

**CENTER FOR
TRANSGENIC ANIMALS AND PLANTS**

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The worldwide genome project has been almost completed and research on basic biology has arrived at a post-genome era in which researchers focus on investigating the function of individual genes. To promote functional analysis of a gene of interest it is essential to utilize genetically altered model organisms, which are generated by the genetic engineering technology, the creation of gene deletion, gene replacement or point mutation.

The NIBB Center for Transgenic Animals and Plants (CTAP) was established in April 1998 to support research using transgenic and gene targeting techniques at NIBB. The CTAP is managed by the head (professor, a concurrent post) and an associate professor.



Figure 1. A new center facility for transgenic animals in

the Yamate area.

Technical staff and supporting staff develop and promote research-supporting activities. In 2003 two associate professors joined the CTAP. A new CTAP building for transgenic animals in the Yamate area opened at the end of 2003.

The expected activities of the CTAP are as follows:

1. Provision of information, materials, techniques and animal housing space to researchers.
2. The use of various kinds of instruments to analyze mutant, transgenic, and gene-targeted animals and plants.
3. Development of novel techniques related to transgenic and gene targeting technology.
4. Cryopreservation and storage of transgenic strains.

I. Research supporting activity (mouse)

In 2001 the NIBB mouse facility (built under specific pathogen free (SPF) conditions) opened in the Myodaiji area and the production, breeding, analysis, cryopreservation and storage of genetically manipulated mouse strains has been conducted there since then. The new CTAP building in the Yamate area strengthened research activities using genetically altered organisms. The building has five floors and a total floor space of 2,500m², in which we can generate, breed, store and analyze transgenic, gene targeting and mutant mice under SPF conditions. This building is also equipped with breeding areas for transgenic small fish, birds and insects on the first floor. The mouse housing area of this building is constructed based on a barrier system in which the clean area and the semi-clean area are clearly separated and designed for an efficient and one-directional flow of mice, personnel, articles of animal housing and equipment from the clean area side to the semi-clean area side.



Figure 2. Autoclaves of a large scale for sterilization

In 2005, 4,122 mice were brought into the CTAP in the Yamate area, and 20,521 mice (including pups bred in the facility) were taken out from the CTAP from April 01, 2005 to October 31, 2005.

A number of strains of genetically altered mice outside the CTAP were brought into the mouse housing area by microbiological cleaning using the *in vitro* fertilization-embryo transfer techniques, and stored by cryopreservation.

A new mouse facility in the Myodaiji area opened in the beginning of 2005. The facility provides research-supporting activities to researchers in the Myodaiji area. In 2005, 958 mice were brought into the CTAP in the Myodaiji area, and 2,321 mice (including pups bred in the facility) were taken out from the CTAP from April 01, 2005 to October 31, 2005.



Figure 3. Equipments to generate mutant mice under condition of specific pathogen-free

II. Research supporting activity (small fish, birds, and insects)

The first floor of the CTAP building in the Yamate area provides space and facilities to maintain small fish, chick embryos and insects. In a laboratory room for chick embryos, a large incubation chamber is equipped and set at 42 degrees (suitable for chick embryogenesis). For researchers who need fish, 480 tanks (1 liter) and 450 tanks (3 liters) are available for medaka and zebrafish, respectively. Water circulates and can be maintained to suit conditions desired for fish breeding in the aquarium systems. Currently, three mutant lines and two transgenic lines of medaka are maintained in our facility. In addition to the rooms mentioned above, another room is available for insects. All the rooms are qualified to meet the criteria for P1A transgenic animals, allowing researchers to generate and maintain transgenic animals.

In 2005 (as of the end of November from the beginning of January), 944 medaka (452 fertilized eggs, 440 embryos and 52 adults) were brought to the facility and 46,842 medaka (45,923 fertilized eggs, 700 embryos, and 219 adults, including animals bred in the facility) were taken out from the CTAP. In a laboratory for chick embryos 44,531 fertilized chicken eggs were brought in and 452 animals (190 fertilized eggs and 262 embryos) were taken out from the CTAP. These animals were used for research activities in neurobiology and developmental biology



Figure 4. Breeding equipments for transgenic chickens

III. Academic activity

The associate professors of this center - E. Watanabe, T. Sasaoka, and M. Tanaka - are the principal investigators of the Laboratory of Neurophysiology, the Laboratory of Neurochemistry and the Laboratory of Molecular Genetics for Reproduction, respectively. The Laboratory of Neurophysiology is studying the brain sensing system for the water and sodium homeostasis in the body fluid by using gene-targeting mice, the Laboratory of Neurochemistry is studying a physiological role of dopaminergic system using genetically altered mice, and the Laboratory of Molecular Genetics for Reproduction is studying molecular mechanism of reproductive organ development and sex differentiation using mutagenized or transgenic medaka. For details, please refer to the academic activity of each laboratory.