

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 in collaboration with NIBB's divisions/laboratories using NIBB's facilities are solicited from external researchers. "Individual collaborative research projects" are the basic form of collaboration support which provide external researchers with travel and lodging expenses to visit NIBB's laboratories for collaborative research. For the use of NIBB's unique and excellent research instruments, such as the large spectrograph, the DSLM, and next generation DNA sequencers experimental projects are solicited and reviewed to provide machine time and travel expenses. "Priority collaborative research projects" are carried out in one to three years as group research by internal and external researchers with the purpose of developing pioneering research fields in biology and the "collaborative research projects for model organism/technology development" are for developing and establishing new model organisms and new research technology. For these projects, research expenses in addition to travel expenses are provided.

Shortly after the Great East Japan Earthquake in March 2011 we began to solicit special emergency collaborative research projects to allow researchers whose labs suffered damage to stay at our institute to continue their work. Six projects from Tohoku University, Chiba University, and the University of Tokyo etc. were accepted.

■ NIBB Core Research Facilities

year	2009	2010	2011	2012
Priority collaborative research projects	1	4	6	5
Collaborative research projects for model organisms/technology development	3	2	2	3
Individual collaborative research projects	54	68	88	89
NIBB workshops	3	3	6	6
Collaborative experiments using the large spectrograph	10	8	9	14
Collaborative experiments using the DSLM	—	7	8	5
Collaborative experiments using the next generation DNA sequencer	—	11	45	47
Facility Use (Training Course Facility)	—	1	0	2
total	71	94	164	171

Collaborative Research Projects by Year

The NIBB Core Research Facilities were launched in 2010 to support research in NIBB and also to act as an intellectual hub to promote collaboration among the researchers of 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. 68).

The Functional Genomics Facility maintains a wide array of core research equipment, including cutting edge tools such as next generation DNA sequencers. The facility is dedicated to fostering NIBB's collaborative research by providing these tools as well as expertise. The current focus is supporting functional genomics works that utilize mass spectrometers and DNA sequencers, holding training courses as one of these undertakings (p. 86). 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 hold specially-appointed associate professors, an expert in each field, with a mission to manage each facility as well as conducting his own academic research. The Data Integration and Analysis Facility supports large-scale biological data analysis, such as genomic sequence analysis, expression data analysis, and imaging data analysis. For this purpose, the facility maintains high-performance computers with large-capacity storage systems.

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

The 2011 Tohoku Earthquake and Tsunami in March, 2011, caused massive damage to important biological resources. To prevent such loss, NIBB established the IBBP Center in 2012 in collaboration with seven national universities for multiple preservation of genetic libraries and other invaluable bioresources (p.76).

International Cooperation and Outreach

■ Collaborative Programs with Overseas Institutes

NIBB takes a leading role in the collaborative research programs between the European Molecular Biology Laboratory (EMBL), a research institute established in 1974 and funded by 21 mostly European countries, 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. The 10th NIBB-EMBL symposium "Quantitative Bioimaging" was held in March, 2013, and will appear in the 2013 Annual Report.

NIBB formed an agreement with the Max Planck Institute for Plant Breeding Research (MPIPZ) in April 2009 to start a new initiative aimed at stimulating academic and scholarly exchange in the field of plant sciences. NIBB and MPIPZ work together to plan and promote joint research projects, collaborative symposia, training courses and student exchange programs.

Collaborative programs have also been started with the Temasek Life Sciences Laboratory (TLL), of Singapore and Princeton University. The 4th NIBB-MPIPZ-TLL Joint Symposium "Arabidopsis and Emerging Model Systems" was held in November, 2012 at NIBB (p. 85).

■ NIBB Conference

The NIBB Conferences are international conferences on hot topics in biology 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 58th/60th conference "Germline -Speciation, Sex, and Stem Cells-" was held

in July, 2012 (p.84) and the 59th conference “Neocortical Organization” was held in March, 2012 (p. 83).

