NATIONAL INSTITUTE FOR BASIC BIOLOGY

基 礎 生 物 学 研 究 所　岡崎国立共同研究機構

1987

THE MAIN RESEARCH BUILDING OF THE NATIONAL INSTITUTE FOR BASIC BIOLOGY.

BRIEF SUMMARY

The National Institute for Basic Biology, NIBB, is a part the Okazaki National Research Institutes located on a hill overlooking the old town of Okazaki. The research institute is composed of three independent organizations, National Institute for Basic Biology, National Institute for Physiological Sciences, and Institute for Molecular Science.

NIBB is an interuniversity research institute with its own research programs as well as cooperative programs to promote basic biology in Japan. The programs are 1) joint research programs in which university scientists are invited to participate in research projects with NIBB members, 2) facility-sharing programs in which university scientists utilize the institute's research resources, 3) graduate student training programs in which graduate students from universities spend fixed periods of time with the NIBB, and 4) international programs in which foreign scientists are invited to NIBB to conduct research projects.

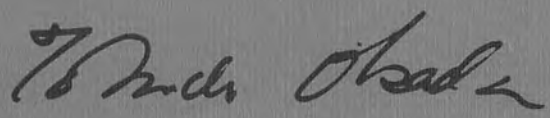
PROF. T. S. OKADA

INTRODUCTION

The National Institute for Basic Biology (NIBB) aims to facilitate basic research in the biological sciences in Japan by conducting advanced studies to elucidate various fundamental mechanisms underlying living organisms. Research areas include studies of cell growth, development and differentiation, and control of various cell functions, among others. The ultimate goal is to understand the mechanism of phenomena in eukaryotic organisms at the molecular level. Analytical approaches include biophysical, cell biological, and molecular techniques, incorporating the latest methods of gene manipulation.

The NIBB, is an inter-university research institute, and as such has a two-fold mission: (1) to conduct in-house research and (2) to make the facility available for collaboration with scientists outside the NIBB. Thus, the NIBB is an "open" institute. The Institute contains three departments, Cell Biology, Developmental Biology, and Regulation Biology, which are divided into 13 divisions. Each division is staffed by a full professor, an associate professor and two research associates. Six of the professional appointments are adjunct professorships; these individuals have joint appointments at other institutes in Japan. The NIBB sponsors joint research programs with participating individuals or research groups nationally and internationally.

The NIBB provides an opportunity to share reseach resources among biologists in Japan and from abroad. It also sponsors symposia on current topics at the interdisciplinary level by inviting participation by leading scientists in various related fields, both from inside Japan and abroad. Thus, the NIBB is becoming and will continue to be an internationally recognized facility for conducting basic research in the biological sciences.



T.S. Okada, D.Sci.
Director General

ORGANIZATION OF THE INSTITUTE

The Okazaki National Research Institutes, ONRI, are composed of three individual Institutes, NIBB, Institute for Molecular Science (IMS), and National Institute for Physiological Sciences (NIPS). The president of ONRI is Prof. Saburo Nagakura. IMS and NIPS are headed by Professors Hiroo Inokuchi and Setsuro Ebashi, respectively.

Policy and Decision Making

The Director General overseas the operation of the institute assisted by two advisory bodies, the Advisory Council and Steering Council. The Advisory Council is made up of distinguished scholars representing various fields of science and culture, and advises the Director General on the basic policy of the institute. The Steering Council is made up of professors of the institute and an equal number of professors from other leading universities in Japan, and advises the Director General on the scientific activities of the institute. The Council advises on faculty appointments and on the institute's annual budget.

Administration

Administration of the institute is undertaken by the Administration Bureau of the Okazaki National Research Institutes under the direct auspices of the Ministry of Education, Science and Culture. Currently the chief administrator is Mr. Kiyoshi Inoue.

Research

The institute conducts its research programs through three departments organized into 13 divisions. Each division has its own research project and is staffed by a professor, an associate professor and two research associates. A division forms a project team and is expected to be reorganized when a division's project is completed. Half of the divisions are for adjunct professorship and are under professors who hold joint appointment with other universities. The adjunct division has resident research associates. The arrangement aims to facilitate exchange of research activities in Japan.

Technical Department manages the activities of research techniques and help to promote research activities of each division and also to maintain the research resources of the institute. The department undertakes the technical education of its staff.

Research Support Facility

The research support facilities of NIBB consist of the Large-scale Spectrograph Laboratory, Tissue and Cell Culture Laboratory, Laboratory Computer Facility, Plant Culture Facility, Plant Cell Culture Facility, and Experimental Farm. In addition, seven facilities are operated jointly with the National Institute of Physiological Sciences; they consist of the Radioisotope Facility, Electron Microscope Center, Center for Analytical Instruments, Machine Shop, Laboratory Glassware Facility, Animal Care Facility, and Low-Temperature Facility.

