

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 envision contributing to the world-wide community of biologists through our efforts to accomplish these goals. This chapter briefly explains four of the 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 to be 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 will facilitate the strategic organization of collaborative research projects. "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. Six projects have already been carried out, including "molecular mechanisms for controlling the individuals of higher plants." The category "collaborative research projects for model organism/technology development" was established in 2007 with the aim of developing and establishing new model organisms. Five projects have already been carried out, including "development of the transgenic strain of *Cabombaceae* (primitive angiosperm)." NIBB always encourages discussion on such projects in the belief that the 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 | 2005 | 2006 | 2007 | 2008 |
|--|------|------|------|------|
| Priority collaborative research projects | 2 | 3 | 1 | 0 |
| Collaborative research projects for model organisms / technology development | — | — | 2 | 3 |
| Individual collaborative research projects | 41 | 37 | 43 | 49 |
| NIBB workshops | 4 | 1 | 5 | 5 |
| Collaborative experiments using the Large Spectrograph | 19 | 18 | 14 | 11 |
| Facility Use (Center for Analytical Instruments) | 0 | 0 | 1 | 0 |
| total | 66 | 59 | 66 | 68 |

■ Enhancement of the Large Spectrograph

The Large Spectrograph Laboratory, a world-leading research facility in photobiology, has succeeded in a large number of collaborative research projects since its establishment in 1980. To ensure further high-level achievements, the Laboratory has promoted the enhancement of its laboratory equipment, including advanced control systems, the use of laser sources, and sophisticated analysis equipment. To supplement the



currently operating fixed (partly tunable) wavelength laser sources, the introduction of tunable laser sources covering a wide range of wavelengths from UV to IR are in preparation.

International Cooperation

■ Collaborative research projects 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 81 for details of the NIBB-EMBL joint meetings held in 2008).



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

■ NIBB Conference

The NIBB Conference is an international conference organized by NIBB's professors once or twice a year with the participation of a guest lecturer 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 (see page 78 for details of the NIBB Conferences held in 2008).

■ 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 second and third courses were held in 2008 (see page 83). Graduate students and young researchers from various areas including China, Hong Kong, Taiwan, and Korea, 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.



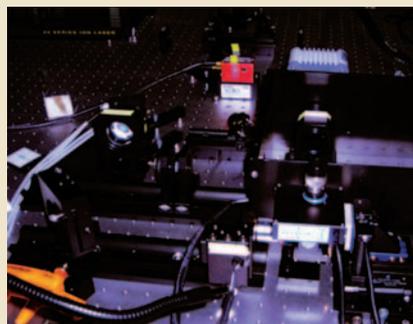
Top: Medaka strain for which the full genome sequence was determined,
Middle: Transgenic Medaka with red fluorescence,
Bottom: A strain with transparent body.

Development of New Fields of Biology

Bioimaging

Recently, the capability of optical microscopes has greatly improved, and biophotonic probes have also 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) in biological research and to develop new imaging techniques.

- 1) *Imaging Science Laboratories*, NIBB aims to be a center for developing 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 DSLM (Digital Scanned laser Light sheet Microscopy)*, As part of collaborative work with EMBL, NIBB has introduced 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 exchanges 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.

Graduate students educated by NIBB

