

GOALS OF THE NATIONAL INSTITUTE FOR BASIC BIOLOGY

The National Institute for Basic Biology (NIBB) has set 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 Projects

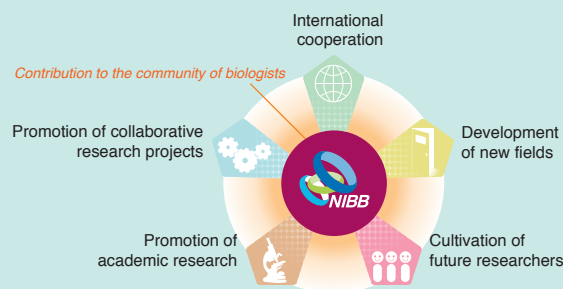
Research projects in collaboration with NIBB's divisions/laboratories and research activities conducted using NIBB's facilities are solicited from external researchers at other universities and institutes. In addition to conventional "individual collaborative research projects," "collaborative experiments using the Large Spectrograph," and "NIBB workshops," new types of research projects are solicited that facilitate the strategic organization of collaborative research projects. "Priority collaborative research projects" are carried out as group research by internal and external researchers with the purpose of developing pioneering research fields in biology. Five projects have already been carried out and as an outcome of the project "Molecular mechanisms for controlling the individuals of higher plants," Prof. I. Terashima (Univ. Tokyo) started a project of Grant-in-Aid for Scientific Research on Innovative Areas in 2009. The category "Collaborative research projects for model organism/technology development" was started in 2007. Six projects have already been carried out, including those using *Cabombaceae* or *Pophyra* as model organisms and those related to methodologies in medaka genome analyses. NIBB always encourages discussion on such projects in the belief that our methods of conducting collaborative research projects must be constantly modified, according to the demands of the age and the biology community.

Collaborative research projects by year

year	2006	2007	2008	2009
Priority collaborative research projects	3	1	0	1
Collaborative research projects for model organisms/ technology development	—	2	3	2
Individual collaborative research projects	37	43	49	54
NIBB workshops	1	5	5	3
Collaborative experiments using the Large Spectrograph	18	14	11	10
Facility Use (Center for Analytical Instruments)	0	1	0	0
total	59	66	68	71

■ Enhancement of the Large Spectrograph

The Large Spectrograph Laboratory, a world-leading research facility in photobiology, has been instrumental in a large number of collaborative research projects since its establishment in 1980. To ensure further high-level achievements, the Laboratory has undertaken an enhancement of its laboratory equipment, including the addition of advanced control systems, and the use of laser



sources and sophisticated analysis equipment. To supplement the currently operating fixed (partly tunable) wavelength laser sources, we are preparing to introduce tunable laser sources covering a wide range of wavelengths from UV to IR.

International Cooperation

■ Collaborative Programs with EMBL

The European Molecular Biology Laboratory (EMBL), established in 1974, is a research institute funded by 18 European nations. It conducts comprehensive, high-level basic research programs and leads the world in the field of molecular biology. NIBB takes a leading role in the collaborative research programs between EMBL and the National Institutes of Natural Sciences (NINS), which were launched in 2005, and promotes personal and technological exchange through symposia, exchange between researchers and graduate students, and the introduction of experimental equipment (see page 85 for details of the EMBL meetings held in 2009).



Meeting (left) and discussions (right) in EMBL, Heidelberg

■ Collaborative Programs with MPIZ

NIBB formed an agreement with the Max Planck Institute for Plant Breeding Research (MPIZ) in April 2009 to start a new initiative aimed at stimulating academic and scholarly exchange in the field of plant sciences. NIBB and MPIZ work together to plan and promote joint research projects, collaborative symposia, training courses and student exchange programs. NIBB acts as a bridge between Japanese and German researchers in the field of plant sciences. (see page 87 for details of the joint meeting held in 2009).

■ NIBB Conference

The NIBB Conference is an international conference organized by NIBB's professors once or twice a year with the participation of guest lecturers from abroad. Since the first conference in 1977 (the year of NIBB's foundation), the NIBB Conference has provided researchers in basic biology with valuable opportunities for international exchange.

International Practical Course

With the cooperation of researchers from Japan and abroad the NIBB international practical course, a practical training program, is given at a laboratory specifically prepared for its use at NIBB. The fourth course was held in 2009 (see page 88). Graduate students and young researchers from various areas including EU countries, Israel, India, and Singapore, were provided with training in state-of-the-art research techniques.

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 (*Oryzias latipes*)” whose usefulness as a vertebrate model first developed in Japan. 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 and Zebrafish. In addition, NIBB provides databases containing research data on the moss *Physcomitrella patens*, *Daphnia*, *Xenopus laevis*, plant cell organelles, and bacterial genomes.



Top: Medaka strain for which the full genome sequence was determined,
Middle: Transgenic Medaka with red fluorescence,
Bottom: A strain with transparent body.

Development of New Fields of Biology

Bioimaging

Recently, the capability of optical microscopes has greatly improved and biophotonic probes have been developed. The combination of these technologies allows us to use living samples and observe biological phenomena in real time, which, in the past, could only be estimated based on fragmentary information from fixed samples. NIBB aims to maximize the application of these techniques for visualizing biological phenomena (bioimaging) and to develop new imaging techniques.

- 1) *Imaging Science Laboratories*, NIBB aims to be a center for the development of new microscopes and biophotonic probes.
- 2) *Advisory Committee on Bioimaging*, Regular meetings are held with several leading researchers in the bioimaging field in Japan to formulate advice on imaging research.
- 3) *Bioimaging Forum*, This provides an opportunity for researchers at NIBB, members of the Advisory Committee, and company engineers to frankly discuss practical difficulties and needs regarding imaging.
- 4) *Introduction of DSLMs (Digital Scanned Laser Light*

sheet Microscope), As part of our collaborative work with EMBL, NIBB has introduced a DSLM, which is effective for the three-dimensional observation of living samples, and is the first of its kind in Japan.

- 5) *Bioimaging Symposium*, This provides an opportunity for academic exchange with cutting-edge overseas researchers in the imaging field, mainly from EMBL.



Optical path of the DSLM

Okazaki Biology Conferences

NIBB holds Okazaki Biology Conferences (OBC) that, with the endorsement of the Union of Japanese Societies for Biological Science, support the formation of international communities in future biological research fields with the goal of identifying new research issues in biology. Dozens of top-level researchers from Japan and abroad spend about one week together in exhaustive discussions seeking strategies for addressing future critical issues in biology. Past Conferences have promoted the formation of international researcher communities.

Cultivation of Future Researchers

NIBB sponsors two education programs for graduate students.

1. Graduate University for Advanced Studies

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.

2. Graduate Student Training Program

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.

