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BioResource now! Vo2.No.6 is here

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- NBRP** <http://www.nbrp.jp/index.jsp>
- 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>

Information on Resource-related Events

- Oct. 28 (Sat) 9:00–11:00 **Progress in Fertilization Techniques of Rats** at TERRSA Hall at Kyoto TERRSA (Kyoto Citizen's Amenity Plaza, Shinmachi Kujo Minami-ku, Kyoto, Japan)

Detailed information is available at <http://www.nbrp.jp/index.jsp>

Introduction to Resource Center No. 10

National BioResource Project on Wheat

Takashi Endo, Laboratory of Plant Genetics, Division of Applied Biosciences, Graduate School of Agriculture, Kyoto University

It has been 4 years since the initiation of National BioResource Project (NBRP) on Wheat in October 2002. Currently, the core (primary) institute for this project is the Graduate School of Agriculture, Kyoto University and the sub (secondary) institutes are the Kihara Institute for Biological Research, Yokohama City University and the Faculty of Agriculture, Tottori University. In this project, the strain resources of the wild and native species and the experimental strains are collaboratively collected, preserved, and distributed at the institutes as bioresources (Fig. 1). The DNA resources are administrated solely by the Kihara Institute for Biological Research. Please refer to the website (<http://www.shigen.nig.ac.jp/wheat/komugi/top/top.jsp>) for detailed information of the resources. Now, the preservation of the genetic resource of wheat will be described.



Fig. 1. A scenic picture showing the covering of wheat ears with paraffin bags to preserve the wheat strains.

Left : the Greenhouse of the Graduate School of Agriculture, Kyoto University. Right : the Farm field of the Faculty of Agriculture, Tottori University. Although the cultivated wheat is self-fertilized, fertilization by the pollens of other strains is prevented by covering the wheat ears with paraffin bags prior to bloom. The wheat crop should be covered with a net to prevent sparrows from feeding on them.



Since I am affiliated to the wheat genetic resource institutes in Japan, I attended the meeting "Global Conservation Strategy for Wheat, Rye, and Triticale" organized during June 20–22, 2006 at the International Maize and Wheat Improvement Center (CIMMYT: CENTRO INTERNACIONAL DE MEJORAMIENTO DE MAIZ Y TRIGO), which is an international organization located in the suburban Mexico City. The meeting was supported by financial groups such as CIMMYT and the Global Crop Diversity Trust. The chairpersons of CIMMYT, ICARDA (INTERNATIONAL CENTER FOR AGRICULTURAL RESEARCH IN THE DRY AREAS), which is another international organization of wheat preservation facility, and genetic resource centers of wheat (gene banks) in several countries (US, Australia, Russia, Switzerland, Czech Republic, and China) attended the meeting. The purpose was to report on the preservation of the wheat genetic resources of each gene bank and discuss the methods to construct a worldwide network for the realization of efficient collection and long-term preservation of the strains. I reported on NBRP and wheat. While the collections of most gene banks include the cultivated variety of wheat, NBRP specializes in the collection of wild species and experimental strains, and this was considered a unique collection. The collected and preserved strains of NBRP attract attention because they include the experimental strains that are being lost due to the retirement of researchers, and the wild-type species that have originated in the regions such as Afghanistan where their collection is currently difficult. The following opinion and report presented at the meeting were regarded helpful and informative.

- Improving the benefits of strains, such as the resistance of the preserved strains against diseases and the publicity of research conducted using the strains, will lead to a substantial increase in the number of requests (Dr. B.S. Gill, Kansas State Univ., USA).
- Although the persons in charge of preserving strains concentrate on a further increase in the number of species, the survey result shows that the user should rather hope for the strains that are directly associated with the research, such as the mutant strains and mapping group strains (Dr. T. Payne, CIMMYT).



CIMMYT is the institute where Dr. Norman Borlaug, who received the Nobel Peace Prize in 1970 for the so-called "Green Revolution," developed the wheat with a short stem and high yield by using Japanese Norin 10 as the basis. Surprisingly, he attended this meeting, and we were treated to memorable stories over dinner. One of the stories was that he used to be on familiar terms with the late Dr. Hitoshi Kihara, a professor of the laboratory of experimental genetics (now, plant genetics laboratory) at Kyoto University. In addition, Dr. Masaru Iwanaga, the current Chair at CIMMYT was 2 years junior to me at the laboratory of experimental genetics at Kyoto University; this made me feel a sense of intimacy toward CIMMYT (Fig. 2).

