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Our monthly newsletter features a variety of information, highlighting current domestic and international issues concerning bioresources.

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Introduction to Resource Center No.16

National BioResource Project "Rat"

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The 2nd stage of the National BioResource Project (NBRP) was started in the fiscal year 2007. The Institute of Laboratory Animals at the Graduate School of Medicine, Kyoto University, has conducted this project consecutively from the 1st stage as the core institute for the NBRP-Rat by closely collaborating with the sub-institutes, RIKEN BRC and the National Institute for Physiological Sciences. In addition to the fundamentals of resource administration—collection, preservation, and distribution—the sophistication of resources is carried out by genome analysis using SNP data and bacterial artificial chromosome (BAC) end sequences in the 2nd stage of NBRP-Rat. This aims at improving the added values of bioresources. Moreover, we would like to conduct the vitalization and information exchange of research that involves the use of rats by holding research workshops for rat resources.



A Figurine of Rats: This is a token of gratitude for NBRP-Rat's contribution to rat users all over the world.

Upon the initiation of the 2nd stage of the NBRP-Rat, we would like to introduce the operations that we carry out to manage rat resources.

1 Collection, Preservation, and Distribution

As of the end of May 2007, a total of 427 rat strains were collected from 53 domestic and 2 international institutes. The breakdown of the strains is as follows: inbred, 78; mutant, 75; transgenic, 47; recombinant, 40; and congenic, 187. In addition, we collected the rat mutant archive comprising frozen sperm bank and genome DNA bank of 1,735 G1 rats that was developed by ENU mutagenesis.

At NBRP-Rat, we not only keep live rats but also their embryos and sperms. Approximately 44,000 embryos from 364 strains and sperms from 94 strains were cryopreserved. In addition, we prepared "The Manual of Ultracold Preservation of Embryos and Sperms of Rats and Their Individual Reconstruction (DVD edition)" for the standardization of the preservation technology of embryos and gametes of rats.



This manual is provided for free.
Please contact the following website if interested.
http://www.anim.med.kyoto-u.ac.jp/NBR/contact_us.htm

Download the PDF version of this newsletter at
<http://www.shigen.nig.ac.jp/shigen/news/>

Other information on bioresources is available at

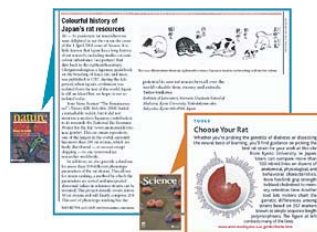
NBRP <http://www.nbrp.jp/>
SHIGEN <http://www.shigen.nig.ac.jp/indexja.htm>
WGR <http://www.shigen.nig.ac.jp/wgr/>
JGR <http://www.shigen.nig.ac.jp/wgr/jgr/jgrUrlList.jsp>

"2nd International Biocuration Meeting"

October 25–28, 2007
at Dolce Hayes Mansion, San Jose, CA, USA
Details are available at the following website:
<http://biocurator.org/Mtg2007/>

Cell Technology initiated a new series entitled "Let's Use! BioResource". Bioresources in Japan will be introduced in a series of 14 volumes from November 2006 to December 2007.

Thus far, a gross total of 445 cases (1,856 samples) have been distributed to 11 international and 73 domestic institutes. This resource project has been introduced in journals such as Nature and Science, and numerous research articles have been reported by researchers using our rat resources.



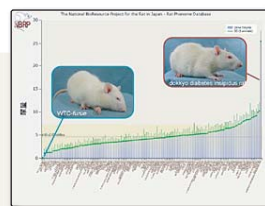
Serikawa T. Colourful history of Japan's rat resources. *Nature* 429: 15, 2004
Choose Your Rat. *Science* July 2005: 209: 361

2 Rat Phenome Project

We considered it important to improve the utility values of the collected rat strains and conducted the "Rat Phenome Project." This project consists of 2 features—characteristic and genetic inspections.

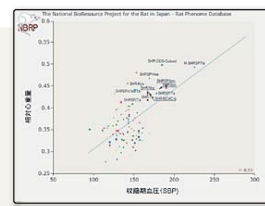
<Characteristic Inspection>

We constructed "Characteristic Profiles" of approximately 200 strains of male and female rats containing 109 items such as physiology, hematology, and anatomy. The obtained information of the rat characteristics can be viewed on a user-friendly database.



"Strain Ranking" Based on Urine Volume

For example, rats with the highest urine volume are the Dokkyo diabetes insipidus rats, model rats of diabetes insipidus, which are significantly different from those with the lowest urine volume, the WTC-furue rats.



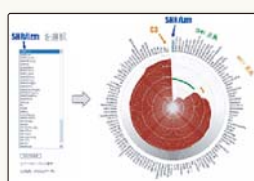
Correlation Analysis between Systolic Blood Pressure and Relative Heart Weights

Positive correlation is found between the systolic blood pressure and the relative heart weight of the rat strains. SHR strains are model rats of high blood pressure and any of the SHR strains exhibit high systolic blood pressure and relative heart weight values.

<Genetic Inspection>

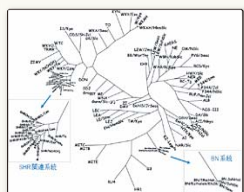
The "Genome Profiles" of approximately 200 rat strains were constructed using 357 microsatellite markers on all the chromosomes. In addition, the pedigree of rat strains is elucidated based on the phylogenetic tree constructed from the genome profiles.

next page



Genome Inspection Chart

Basic information of genetic analysis is provided. When SHR/Izm rats are used as the standard, the genetically farthest rats – G3 rats (wild rats from Germany) – exhibited a 94% polymorphism rate.



