For Trust, Sustainability and Leadership
Greetings

Yusuke OBATA, Ph.D. 
RIKEN BioResource Center

RIKEN has embarked on the Third Term as an independent administrative institution from April 1, 2013. Over the next five-year period, it will commit to the activities defined by the Japanese government’s Fourth Basic Plan for Science & Technology, which calls for promotion of science, technology, and innovation, as well as reconstruction and rebuilding from the disaster, with the following three specific objectives as its pillars of endeavor:

- To promote solution-oriented research and development to meet national and social needs
- To promote development, maintenance, sharing, and usage of research infrastructures of highest level
- To promote cross-organizational collaboration, industry-academia partnership, and international cooperation for making significant contributions to our society

As a part of RIKEN, the BioResource Center (BRC) will strive to function as one of the “research infrastructures of highest level,” as it did during the First and the Second Terms.

Since its establishment in January 2001, the BRC has been engaged in collection, preservation, quality control, and distribution of bioresources that are indispensable for research in life sciences, including experimental mice, the model experimental plant Arabidopsis, cell lines of human and animal origins, genetic materials, and microorganisms, along with conducting relevant R&D. Guided by its three founding principles—“Trust,” “Sustainability,” and “Leadership,” our Center has come to be recognized as one of the world’s most prominent institutions for repository in all these categories of bioresources. We would like to express our sincere gratitude to research community and more broadly, to all the people of Japan for their understanding and support.

In recent years, competition for bioresources is becoming increasingly severe around the world. On the other hand, the variety of bioresources required for research has become overwhelming, having already exceeded the capacity of a single center or even all centers in an entire country. International partnership and cooperation are highly needed. Furthermore, it is required for all of us to make sustainable use of biological resources for the future, in compliance with the Convention on Biological Diversity and the Nagoya Protocol. With this background, the BRC is taking initiative as Japan’s core center in various international collaborative efforts by bioresource centers. Among such efforts, in particular, we established the Asian Network of Research Resource Centers with other members from more than ten countries. We would like to continue to play a leading role in making bioresources available and facilitate their use for global scientific community.

Our mission is being second to none in responding to both social and academic needs quickly and flexibly by grasping research trends, fully using our expertise, and thus, we will dedicate ourselves to make the BRC most reliable and widely appreciated. We wish to create a brand new value through developing our operations, in hope of serving as a dependable infrastructure for research activities that address vital issues of public concerns such as health, environment, energy, and food, in order to ensure survival and development not only of the Japanese and our nation but of all human beings. Our Center is built upon the support and the request of our users, and we hope that we may rely on your continuing support into the future.

Since its establishment in 2001, the RIKEN BioResource Center (BRC) has made steady progress. We have gained recognition around the world as a leader in each of the areas that we provide resources in, including experimental mice, Arabidopsis experimental plants, cell lines of human and animal origins, genetic materials, and microorganisms. We have now become a key member of resource provider networks in the West and in Asia. Going back to the days when we founded this center, I am deeply grateful for the efforts of all our staff as well as the support and understanding we received from people in both the academic and administrative fields. As the director, Dr. Obata, has already stated, in considering the future direction we should take, we need to consider trends in the life sciences both in Japan and abroad concerning the provision of resources. Moreover, we must work to gain increased understanding of the importance of human resources in the area of bioresources, since they are an important foundation for supporting research in the life sciences, which have become intimately linked to our society today.

It is critical, of course, for the managers of our center to be thoroughly familiar with the bioresource enterprise we are involved in. In addition, we should not underestimate the importance of the technical specialists who play a core role in our activities. It is not realistic to judge them merely through the number of papers they publish. Rather, we require a unique job classification system. As an important condition for maintaining the “Trust” and “Sustainability” that are our founding mottoes, we must endeavor to gain the understanding of all the stakeholders involved in our activities.

The Noyori Initiatives
1. Visibility of RIKEN
2. Maintaining RIKEN’s outstanding history of achievement in science and technology
3. RIKEN that motivates researchers
4. RIKEN that is useful to the world
5. RIKEN that contributes to culture

The three pillars toward RIKEN 100th anniversary (2017)
- Making dramatic advances in science and technology
- Contributing to society and being trusted by society
- Making RIKEN a globally recognized brand

Mission

Providing bioresources to life science researchers worldwide

Life Innovation

Green Innovation

Regenerative Medicine
Cell therapy
High quality of life in rapidly aging society

Bioresources are indispensable in all these areas!