Campus

The Okazaki National Research Institute covers an area of 150,000 m^2 with four principal buildings. The NIBB's main research building has a floor space of 10,930 m^2. Two-thirds of the space was completed in 1982 and the remaining third in June, 1983. The buildings to house research support facility was also completed in June 1983.

DEPARTMENT OF CELL BIOLOGY

Chairman: Yoshihiko Fujita

Two research divisions and three adjunct research divisions are conducting research on the structure and function of cells at the molecular level.

Division of Cell Mechanisms

Professor: to be appointed.
Associate Professor: Toshiyuki Nagata
Research Associate: Shigeyuki Kawano
Kazuo Ogawa

A new professor will be appointed to this division, which was headed by Professors Noboru Kamiya and Tsuneyoshi Kuroiwa.

Division of Bioenergetics

Professor: Yoshihiko Fujita
Associate Professor: Shigeru Itoh
Research Associate: Mamoru Mimuro
Kaori Ohki

Mechanisms involved in energy conversion in photosynthesis have been investigated. Special attention has been paid to the mechanism of homeostasis in the photosynthetic energy conversion system. The study has been conducted with algal systems and focused on the regulatory change of the composition of the energy conversion system in response to the light. The mechanisms of excitation energy transfer in the light-harvesting antenna and of the photochemical reaction in the reaction centers have also been investigated with isolated functional protein complexes.

Division of Cell Fusion (Adjunct)

Professor: Tsuyoshi Uchida
Associate Professor: Masaru Yamaizumi
Research Associate: Masahiro Ishiura
Kenji Kohno

Molecular and cellular biology of mammalian cells including human cells, aided by cell engineering and recombinant DNA technology, are the research projects of this division. In relation to the action mechanism for diphtheria toxin in mammalian cells, currently, the structure and function of the elongation factor-2 (EF-2) involved in the protein synthesizing system of mammalian cells have been extensively studied at the molecular level using cloned EF-2 genes. Cosmid cloning has been established by constructing simplified cosmid vectors and selecting adequate *E. coli*. Elucidation of the mechanism for DNA repair in mammalian cells is also in progress.

Division of Cellular Communication (Adjunct)

Professor: Yoshiro Shimura
Associate Professor: Kenzo Nakamura
Research Associate: Kiyotaka Okada

The division pursues molecular biological as well as genetic analyses on gene regulation mechanisms of higher plants, especially *Arabidopsis thaliana,* a small crucifer. Our interests are on the genes whose expressions depend on developmental stages or on specific tissues, and genes which respond to environmental stimuli such as light and temperature. We are also interested in the genes responsible to cell division and RNA processing procedures.

Division of Cell Proliferation (Adjunct)

Professor: Yasuhiro Anraku
Associate Professor: to be appointed.
Research Associate: to be appointed.

The division conducts research into the mechanisms of cell proliferation and cell division cycle through genetic, biochemical, and morphological approaches. Main projects are to explore the genetic systems and molecular mechanisms of calcium control of organelle biogenesis, mitosis, and cytoskeleton network.

DEPARTMENT OF DEVELOPMENTAL BIOLOGY

Chairman: Goro Eguchi

The department is composed of three research divisions and one adjunct research division, and conducts research into the cellular and molecular mechanisms of various processes that are involved in developmental phenomena.

Division of Reproductive Biology

Professor: Yoshitaka Nagahama
Associate Professor: to be appointed.
Research Associate: Hiroko Shirai
Takeo Kishimoto

The division conducts research on the cellular and molecular mechanisms of formation and release of gametes in multicellular animals, particularly the hormonal control of oocyte growth, oocyte maturation and ovulation. These studies combine biochemical, ultrastructural and physiological approaches. Research centers around oocyte maturation in teleosts and starfish. In these animals, our previous studies have established that three major mediators are involved in the regulation of oocyte maturation: gonadotropin (GTH) or gonad-stimulating substance (GSS), maturation-inducing substance (MIS) and maturation-promoting factor (MPF). These three mediators function sequentially at the levels of the follicle layer, the oocyte surface and the oocyte cytoplasm, respectively. Currently our research is concerned with (1) the characterization and/or synthesis of teleost GTH and starfish GSS, (2) the molecular mechanisms of biosynthesis of salmonid MIS, 17α, 20β-dihydroxy-4-pregnen-3-one, and starfish MIS, 1-methyladenine, in ovarian follicle cells, (3) the characterization of GTH receptors located on salmonid ovarian follicle cells, (4) the characterization of the MIS receptors located on the oocyte surface, and (5) the characterization and function of MPF.