Phylogenetic Tree of Rats

The genetic proximity and variety of rat strains were revealed at the genome level by the phylogenetic tree of rats.

Discussion of MTA at AUTM (Association of University Technology Managers') 2007 Annual Meeting (1) - Discussion of Assignments and Responses regarding Material Transfer at the MTA Sectional Meeting -

Mutsuaki SUZUKI Director, Intellectual Property Unit,
National Institute of Genetics

I participated in the AUTM 2007 annual meeting held in San Francisco in March 2007. There are 28 sectional committees in AUTM, and all the committees are actively operational. I will introduce the presentation of the MTA sectional committee (a special interest group dealing with material transfer) in this article.

The MTA sectional committee is led by Dr. Kristin Rencher from the Oregon Health and Science University as a facilitator. This committee discusses the activities and solutions for topics regarding the interchange of research materials between academic institutions or between corporations and academic institutions.

Members of the MTA sectional committee develop ways to promote the interchange of research materials and assets, address the advancement of research projects and the needs of the providers and recipients and position themselves as mediators to assist the research community.

This time, the session included reports regarding the distribution of *E. coli* by Dr. Hirohisa Kawamoto, a specially appointed professor from the Nara Institute of Science and Technology; several problems faced in MTAs by Ms. Mary Broderick from Loyola University; and the eMTA Commons by Dr. Larry A. Couture from the City of Hope National Medical Center.

According to Mary Broderick, researchers frequently utilize new materials distributed by other research institutes and MTAs should be well-balanced between the distributors and recipients. Inappropriate expressions for universities in MTAs include the following: (1) handing over inventions to corporations that provided the samples, (2) obligation to pay for patent applications, (3) authorization of sublicense to corporations that provided the samples, and (4) setting an upper limit of license fee to corporations. In addition, corporations spend significant funds for research and development, and their aim is to call on the attribution of invention when providing samples. However, universities should negotiate according to licenses and there are arguments from both points of view.

The MTA sectional committee attempts to clarify what is fair for distributors and recipients, and also universities and corporations, and recommends cooperative operations to achieve a mutual standpoint.

Moreover, there are major problems in the interchange of MTAs: (1) how to deal with large numbers of MTAs, (2) MTA with corporations, and (3) interchange between countries. As a solution to these issues, Larry A. Couture, Ph.D (City of Hope) presented the eMTA. The eMTA is a web-based system that will digitalize the currently paper-based MTA interchange.

If this system is realized and becomes widespread, the enormous amount of processes and processing time currently required are expected to be reduced and the problems of expressions in interchanging with corporations can also be alleviated. This is advantageous not only for the MTA affiliates but also for researchers. Currently, a beta version has been developed and it is a very promising system for the future.

By participating in the AUTM this year, I think that problems concerning MTAs are fundamentally the same in the US and in Japan but the US is one step ahead when it comes to dealing with these issues. I feel that all the research institutes and bioresource projects in Japan will need to deal with such issues in the future and that there should be opportunities in Japan to discuss MTAs.

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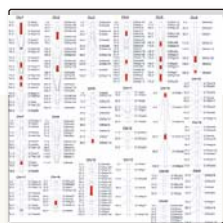
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3 Recombinant Inbred Strains

Dr. Shisa of the Saitama Cancer Center has developed 34 lines of LEXF/FXLE recombinant inbred strains, which are currently the world's largest number of lines developed using LE/Stm and F344/Stm as parent strains. Users can analyze the quantitative trait locus (QTL) simply by assessing the traits of interest by referring to the genotypic profile (strain distribution pattern; SDP) comprising 232 SSLP markers.

QTL Analysis using LEXF/FXLE Recombinant Inbred Line

The QTLs of blood pressure and blood sugar content are located on the chromosomal regions of the rat and are indicated in red.



4 NBRP Genome Analysis Project

We adopted the genome analysis project of the NBRP in the fiscal years 2005 and 2006 and developed BAC libraries of the LE/Stm and F344/Stm strains (equivalent to approximately 10 genomes each). The libraries were prepared in a way that enables users to search the genome sequence browser and select BAC clones with target regions (indicated in red lines) at the NBRP-Rat website.

BAC Clones Lined up on the Genome Sequence of Rats



Laboratory rats (scientific name: *Rattus norvegicus*; common name: wharf rats) are the first mammals bred for scientific use and are employed as models in biological function studies and disease studies because of their convenient size, adaptability to environment and the possibility to strictly control their genetic foundation and environment foundation. As a resource center with the world's highest standard of rats, we continue our operations of collecting, preserving, and distributing rat resources, which are fundamental to life science research. We deeply appreciate the continuous support and cooperation from all our affiliates. ■

Editor's Note : Dr. Serikawa, who is in charge of rat resources, provided a topic for us this month. Dr. Serikawa has innovatively and actively contributed to NBRP-Rat and his contributions have been highly acclaimed internationally.

Dr. Suzuki, who is responsible for the management of intellectual property, reported the annual meeting of the AUTM in the US, a country that is advanced with regard to MTA. The practical realization of the eMTA is greatly expected. This topic will be continued next month.

I sincerely wish you will take good care of yourself during this rainy season.
(Y.Y.)