Cancer Research
Novel prevention and diagnostic methods
Advanced and novel treatment

Environmental Issues
R&D for bioenergy production
Global warming issues

Food Production
Stress tolerant crops
Probiotic food

Basic and Fundamental Sciences
Essential materials supporting all fields of life science
Overview of The RIKEN BRC

The RIKEN BRC operates with three principles, “Trust”, “Sustainability” and “Leadership”

The 5 Year Plans of RIKEN BRC, 2013-2017

Bioresource Infrastructure
1. Collection, Preservation & Distribution
2. Quality Control and Improvement Backup
3. Training and Education, Public Relation
4. International Cooperation

Key Technology Development
Technologies for efficient production, preservation, distribution and quality control

Bioresource Frontier Programs
Novel characterization technologies, databases and novel bioresources

Protection of Intellectual Property Rights of the Developers and Promotion of Science

For Sustainable Use of Irreplaceable Bioresources

Individual Researches
Mouse Strains, Cell Lines, and others,
The University of Tokyo, University of Tokyo Institute of Molecular and Cellular Bioscience,
Former Institute of Applied Microbiology, IAM Culture Collection, HIN Microbe Strains
Primary University, Institute of Development, Aging and Cancer, All Human and Animal Cancer Cell Lines
Kagoshima University, 4,000 blood Specimens of Japanese and Mongoloid

Bioresources from National Projects
Genome Network Projects, Human CDNA, Protein 3,000 Project
DNA of Human, Animal, Microorganisms

Support both Academic and Output-oriented Researches
Health, Food Production, Green Energy, Environment

Promotion of Science, Technology & Innovation

The RIKEN BRC as a station for dissemination of bioresources produced by RIKEN and Japanese scientists

The BioResource Center collaborates with other centers within RIKEN and with universities, research institutions and industries, performs collection and distribution of bioresources, and serves as a hub for the national and international research community.
Arabidopsis

We distribute mutant Arabidopsis resources that are useful for functional genomics.

We establish SABRE database that connects plant cDNA to Arabidopsis genes.

We maintain plant cultured cell lines that can be applied to both basic and applied researches.

(Experimental Plant Division)

Mouse

Collection, preservation and distribution of high-quality mouse resources useful for basic researches to contribute our health.

Development of novel mouse resources and technologies for preservation, distribution and quality control.

Provision of training courses for advanced technologies to best use mouse resources.

(Experimental Animal Division and Bioresource Engineering Division)
From life sciences to clinical applications

Cell

As a striking fact, approximately 30% of the deposited cell lines are infected with mycoplasma and nearly 10% of them are misidentified with other cell lines.

The cell engineering division is providing a high quality cell lines free of mycoplasma infection and misidentification. In order to contribute not only to basic sciences but also to applied sciences, we are providing various cell materials such as human cancer cell lines, ES cells, iPS cells, and human somatic stem cells.

In addition, we are also offering training courses for the technologies relating to cell culture. (Cell engineering Division)

Gene

A tool to understand how the body works

We aim to facilitate life science research for improvement of human welfare and for solution of environmental issues and hope to contribute to the sustainable development of science.

Genetic materials are the most fundamental and essential research tools. They are used in the all fields of the life science, from basic to applied researches.

Current trend is to search and find genetic materials by internet. A clone of desired gene can be easily retrieved via the web sites. (Gene Engineering Division)
Microbe

We are contributing to a wide-variety of researches from basic to applied science by collecting and providing diverse authentic type strains and their derivatives of microorganisms.

We hold a number of microbial strains useful for researches in sustainable development and environmental issues such as production of bioenergy, development of biodegradable plastics, and bioremediation.

We hold a number of strains isolated from human and its surrounding environments. These strains are beneficial for health science such as improvements of enteric condition and immunological competence, antibiotic production, and fermented food.

(Microbe Division / Japan Collection of Microorganisms)

Laboratories

**Experimental Animal Division**

**NBRP Mice**

- Collection, preservation and distribution of high-quality mouse resources useful for basic researches to understand the gene functions and to cure human complex diseases.
- Development of novel mouse resources and relevant technologies for preservation, distribution and quality control.
- Provision of training courses to disseminate advanced technologies for the best use of frozen strains and quality control of mouse resources.

**Experimental Plant Division**

**NBRP Arabidopsis, Cultured Plant Cells, Genes**

- Collection, preservation and distribution of various Arabidopsis resources that are indispensable for plant science.
- Maintenance and improvement of plant cultured cell lines and genetic materials for the studies on environment, food, and useful materials.
- Development and propagation of technologies and databases that promote effective use of biological materials.