Division of Cell Differentiation

Professor: Yoshiaki Suzuki
Associate Professor: to be appointed.
Research Associate: Shigeharu Takiya
Toshiharu Suzuki

Members of the division have been analyzing developmental regulation of the tissue-specific genes and the homeotic genes in *Bombyx mori*. The silk fibroin gene starts to be transcribed specifically in the posterior silk gland cells as soon as the silk gland morphogenesis has been accomplished in a late embryonic stage, and is repeatedly switched on and off in the following stages. To analyze the molecular mechanisms of this tissue- and stage-specific regulation of transcription, we have developed cell-free transcription systems from several tissues and cultured cells. Using these systems we have detected tissue-specific factor(s) that transacts on

DATA TO DETERMINE THE PROMOTER REGION OF THE SILK FIBROIN GENE.

the distal region of the upstream sequence of fibroin gene. Currently we are concerned with how synthesis and specificity of the factor(s) are regulated. In *Bombyx mori*, more than 20 homeotic mutants that mapped to the proximal end of the 6th linkage group had been described as the "E-group" during the period of 1930 and 1960 in Japan. They exhibit a variety of developmental abnormalities in organogenesis in various body segments, and in most cases homozygosity of the mutant gene results in embryonic lethality. These genes are probably regulating some structural genes that play important roles in pattern formation. We have cloned some of these homeotic genes in order to analyze the molecular events during embryonic development and hopefully to clarify the relationship between these regulatory genes and those structural genes such as fibroin gene that is expressed tissue-specifically.

Division of Morphogenesis

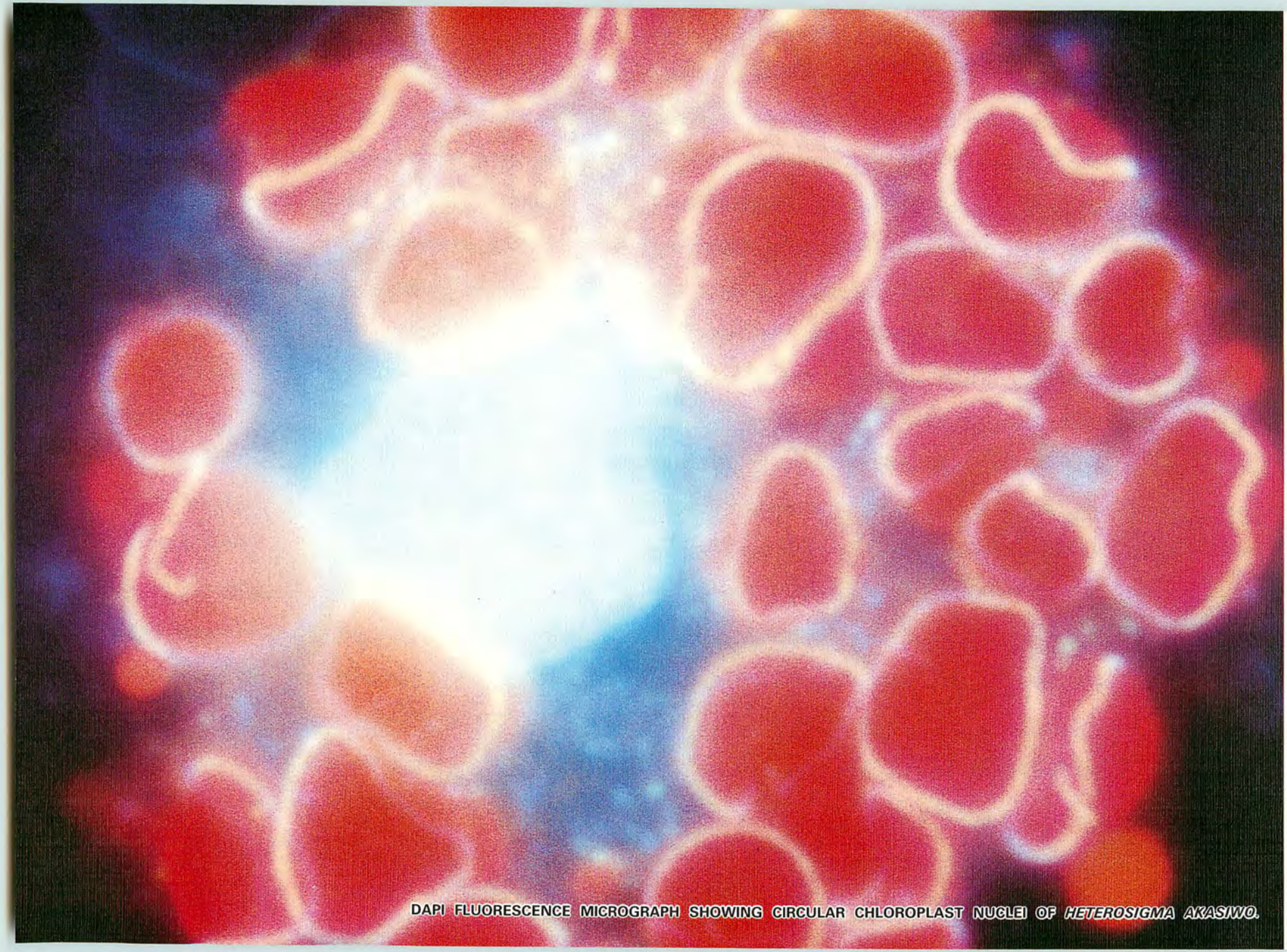
Professor: Goro Eguchi
Associate Professor: Kenji Watanabe
Research Associate: Ryuji Kodama
Kiyokazu Agata