Fig. 2. Left : Dr. Iwanaga, the Chair of CIMMYT, and his wife welcoming people to the party
 Right : Dr. N. Borlaug and Dr. J. Jia from Chinapage top



CIMMYT
<http://www.cimmyt.org/>



NBRP KOMUGI Database
<http://shigen.lab.nig.ac.jp/wheat/komugi/>

Meanwhile, I shall illustrate an example of the usefulness of preserving genetic resources. It may be acknowledged that Kyoto University's brand beer "WHITE NILE" has been released. On the front of the beer can is inscribed "Generated by Egyptian archaeologists and plant geneticists" in English (Fig.3), and "Ancient Egyptian civilization reincarnated in the modern world by an Egyptian archaeologist at Waseda University and a geneticist at Kyoto University" is inscribed in Japanese on the back of the can. The beer was developed by the current chancellor of Kyoto University as a Kyoto University brand competing with Awamori brand of the University of Tokyo. A wheat strain that had been collected and preserved at the Plant Germplasm Institute, Faculty of Agriculture, Kyoto University (now, Laboratory of Crop Evolution) was used as the basic ingredient, and Kizakura Co., Ltd. manufactured the beer by following the ancient Egyptian beer manufacturing process, which was decoded by an Egyptian archeologist Dr. Sakuji Yoshimura. In fact, although beer is generally manufactured from barley, it is widely known that it can also be manufactured from other grains. According to Prof. Taihachi Kawahara of the Laboratory of Crop Evolution, originally Kirin Brewery Co., Ltd. and Dr. Sakuji Yoshimura collaboratively planned to renovate the ancient



Fig. 3.
The Kyoto University's Beer WHITE NILE



Fig. 4.
The Ear of Amelum, which is an early variety and short stemmed (Fig.4). Thus, it is predicted that the strain was propagated from Palestine, Egypt, Ethiopia, Oman, and then finally to India

from Ethiopia to India via the coast of the Indian Ocean) in the given order. Egyptian beer (http://www.kirin.co.jp/daigaku/o_egypt/) in 2001. At that time, 25 strains of amelum that were presumably cultivated in the ancient Egypt (an old cultivated species of tetraploid wheat that was similar to Durum wheat) were transported to Kirin Brewery; from them, an Ethiopian strain, which has excellent cultivation property and is geographically related to the Egyptian cultivated species that have been exterminated, was grown. Moreover, the morphology of the Ethiopian amelum is analogous to that of the Khapli type in India, which is an early variety and short stemmed (Fig.4). Thus, it is predicted that the strain was propagated from Palestine, Egypt, Ethiopia, Oman, and then finally to India

(from Ethiopia to India via the coast of the Indian Ocean) in the given order. Genetic resources are considered the artistic products that have been invented over a long period by nature and humans. Our wheat strains are the ones that have undergone strict critical evaluations in the field of natural environment, agriculture, and research. The preservation of these genetic resources, i.e., protecting the variation, is considered an extremely important factor for the sustenance of agriculture.



News from the Resource Center No. 6

I attended the "High-technology Training for Laboratory Animal Reproduction (Reproduction Technology)" conducted by the Center for Animal Resources and Development (CARD) at Kumamoto University during June 12-18. This training course is conducted twice a year to promote reproduction technology widely. The experimental animal resource material that has to be preserved is transferred from the conventional individual biological species to



Laboratory Training

frozen sperms and embryos. Although this would lead to the reduction in the preservation cost, advanced technique would be required to reproduce individuals from the frozen-preserved sperms and embryos. This technique is difficult and requires high skills; therefore, a training program such as the one introduced here is inevitable. Recently, the trend to preserve sperms and germs is increasingly prevailing, partly because regulations for the import and export of animals have become strict.