**Cell Engineering Division**

**NBRP Human and Animal Cells**

- We are collecting and providing the following cells: cultured cell lines such as human cancer cells; stem cells such as ES cells, iPS cells and human somatic stem cells; the cells for human genome research.
- We accept donation and deposition of the cells that have been developed by life science community, carry out quality control of them, standardize them, and provide high quality cell materials to all scientists around the world.
- We offer training courses for the technologies relating to cell culture, so as to contribute to the development of new technology such as human ES cells and iPS cells.
**Gene Engineering Division**

**Head** Yuichi OBATA, Ph.D.

- The Gene Engineering Division conducts rigorous quality control on genetic materials and provides domestic and international scientific community with the materials of ensured reproducibility of experimental results. We aim to contribute to solution of problems in human health and environment.
- We distribute genes derived from human, animals, and microorganisms as well as expression vectors for forced expression and reporter plasmids for monitoring gene expression. We have opened a path to the academic use of genetic materials produced by research tools owned by commercial entities.
- By comprehending newest trends and needs of life science, we collect and distribute genetic materials developed in the domestic and international scientific community as well as compiled products of National Projects.
- RIKEN BRC securely preserves bioresources and uses the Material Transfer Agreements (MTA) for each transfer of bioresources to protect the intellectual property rights of the developers of genetic materials and to define the responsibility of users.

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**Microbe Division**

**Japan Collection of Microorganisms**

**Head** Mariya OhKUMA, Ph.D.

**NBRP** DNA Material

- Preservation and provision of scientifically important microbial strains representing diverse species of Bacteria, Archaea, and Fungi.
- Collection of microbial bioresources that contribute to environmental and health science, enrichment of information of the strains in the database, addition of high values to them, and development of related technology.
- Provision of reliable high-quality microbial cultures by intensive quality control with genetic and physiological tests and stable preservations.

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**Bioresource Information Division**

**Head** Kaoru FUKAMI, Ph.D.

- Collection, analysis, management of bioresource information and its dissemination to research communities through the web-based catalogs.
- Development and operation of tools for users to make BRC bioresources easy to use.
- Development and operation of distribution system necessary to execute the mission of BRC efficiently.

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**Support Unit for Quality Management**

**Head** Hisao MOTEKI

**Endeavor to deliver the biological resources of reliable quality**

**Uniform international quality standard : ISO 9001**

We shall strive for excellence and take all possible measures to QMS (Quality Management System) in order for BRC to achieve total customer satisfaction and to deliver the highest value biological resources and services on time.

- Maintenance of ISO 9001 certification to deliver the biological resources of reliable quality, and horizontal development of ISO management system framework.
- Endeavor for customer satisfaction, human resource development and continual improvement, based upon Total Quality Management (TQM) which has made Japanese manufacturing industry very strong.
- Realization and standardization of high-quality, speedy and simple job process, by means of the data digitization making use of the latest Information Communication Technology (ICT).

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**Bioresource Engineering Division**

**Head** Atsuo OGURA, D.V.M., Ph.D.

- Nuclear transfer cloning: Establishment of an efficient technique for production of cloned mice. A great leap to the practical use of cloning technology in mammals.
- Microinsemination (sperm injection): Production of normal mice using not only normal mature spermatozoa, but also immature spermatids and spermatozoa retrieved from frozen mouse bodies.
- Cryopreservation of embryos and germ cells and their transportation: Development of embryo cryopreservation techniques applicable to a variety of mouse strains. Safe transportation of vitrified embryos in dry ice packages to avoid the use of dry shippers.
- Establishment of new stem cell lines: Mouse ES cells with different characters and different origins. Rabbit ES cells and iPS cells with potential usefulness as new experimental models.
- Technical training courses (Cryopreservation of mouse sperm and embryos, Establishment and maintenance of mouse embryonic stem cells).
Technology and Development Team for Mammalian Genome Dynamics

Team Leader
Kuniya ABE, Ph.D.

- Technology development for functional genomic analysis: methods for high resolution genotyping and genome manipulation utilizing high quality BAC genomic resources.
- Technology development for characterization of embryo-derived stem cells and germ cells: analysis of molecular features that characterize cell types in which "genomic reprogramming" take place utilizing novel visualization tools and micro-analytical methods.
- Technology development for bioimaging: analysis of cellular behaviors and functions in vivo utilizing an intravital microscope equipped with novel stick-type lenses.