Mechanisms of differentiation and morphogenesis in multicellular organization have been investigated at cellular and molecular levels. The research has been currently focused on the following three projects. (1) The cell culture experimental system of chick embryo pigment epithelial cells (PECs) has been established. This system can produce a multipotential dedifferentiated state of PECs, which is able to redifferentiate to lens cells or pigment cells. By this system environmental factors controlling the transdifferentiation have been analyzed, particularly focussing on the structural and functional changes of the cell surface relating to dedifferentiation and redifferentiation of the PEC. The molecular mechanism of specific gene expression has also been analyzed in the same system. (2) The mechanisms of pattern formation and stabilization of two dimensional epithelial tissue structures have been investigated *in vivo* as well as *in vitro* experimental systems by computer graphics, electron microscopy, micromanipulation and biochemical techniques. Such approaches have also been extended to analyze morphogenesis of three-dimensional tissue structures.
In addition to these two projects, (3) cell changes during morphogenesis of three-dimensional tissue structures have been analyzed in eye lens systems *in vivo* and *in vitro*, particularly focussing on the cell surface functions.

Division of Developmental Biology (Adjunct)

Professor: Ikuo Takeuchi
Associate Professor: Masaki Iwabuchi
Research Associate: Masao Tasaka

Regulation of development has been investigated at cellular and molecular levels with the developmental system of the cellular slime molds. Currently, research is being carried out along the following three lines: (1) Cloning and analysis of genes specifically expressed in pathways of spore and stalk cell differentiation and elucidation of the regulatory mechanisms of their expression. (2) Analysis of non-histone chromatin proteins with the hope of their involvement in regulation of cell-type specific gene expression. (3) Analysis of cell movement during formation of differentiation pattern within the tissue and elucidation of the mechanism of cell sorting.



DAPI FLUORESCENCE MICROGRAPH SHOWING CIRCULAR CHLOROPLAST NUCLEI OF *HETEROSIGMA AKASIWO*.

DEPARTMENT OF REGULATION BIOLOGY

Chairman: Ken-ichi Naka

The department has two divisions and two adjunct divisions, and conducts research on the information processing and control mechanisms in biological systems.

Division of Sensory Processing

Professor: Ken-ichi Naka
Associate Professor: Shozo Yasui
Research Associate: Hiroko Sakai
Eiki Hida

This division's research activity is focused on information processing in the vertebrate visual system and is a continuation of research originating at the California Institute of Technology in 1968 and then conducted at the University of Texas at Galveston in 1977. This research is characterized by unique choice of preparation as well as of methodology. Our principal preparation is the retina of channel catfish, *Ictalurus punctatus*. The retina is very simply organized and our effort has made it one of the most extensively analyzed components in the central nervous system. We have also pioneered the application of the Wiener's theory on nonlinear analysis or white-noise analysis. Our application is the most extensive example of the use of Wiener's theory.

Our analysis has shown that information processing in the retina is composed of three stages: 1) Piecewise linearization in the outer retina, 2) generation of static nonlinearities in the amacrine cells, and 3) encoding of processed information into spike trains.

In the more classic field of morphology, we have discovered three new synapses, a) the synapse made by the horizontal cells back to the receptors, b) the synpase made by the horizontal cells onto the amacrine cells, and c) the synapse made by the ganglion-cell dendrites.

Division of Cellular Regulation

Professor: Norio Murata
Associate Professor: Hideaki Nakashima
Research Associate: Takao Kondo
Mitsue Miyao
Ikuo Nishida

This division studies two important phenomena in higher plants and microalgae: (1) The molecular mechanisms of low-temperature sensitivity and adaptation to temperature stress. (2) The structure and function of chloroplast membrane proteins in photosynthesis. The temperature work emphasizes the participation of biological membranes and membrane lipids. The enzymes which produce special lipid molecules that are responsible for the low-temperature sensitivity and their genes are under investigation. The photosynthesis research focusses on the machinery of the oxygen-evolving complex. The ultimate goal of this research is to elucidate the three-dimensional structure of the oxygen-evolving complex.

