

## 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

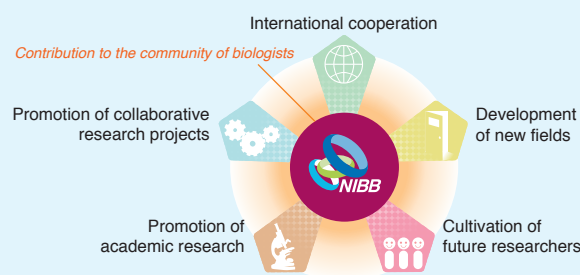
Research activities that are conducted using NIBB's facilities and in collaboration with NIBB's divisions/laboratories are solicited from external researchers. "Individual Collaborative Research Projects" are a basic method of supporting collaborations which provide external researchers with travel and 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. In 2016, two new projects, "Collaborative Research Projects for Integrative Genomics" and "Collaborative Research Projects for Integrative Bioimaging" were initiated by reorganizing two former 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	2016	2017	2018
Priority collaborative research projects	2	2	1
Collaborative research projects for model organisms and technology development	2	2	2
Individual collaborative research projects	46	51	57
Collaborative research projects for integrative genomics	59	62	67
Collaborative research projects for integrative bioimaging	38	28	23
NIBB workshops	6	3	2
Collaborative experiments using the Large Spectrograph	10	9	9
Support for NIBB training courses	0	0	1
Collaborative research projects for biore-source preservation technology development	12	12	18
total	175	169	180

#### ■ 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. 80).

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

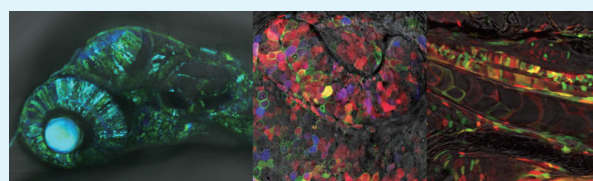


collaborative research by providing these tools as well as expertise. Its current focus is supporting functional genomics projects that utilize mass spectrometers and DNA sequencers, and holding events such as training courses to achieve this end (p. 103). The Spectrography and Bioimaging Facility manages research tools, such as confocal microscopes, DSLM and the large spectrograph, and provides technical support and scientific advice to researchers. These two facilities task specially appointed associate professors, 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 (*Oryzias 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 and zebrafish (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 Rainbow system.

### ■ NIBB Center for the Interuniversity 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 multiple 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 newly assigned cross-appointment researcher who developed and refined genome editing techniques in particular in *Pleurodeles waltl* (Iberian ribbed newt) (p. 94) and also taught these techniques in the NIBB International Practical Course (p. 101).

### ■ Advanced Bioimaging Support (ABiS)

ABiS provides 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 and specialized imaging equipment (p. 105).

## 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 Proteomics Training Course was held in July, 2017.

### ■ 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 66<sup>th</sup> conference "Cutting Edge Techniques of Bioimaging" will be held jointly with ABiS in February, 2019.

### ■ 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 10<sup>th</sup> 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

(p. 101). International conferences and courses are managed by the International Cooperation Group of the Research Enhancement Strategy Office (p. 98).

### ■ 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. Our triannual open campus event was held in October, 2016 at which we welcomed more than 4,700 local citizens. 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. 97).

## 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 an electrically tunable lens (p. 76). 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 12<sup>th</sup> Forum "The Future of Bioimage Analysis Explored by AI" was held in March, 2018 (p. 103). A training course in bioimage analysis was also held in 2018 (p. 104).

### ■ 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

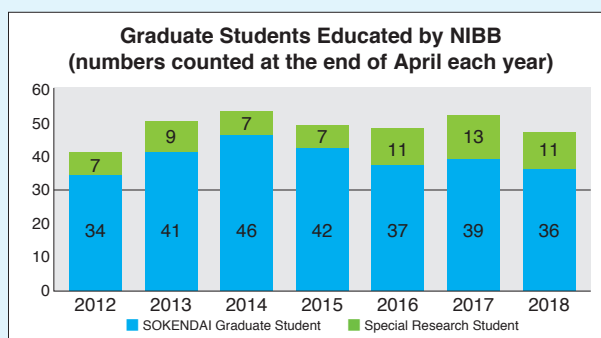
NIBB constitutes the Department of Basic Biology in the School of Life Science of SOKENDAI (Graduate University for Advanced Studies). The department provides a five-year course for university graduates and a three-year doctoral course for graduate students with a master's degree. Graduate students enrolled 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. 107).

Support for young researchers is managed by the Young Researcher Support Group of the Research Enhancement Strategy Office (p. 99).



## ■ Personnel changes in 2018\*

### Newly assigned to NIBB

Name	Position	Research Unit	Date
OTSUBO, Yoko	Specially Appointed Assistant Professor	Laboratory of Cell Responses (Jointly with NIFS)	February 1
MORITA, Miyo T.	Professor	Division of Plant Environmental Responses	April 1
SUZUKI, Ken-ichi	Specially Appointed Associate Professor	Center for the Development of New Model Organisms (Cross-appointment with Hiroshima Univ.)	April 1
MINAMINO, Naoki	NIBB Research Fellow	Division of Cellular Dynamics	April 1
IKEDA, Tatsuro	NIBB Research Fellow	Division of Germ Cell Biology	April 1
NISHIUMI, Nozomi	NIBB Research Fellow	Laboratory of Neurophysiology	April 1
KIM, Eunchul	NIBB Research Fellow	Division of Environmental Photobiology	April 1
NAKAMURA, Taro	Assistant Professor	Division of Evolutionary Developmental Biology	June 1
NISHIMURA, Takeshi	Assistant Professor	Division of Plant Environmental Responses	September 1
ODA, Shigekazu	Assistant Professor	Division of Quantitative Biology	November 1
OHTA, Yusaku	Specially Appointed Assistant Professor	Laboratory of Biological Diversity	December 1

### Newly affiliated with other universities and institutes

Name	New Affiliation	Position	Date
KIMORI, Yoshitaka	Fukui University of Technology	Associate Professor	April 1
YASUGI, Masaki	Utsunomiya University	Researcher (Industry-Government-Academia Collaboration)	April 1
AIHARA, Yusuke	Nagoya University	Researcher	April 1

\* Changes in professors, associate/ assistant professors, and NIBB research fellows are shown below.

## ■ Awardees in 2018

Name	Position	Award
NODA, Masaharu	Professor	The 2nd Seitai-no-Kagaku (Science of the Living Body) Award
MATSUDA, Takashi	NIBB Research Fellow	The 3rd Toshihiko Tokizane Memorial Award for Excellent Graduate Study in Neuroscience
KAWAGUCHI, Haruka	Postdoctoral Fellow	The 21st ESPEC Prize for the Encouragement of Environmental Studies