Technology and Development Team for BioSignal Program

Team Leader
Yoichi OBATA, Ph.D.

- Study for the elucidation of the regulatory mechanisms of autoimmune and inflammation systems.
- Study for the elucidation of the regulatory systems of bone metabolism.
- Study for the elucidation of the regulatory mechanisms of hematopoesis systems.
- Development of methods to expand hematopoietic stem cells in vitro.
- Development of methods for efficient generation and stable expansion of pluripotent stem cells (ES and iPS cells).
- Development of viral vectors to transfer genes into cells and their use in stem cell research.

Technology and Development Team for Mouse Phenotype Analysis

Team Leader
Shigeharu WAKANA, Ph.D.

- Systematic and comprehensive phenotypic analyses for genetically-modified mice based on the fundamental and in-depth pipelines in the Japan Mouse Clinic.
- Contribution to international mouse phenotyping project through the participation to IMPC(International Mouse Phenotyping Consortium).
- Intellectual infrastructure for the mouse resource through the integration of mouse phenotype information with the related clinical data on human diseases.

Team for Advanced Development and Evaluation of Human Disease Models

Team Leader
Tetsuo NODA, M.D., Ph.D.

- Cutting-edge research technologies for metabolic syndrome models: advanced phenotype analyses using proteomic and metabolomic methodology to develop human metabolic syndrome models.
- Quest for cure of the physiological impairments: deafness model and hypertensive model development to better understand their molecular mechanisms.
- Informative models of human carcinogenesis: advanced comprehensive analyses to develop models for pre-symptomatic diagnosis and novel anti-cancer drug development.

Mutagenesis and Genomics Team

Team Leader
Yoichi GONDO, Ph.D.

- Base-substitution mice in your target gene: Originally developed open resource for mouse reverse genetics by random ENU mutagenesis.
- Next-generation sequencing of whole mouse exome: Discovery of unknown mutations and quick access for positional cloning.
- Next-generation gene targeting toward the modeling of epistatic interactions: No backcrosses to identify modifiers.
Technology: enabling integration of biological data to show variety of utilities of bioresources and their reliabilities in life science studies.

Interoperability and sustainability: working in the international cooperation to build the common framework to browse and handle information of bioresource.

Exploitation: development of forefront studies based on the mining of accumulated information in life science.

Bioresource Research Collaborative Group

The RIKEN BRC is working closely with the following Research Collaborative Groups.

Ishii Research Collaborative Group

Contribution to Bio-Resource project by generation and analysis of mutant mice of transcription factors Contribution to Bio-Resource project by analysis of reprogramming mechanism and by development of new technology of iPS cell generation Contribution to Bio-Resource project by analysis of gene expression network using various mutant mice.

Shinozaki Research Collaborative Group

Construction of research infrastructure for the promotion of biomass engineering based on a model biomass plant Brachyypodium.

Contribution to advanced bioresources on the collection of full-length cDNA and phenotype analysis of gene knock-out mutants in Arabidopsis.

Discovery of useful genes for the application to molecular breeding of drought tolerant rice, wheat and soybean.
**History**

- **1917 March**: RIKEN Foundation established.
- **1948 March**: RIKEN Foundation dissolved and replaced by Kaken (Kagaku Kenkyusho) Corporation.
- **1959 October**: RIKEN Act enforced.
- **1974 May**: Life Science Promotion Division set up to undertake life science projects.
- **1984 October**: Tsukuba Life Science Center founded.
- **1987 May**: Gene Bank began operation.
- **2000 April**: Tsukuba Life Science Center renamed Tsukuba Institute.
- **2001 January**: RIKEN BioResource Center founded in Tsukuba Institute.
- **2003 October**: RIKEN reorganized as independent administrative institution.
- **2004 July**: The Japan Collection of Microorganisms (JCM) in Discovery Research Institute in the Wako Institute was integrated with the BioResource Center.
- **2008 April**: The second term as an independent administrative institution.
- **2012 October**: Relocation of Microbe Division (JCM) from RIKEN Wako campus to Tsukuba campus.
- **2013 April**: RIKEN Tsukuba Institute renamed Tsukuba Branch.