Division of Biological Regulation (Adjunct)

Professor: Hidemasa Imaseki
Associate Professor: to be appointed.
Research Associate: Kotaro Yamamoto
Satoru Tokutomi

The research in this division aims to study responses of plants to environmental stimuli at the biochemical and molecular levels. Special attention is paid to the developmental changes of cell functions during conversion of immature leaves to mature leaves of

leguminous plants as affected by light, plant hormones and ageing, and to mechanisms of acquisition of thermotolerance by a temporal treatment at a high temperature.

Division of Behavior and Neurobiology (Adjunct)

Professor: Katsuhiko Mikoshiba
Research Associate: Takaai Tamura

In our research division, we are studying the mechanism of development, growth, and differentiation of the mammalian nervous system at the molecular level. The main themes of our division are:
(1) Studies on myelin-deficient mutant animals. We have produced several mutants with abnormalities at different steps of myelinogenesis. We are studying myelination as a typical morphogenetic phenomenon in the central nervous system, and also as a neuron-glia inter-relationship.
(2) Studies on the mechanism of brain specific gene expression. We are studying these subjects with both *in vitro* and *in vivo* systems. In the *in vitro* system, we are studying promoter activity of myelin basic protein (MBP) and proteolipid protein (PLP) genes by cell-free transcription assays. In the *in vitro* system, we are utilizing the cells from a neurological mutant mouse termed *shiverer*. The *shiverer* mouse is characterized by the absence of MBP. Most of the MBP gene is deleted. We are studying the mechanism of MBP gene expression by introducing the MBP gene into various types of the cells in *shiverer*.
(3) Studies on the function of brain-specific proteins. Brain-specific proteins, such as MBP, PLP, and neurofilament (NF) were artificially expressed in various strains of cell lines including NIH3T3 cells by retrovirus vector mediated gene transfer. Localization and effect of protein production on morphology have been investigated.

TECHNICAL DEPARTMENT

Head: Hachiro Honda

The Technical Department is a supporting organization for researchers and reseach organizations within the NIBB. The department develops and promotes the institute's research activities and, at the same time, maintains the research functions of the institute.
The department is organized into two groups: one, the Common Facility group, which supports and maintains the institute's common research facilities and the other, the Research Support group, which assists the research activities.
Technicians participate, through the department, in promoting their capability through mutual enlightenment and education so that their capability in technical areas develops.

Head: **Hachiro Honda**
Staff:
Common Facility Group
Tissue and Cell Culture Laboratory: **Masahiro Kawaguchi**
Large-Scale Spectrograph Laboratory: **Mamoru Kubota**
Experimental Farm: **Chieko Nanba**
Laboratory Computer Facility: **Masahiro Nasu**
Radioisotope Facility: **Kazuhiko Furukawa**, **Yukie Shinohara**, **Kanako Funadera**
Center for Analytical Instruments: **Hiroyuki Hattori (Chief)**, **Hiroko Kajiura**

Hisashi Kojima
Hisaya Uemura

Laboratory Glassware Facility:
Toshiki Ohkawa

Research Support Group

Department of Cell Biology:
Akio Murakami
Soichi Nakamura
Masayo Iwaki

Department of Developmental Biology:
Shinji Adachi
Kaoru Kato
Mayumi Nasu
Miyuki Oda
Noriko Sakurai

Department of Regulation Biology:
Yu-ichiro Ando
Yohko Fujimura
Soh Hidaka

RESEARCH RESOURCE

There are four categories of research support facilities available to research members and visiting biological scientists: 1) Campus-wide facilities (CENTRAL COMPUTING CENTER and LIBRARY), 2) NIBB's own research support facilities (RESEARCH SUPPORT FACILITY, intramural), 3) facilities jointly maintained by the NIPS and the NIBB but managed either by the NIPS (ANIMAL-CARE FACILITY) or by the NIBB (RADIOISOTOPE FACILITY), 4) facilities jointly run by NIPS and NIBB (CENTER for ANALYTICAL INSTRUMENTS, ELECTRON MICROSCOPE CENTER, LABORATORY GLASSWARE FACILITY, MACHINE SHOP and LOW-TEMPERATURE FACILITY).