The course comprised training of all techniques that are necessary for the reproduction of an individual mouse from frozen sperms and embryos. The techniques included mouthpiece capillary construction, which is a necessary procedure, preservation by freezing and thawing of sperms and embryos, embryo extraction by ovarian duct perfusion, in vitro fertilization, vasoligation, washing of the fertilized egg, embryo replacement, Caesarean section, and genotyping. Additionally, there were demonstrations of injecting ES cells and DNA and lectures regarding the quality control of microbes.

Each technique was excellently demonstrated by the staff members, and the lectures were extremely informative. The reproduction technology of this center is of the highest global standard, and not only the domestic researchers but also those from Jackson Laboratory in the US and resource facilities in China visit this center for training. The magnificent attitude of the training staff while teaching the cutting-edge technology was extremely favorable. The individual care extended during the training program and backup services such as providing advice after the training session were also outstanding. (Related articles in BioResource now vol. 1-3) (Y.Y.)

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"Bioinformatics"

"The Use of Database Management System (SQLite)" (Windows)

Database management system (hereafter DBMS) is a software that administrates databases. Here, a DBMS called SQLite is used. Individuals having some experience regarding the use of genome browsers such as GBrowse or Ensembl may be aware of MySQL, which is also a DBMS. Although SQLite does not contain as many functions as a main DBMS such as MySQL, it does not require installation and is easy to use. Now, let us use it.

PF00001	GO:0001584
PF00001	GO:0007186
PF00002	GO:0004930
PF00002	GO:0016020
PF00003	GO:0008067

The correlation table of the Pfam and GeneOntologyID accession numbers shown on the left is used as the sample data. Please refer to the article in Issue No. 7 (Jul), 2005 regarding GeneOntology.

- From the website <http://www.sqlite.org/download.html> download the file `sqlite-3_3_6.zip` (Precompiled Binaries For Windows; the version number may have been updated) onto the desktop and unzip the file.
- Save the abovementioned sample data as "pfam2go.txt" in the folder "sqlite-3_3_6," which was unzipped in ① (The space between the PfamAccession and GeneOntologyID has been separated by a tab).
- Access the command prompt (Start→All Programs→Accessories→Command Prompt) and type "cd " (the half-size space following "cd" is required but not the quotation marks enclosing cd ("...")).
- Drag and drop the folder, "sqlite-3_3_6," which was unzipped in ①, on the black screen and press Enter. Type "dir" on the black screen and press Enter; the files `sqlite3.exe` and `pfam2go.txt` can now be confirmed.
- Type the following command on the black screen and press Enter.
`sqlite3.exe pfam2go.sqlite`
SQLite would be initiated within a short time, and an empty database `pfam2go.sqlite` would be configured.
- Type the following commands and press Enter.
`sqlite>CREATE TABLE pfam2go (pfam, go);`
`sqlite>.mode tab`
`sqlite>.import ./pfam2go.txt pfam2go`
Now, the sample data have been imported in the database, `pfam2go.sqlite`. Meanwhile, let us access the data.
- Type the following command on the black screen and press Enter.
`sqlite>SELECT * FROM pfam2go;`
All data would be displayed.
- Type the following command on the black screen and press Enter.
`sqlite>SELECT * FROM pfam2go WHERE pfam = 'PF00002';`
The pfam accession number for only the PF00002 data would be displayed.
- Type the following command on the black screen and press Enter.
`sqlite>SELECT * FROM pfam2go WHERE pfam != 'PF00002';`
The pfam accession numbers for data other than PF00002 would be displayed.

The commands such as `CREATE~` or `SELECT~` that are typed on the black screen now are called SQL. The knowledge regarding SQL is essential for operating DBMS (particularly the relational database in DBMS). Further details cannot be shared due to space limitation; however, once an individual is well versed with SQL, it is easy to extract data satisfying a particular condition from several data entries or output onto a file. It is recommended that individuals who believe that the functions of spreadsheet software are inadequate should try data administration with DBMS and SQL by using SQLite. (Shingo Sakaniwa)

Editor's Note: We received some interesting news from Dr. Endo when he returned home. Surprisingly, it is not well known (maybe because the domestic yield of wheat is less) that the qualitative contribution of Japanese researchers is prominent in the fundamental research of wheat. However, what are your views on the taste of WHITE NILE? (Y.Y.)

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