International Practical Course

With the cooperation of researchers from Japan and abroad the NIBB international practical course is given at a laboratory specifically prepared for its use. The 7th course “Genetics, Genomics and Imaging in Medaka and Zebrafish” was held jointly with TLL and the National University of Singapore (NUS) in July, 2012 at NUS and TLL (p. 86). Graduate students and young researchers from various areas including Germany, China, India, and Italy, were provided with training in state-of-the-art research techniques. International conferences and courses are managed by the Office of International Cooperation (p. 79).

Bio-Resources

The National BioResource Project (NBRP) 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 appointed as a center for research on Medaka (*Oryzia latipes*) whose usefulness as a vertebrate model was first shown 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 glory. The NIBB BioResource Center has equipment, facilities, and staff to maintain Medaka and Japanese morning glory safely, efficiently, and appropriately. The center also maintains other model organisms, such as mice, zebrafish, *Arabidopsis*, *Lotus japonicus*, and *Physcomitrella patens*, and provides technical support and advice for the appropriate use of these organisms (p. 73).



Strains of Japanese morning glory maintained in the center

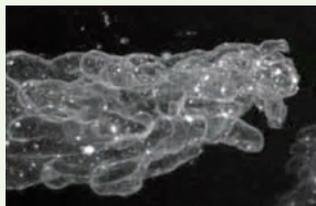
Outreach

NIBB’s outreach activities aim to present cutting edge research results to the public via mass media through press releases or directly through the internet. We made a major revision of our English web page and opened a video gallery containing an English language introduction of NIBB in 2011. NIBB also cooperates in the education of undergraduate and younger students through lectures and workshops. Outreach activities are mostly managed by the Office of Public Relations (p. 79).

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



A frame from a 3D movie of living *Amoeba proteus* first visualized by DSLM owing to its excellent time resolution.

living samples, and has developed an improved model (p. 67). The Advisory Committee on Bioimaging, comprised of leading researchers in the bioimaging field in Japan, is organized to formulate advice on NIBB’s imaging research. The Bioimaging Forum provides an opportunity for researchers and company engineers to frankly discuss practical difficulties and needs regarding imaging (p. 87).

Okazaki Biology Conferences

NIBB holds Okazaki Biology Conferences (OBC) that, with the endorsement of the Union of Japanese Societies for Biological Science, 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 seeking strategies for addressing future critical issues in biology. Past Conferences have promoted the formation of international researcher communities. The OBC8 “Speciation and Adaptation II: Environment and Epigenetics” was held in March, 2012 (p. 81), and the OBC9 “Marine Biology II” was held in October, 2012 (p. 82).

Cultivation of Future Researchers

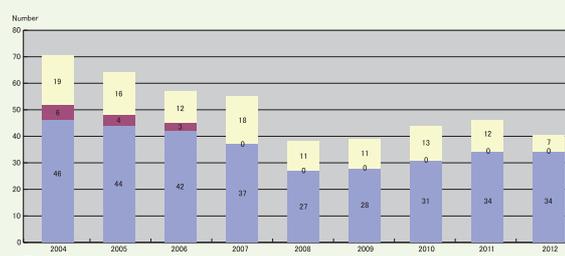
NIBB constitutes the Department of Basic Biology in the School of Life Science of the Graduate University for Advanced Studies (SOKENDAI). The department provides a five-year course for university graduates and a three-year doctoral course for graduate students with a master’s degree.

Graduate students enrolled in other universities and institutions can apply to be special research students eligible to conduct research for fixed periods of time under the supervision of NIBB professors.

In both cases above, graduate students can live an academic life and 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 and provided an opportunity to give oral and poster presentations, at least once during their master’s and doctoral program.

Students from Japan and abroad can also come to NIBB through our Internship Program. Internships give students an excellent way to build international connections while experiencing hands on research in a world class research institute (p. 87).



Graduate students educated by NIBB