RESEARCH SUPPORT FACILITY

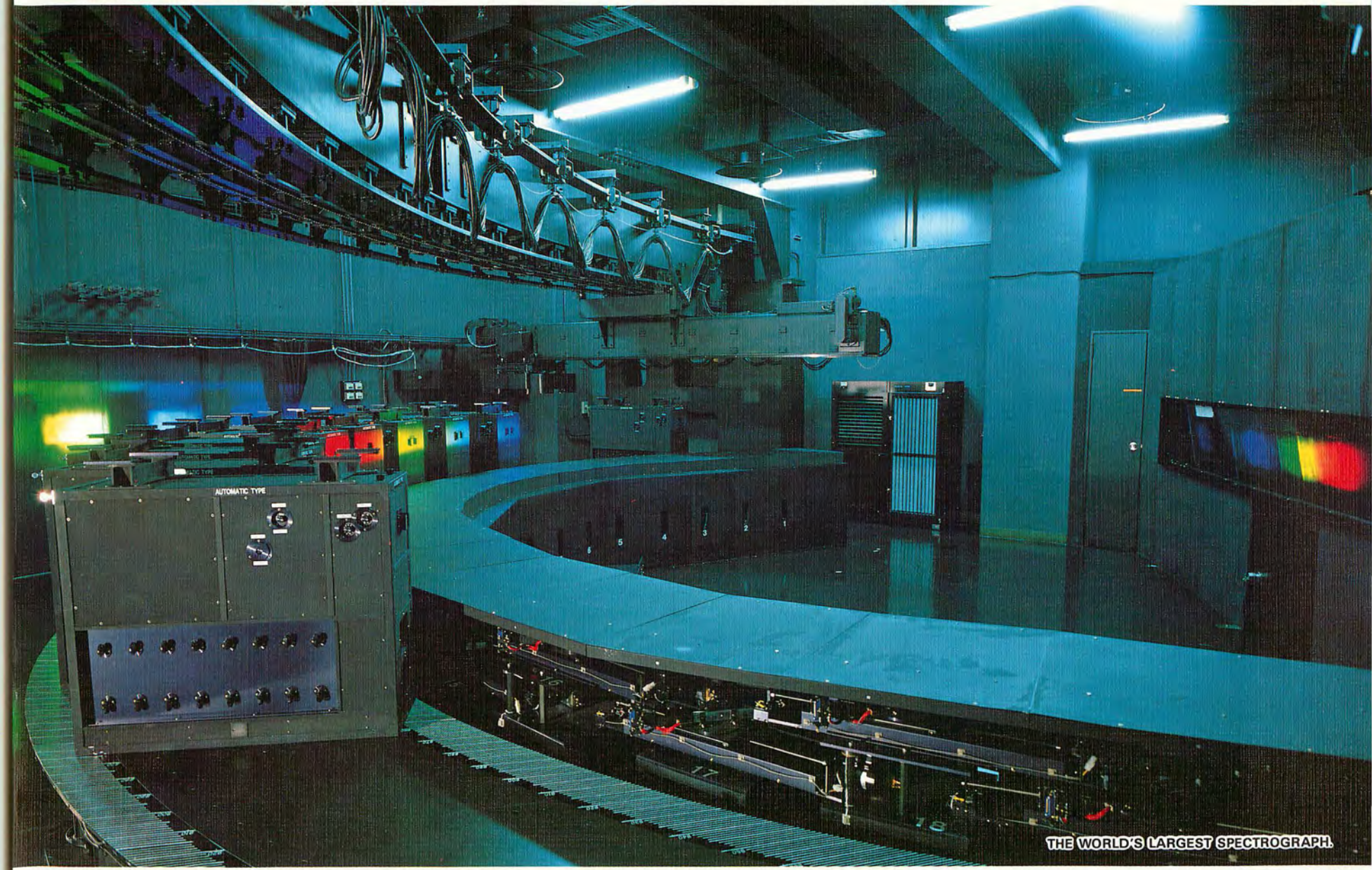
Head of Facility: Yoshiaki Suzuki
Faculty: Masakatsu Watanabe (Spectrograph)
Yoshio Hamada (Tissue and Cell Culture)

The facility maintains large-scale experimental equipments and facilities for growing and maintaining biological specimens. The facility is shared among the research members, and has five laboratories.

The large-scale spectrograph laboratory: This laboratory has the largest spectrograph in the world custom-built by Naka works, HITACHI Ltd. The spectrograph runs on a 30KW-Xenon arc lamp and has a compound grating-surface composed of 36 smaller individual grating. A computer controls the positioning and time-scheduled light exposures of 12 speciment boxes.

Tissue and cell culture laboratory: This is a facility for tissue and cell culture. This laboratory is equipped with safety rooms which satisfy the P3 physical containment level. This facility is routinely used for DNA recombination experiments.

Laboratory computer facility: The NIBB's computing is handled by a Digital Equipment Corporation's VAX 11/780 computer with a Floating Point System AP120B array processor and a Spatial Data's image digitizer. An extensive software system for time-series analysis is available as well as a limited number of image processing routines.


AUTOMATIC TYPE
THE WORLD'S LARGEST SPECTROGRAPH.

Plant Culture facility: There are large number of culture boxes, cubicles, and a limited number of rooms with environmental control for plant culture.
Experimental farm: This facility consists of two 20 m^2. glass-houses with precision temperature and humidity control, a limited farm, a large (88 m^2) and a small (45 m^2) green house with automatic sprinklers and window control, two (30- and 50-ton) open aquariums and several smaller tanks. The facility also includes a building with office, storage and work-space.
Plant Cell Culture Facility: Autotrophic and heterotrophic culture devices are equipped for experimental cultures of plant and microbial cells.