**Budget (FY2013)**

- **BioResource Center**
  - Government subsidy/Operating expenses grant: 2.7 billion yen
  - Competitive external funds: 0.3 billion yen

**Personnel (April, 2013)**

- **Developmental Research Staffs**: 204
- **Permanent Researchers**: 30
- **Contract Research Staffs**: 87
- **Technical Staffs**: 81
- **Special Postdoctoral Researchers**: 4
- **International Program Assistant**: 2
- **Junior Research Associates**: 3
- **Agency Staffs**: 80
- **Visiting Staffs**: 28
- **Outsourcing, Part-timers**: 100
- **Administrative Employees & Tsukuba Office Center Staffs**: 48

**Total**: 442
Biomass Engineering Program

Development of “super plants” for biomass production

Establishment of research tools and resources of Brachypodium

- Full-length cDNA clones
- Information resources
- Metabolome technology
- Mutant lines
- Transcriptome technology

Biomass microbial research

Establishment of microbial research platform based on the discovery and value addition of useful microorganisms and their genes

- Microbiome

Mining and application of useful bioresources for biomass production

Relationship among Asian Countries

- To improve the standard of experimental animals in Asia, it was one of nine Asian organizations which established AMMRA, the Asian Mouse Mutagenesis and Resource Association. (The 7th Meeting, Nagoya, 2012)
- Conclusion MoU with Taiwan National Applied Research Laboratories in 2010.
- Conclusion MoU with Lanzhou Institute of Biological Products in 2011.
- Conclusion MoU with Taiwan National Yang Ming University in 2009.
- Conclusion MoU with Korean National Research Resource Center (KNRRC) and Biological Resource Center, Institute of Microbiology, Chinese Academy of Sciences (IMCAS-BRC) in 2009.
- Participated in the establishment of the Asian Network of Research Resource Centers (ANRRC) in 2009.
- RIKEN BRC participated the 4th meeting of ANRRC in 2012 in Jeju Island, Korea.

- The 1st Nagoya university MARC-RIKEN BRC International Short Summer Course of the Mouse was held in 2012 in BRC. Participants: 15 persons (2 Chinese, 4 Taiwanese, 1 Swiss, 1 Romanian, 1 Malaysian, and 6 Japanese).
- Foreign students: France, Italy, Taiwan, Pakistan, Bangladesh, Thailand

Public Relations Activity

- Maintenance of an informative website (Resource Information, Protocol, Q&A, etc.)
- Monthly newsletter is e-mailed to the divisions. It also introduces “This month’s resources”.
- At conferences, the BRC displays brochures to introduce its activities, distributes materials, and answers questions in the booth.


Training Courses: Advanced Technologies for the Best Use of Bioresources

Courses

- Animal Quality control of laboratory mice
- Plant: Culturing methods for plant cell lines
- Cell: Human ES Cells and iPS Cells
- Gene Reconstituent vector technology
- Microbe: Culture and preservation methods for Microbes
- Reproduction Engineering: Cryopreservation of mouse embryos and sperm

Participants

- Univ.Tokyo, Kyoto Univ., Tohoku Univ., Kyushu Univ., Univ. Tsukuba, AIST, Pharmaceutical manufacturer, Food manufacturer, Motors industry etc.

Summer Course

RIKEN BRC and Model Animal Research Center (MARC) of Nagoya University have co-organized Summer Course since 2012.

International Program Associate (IPA) in RIKEN BRC

An International Program Associate (IPA) is a non-Japanese doctoral candidate attending a Japanese or overseas graduate school participating in RIKEN’s joint graduate school program who conducts research at RIKEN under the supervision of RIKEN scientists as part of work toward obtaining a PhD. RIKEN’s joint graduate school program is based on agreements with a number of Japanese and overseas universities.

Under the terms of the joint graduate school program, RIKEN provides the IPA with a daily living allowance and covers the IPA’s housing costs for up to a maximum of three years.

NBRP (National Bioresource Project)

- Genome information upgrading program (Increase values of bioresources by genome analysis, etc.)
- Functional technologies upgrading program (Development of preservation technology, etc.)
- Core facility upgrading Program (Provision of information on wheezeworm, genome data and etc.)
- Information center upgrading program (Provision of information on wheezeworm, genome data and etc.)

Provision of bioresources and information

- Deposit of bioresources and feedback of research results

General outline and purpose of the project

The aim of National Bioresource Project (NBRP) is to collect, preserve and distribute bioresources (such as animals and plants) that are essential materials for life science researches, and to upgrade the bioresources responding to the demands of the present age by enriching values of bioresources through developing preservation technology, genome analysis and others.

In addition, NBRP aims to improve the function of the information center which provides whereabouts and characteristics of bioresources.
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**RIKEN Campuses**

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**For further information**

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