Professor	April 1, 2019
TAMADA, Yosuke	Utsunomiya University	Associate Professor	August 1, 2019
ANSAI, Satoshi	Tohoku University	Assistant Professor	November 1, 2019
MIYANARI, Yusuke	Kanazawa University	Associate Professor	April 1, 2020
MURATA, Takashi	Kanagawa Institute of Technology	Professor	April 1, 2020

* Changes in professors, associate/ assistant professors, and NIBB research fellows.
# NIBB Research Fellows were reappointed as Specially Appointed Assistant Professors on April 1, 2020.

Awardees from January 2019 to March 2020

Name	Position	Award
KITADATE, Yu	Assistant Professor	NINS Young Researcher Award
HASEBE, Mitsuyasu	Professor	Golden Spore Award 2019 (International Molecular Moss Science Society)