RESEARCH FACILITIES

RADIOISOTOPE FACILITIES (managed by NIBB)

Head of Facility: Yoshihiko Fujita
Faculty: Kohji Hasunuma

The facility is composed of a center and two subcenters, one in NIBB and the other in NIPS. The facility is being used for molecular analyses of eukaryotes. At the center a variety of radioisotopes such as ^{3}H, ^{14}C, ^{22}Na, ^{32}P, ^{35}S, ^{45}Ca dnd ^{125}I are mainly handled as well as various species of beta and gamma-ray emitting nucleides. A P3-level laboratory for recombinant DNA research is included in the center facilities. At the substations, only a limited variety of radioisotopes such as ^{3}H, ^{14}C and ^{32}P are processed. The substation in NIBB is equipped with a P2-level recombinant DNA research laboratory. The members of the Radioisotope Facility maintain and control the centers, and give users appropriate guidance for radioisotope handling. The facility members conduct also their own research on the analysis of mutants in the metabolism of cyclic nucleotides in *Neurospora crassa*. The mutants exhibit several characteristic features such as rhythmic conidiation, sensitivity to light, lack in the production of protoperithecium and abnormality in meiosis. The goal of the research is to isolate and characterize the genes for the regulation of cyclic nucleotides with DNA recombination techniques.

ANIMAL-CARE FACILITIES (managed by NIPS)

Vivarium: This is a 2,000 m^2 building for maintaining land animals, including insects. Operations and experiments of a limited scope may be performed in the vivarium.
Aquarium: This is a 600 m^2 facility for both fresh- and sea-water animals. There are 10 ten-ton and 31 0.5-ton tanks in addition to one seven-ton and one two-ton circular tanks. All tanks are individually temperature controlled and are supplied either with deionized water or seawater. There is a lorry with a one-ton temperature-controlled tank to transport aquatic animals and plants.

RESEARCH FACILITIES RUN JOINTLY WITH THE NIPS

ELECTRONMICROSCOPE CENTER

This facility maintains the following microscopes for the use by the institute's members as well as researchers from other universities and research institutions.
Transmission microscope: Hitachi H-500 125KV, JOEL 100-CX and 200-CX 100 and 200KV and Philips EM-400HM 120KV.
Transmission scope, analytical: JOEL 200-CX, 200KV.
Scanning scope: Hitachi S-450 25KV.

CENTER FOR ANALYTICAL INSTRUMENTS

Head of Facility: Norio Murata

The Center for Analytical Instruments consists of the following five sections. (1) Chemical analysis, (2) Preparation of Biological Materials, (3) Spectroscopic analysis, (4) Physical analysis, and (5) Microscopic analysis. Each section is equipped with instruments for general use as listed below.

1. Sections for Chemical Analysis

Amino Acid Analyzer	HITACHI 835
HPLC	JASCO TRIROTAR III
Peptide Sequence Analyzer	JOEL JAS-47K
Peptide Synthesizer	BECKMAN 990C

2. Section for Preparation of Biological Materials

Coulter Counter	COULTRE ZB
Isotachophoresis System	LKB 2127 TACHOPHOR
Preparative Ultracentrifuge	BECKMAN L8-80
Two Parameter Cell Sorter	BECTON-DICKINSON FACS-II

3. Section for Spectroscopic Analysis

Atomic Absorption Spectrophotometer	PERKIN-ELMER 603
Differential Refractometer	CHROMATIX KMX-16
Dual-wavelength, Spectrophotometer	HITACHI 557
Infrared Spectrophotometer	JASCO A-302
Laser-Roman Spectrophotometer	JASCO R-800
Light Scattering Photometer	CHROMATIX KMX-6DC
Spectrofluorometer	HITACHI MPF-4
Spectrophotometer	CILFORD 250
	HITACHI 330
Spectropolarimeter	JASCO J-40S

4. Section for Physical Analysis

Analytical Ultracentrifuge	HITACHI 282
Differential Scanning Calorimeter	PERKIN-ELMER DSC-2
EPR Spectrometer	BRUKER ER 200D
GC Mass Spectrometer	HITACHI M-80
Superconductive FT-MNR Spectrometer	BRUKER WM 360 wb
Viscometer	CONTRAVES RM-30

5. Section for Microscopic Analysis

2-Dimension Microdensitometer	JOYCE LOEBL 3CS
Film Data Analysis System	NAC MOVIAS GP-2000
Image Analyzer	KONTRON MOP-AM03
Interactive Image Analyzer	KONTRON IBAS-I.II
Microscope Photometer	CARL ZEISS MPM 03-FL

COOPERATIVE RESEARCH ACTIVITIES

The NIBB sponsors four cooperative research activities.

Individual and group cooperative research program: Scientists from other Japanese universities and research institutes are invited to undertake joint research projects with the institute's members. Limited funds are available for travel and expenditures related to the projects.

Research conferences: The NIBB sponsors research conference on important subjects in biology. Ten to twenty scientists are invited and intense discussion is held for two to three days. The NIBB provides financial support for the participants. Conferences may be initiated by the institute's members or scientists from other institutes.

Facility-sharing program: Scientists from other universities are permitted to use specified instruments maintained by the NIBB. No financial support is available except for the Large Scale Spectrograph whose user is provided with limited financial support.

Graduate student program: Graduate students from other universities may spend a fixed period of time with members of NIBB. This allows students to have experience with the very modern facility of NIBB. The NIBB is expected to have its own graduate program in the near future.

LIBRARY

The three institutes of the Okazaki National Research Institutes share a common library facility. The library is a part of the main administration building and has a floor space of 2,500 m^2.

The library has 9,350 books in Japanese and 30,050 in foreign languages, and subscribes to 237 Japanese and 446 foreign journals. Lending records, inventory and literature searches are computerized. The library is open 24 hours a day.

LODGING FACILITY

The Okazaki National Research Institutes maintain two lodging facilities, the Mishima Lodge and Yamate Lodge. Mishima Lodge is a few minutes walk away; Yamate Lodge is less than 20 minutes. The lodges are for scientists and their families staying for fixed periods of time with the institutes. Some suites and bungalows are provided with kitchenette facilities. There is a modest charge to help maintain the facilities.

Mishima Lodge has 54 single rooms, 4 twin rooms, 6 suites, and 10 bungalows for large families. Yamate Lodge has 11 single rooms, 4 suites and 2 family complexes.

On the campus there is a dining facility that is open Monday through Saturday.

THE CITY

The city of Okazaki, incorporated in 1916, is located 30 kilometers southeast of Nagoya, the fourth largest city in Japan. A high-speed urban train connects the two cities.

Okazaki, with a population of 275,000, is a typical medium-size city in Japan and offers the convenience of urban life while avoiding the disadvantages of a large city. Okazaki is the commercial as well as cultural center of the Mikawa (Three River) district with its rich historical heritage. Iyeyasu Tokugawa, the first Tokugawa Shogun, was born here in 1542 and built a castle here. The original parapets and moats and the rebuilt castle still dominate the city as they did 500 years ago. When he established the Shogunate in Edo (the former name of Tokyo) in 1603, Iyeyasu took a large contingent of Mikawa Bushi (Mikawa Samurai or professional warriors) with him. Those Mikawa Bushi formed the nucleus of Iyeyasu's new administration.

Within a radius of 10 kilometers from the city center are located Mitsubishi Motor's Okazaki Plant, Toyota Motor's main production facilities in Toyota city, and Sony's ultramodern Koda plant which produces video tape/disc recorders.

TRANSPORTATION

BY TRAIN

From Tokyo to Toyo-hashi: Two and half hours by the Japan Railway's (JR-Tokai) super-express train (KODAMA or ECHO). The train runs every 30 min.

From Toyo-hashi to Okazaki: Twenty five minutes by the Mei-tetsu (Nagoya Railway) express. Mei-tetsu's station in Okazaki is Higashi (or East)–Okazaki. The train runs every 20 to 30 min. This is the most convenient route to come to Okazaki from Tokyo.

From Tokyo to Nagoya: Two hours by the JR's super-express train (HIKARI or LIGHTENING). The train runs every 30 min.

From Kyoto/Osaka to Nagoya: One to two hours by the JR's super-express train (HIKARI/KODAMA). Kin-tetsu (Kinki Nippon Railway) also serves between Osaka/Nara and Nagoya.

From Nagoya to Okazaki: Thirty five minutes by the Mei-tetsu express which runs every 20 min.

BY AIR

Domestic airlines serve Komaki, Nagoya, airport which is a 1-hour. drive from Okazaki.

WEATHER

In Okazaki, temperature goes up to 30 degree centigrade in summer and down to a few degrees above the freezing point in the winter. May to June is the rainy season and the spring (March to May) and fall (September to November) are most pleasant.

THE OKAZAKI CASTLE,
THE HOME OF THE FIRST
TOKUGAWA SHOGUN, IYEYASU.

DIRECTOR GENERAL

TOKINDO S. OKADA, B. Sci. & D. Sci. (zoology, Kyoto Univ.). Research Associate, Department of Zoology, Kyoto Univ. (1954–59). Macaulley Fellow, Univ. Edinburgh (1957–59), Lecturer, Department of Zoology, Kyoto Univ. (1960–61), and Associate Professor, (1962–66). Carnegie Fellow, Department of Embryology, Carnegie Institution of Washington (1964–1965). Professor, Department of Biophysics, Kyoto Univ. (1967–), Director General, NIBB (1984–).

PROFESSORS EMERITUS

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