BioResource Now !
Issue Number 9 June 2013

Masayuki Sumida, Akihiko Kashiwagi, Atsushi Suzuki
(Institute for Amphibian Biology, Hiroshima University)

Reprinting and reduplication of any content of this newsletter is prohibited.
All the contents are protected by the Japanese copyright law and international regulations.

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

Introduction to Resource Center〈NO. 47〉

The Sole Amphibian Research and Resource Center in the World

Masayuki Sumida[1], Akihiko Kashiwagi[2], Atsushi Suzuki[3]
Institute for Amphibian Biology, Hiroshima University
([1]Professor, [2]Specially Appointed Professor, [3]Associate Professor)

The Institute for Amphibian Biology was established in 1967 to elucidate important issues in life science by using amphibian species, which have various advantages as experimental animals. This institute is the only research and educational organization in Japan whose name contains Amphibia. At present, the institute has pursued the following 4 projects based on long-term research achievements:

1. Core Organization in the National BioResource Project

As one of the core organizations in the third term of the National BioResource Project (NBRP) in the Ministry of Education, Culture, Sports, Science and Technology, the institute has established standard strains and developed inbred strains of *Xenopus tropicalis*; these strains have been distributed to researchers. At present, the institute breeds and conserves 6 strains, 4,000 adults, and 6,000 larvae of *X. tropicalis* and maintains its inbred strains up to the tenth generation (Fig.1 and 2).

Fig.1: Adults of *Xenopus tropicalis* in the relaxed state

Fig. 2: Breeding room for tadpoles and juveniles of *Xenopus tropicalis*

The institute has prepared a system to supply these strains to researchers in both Japan and foreign countries. A diploid *X. tropicalis* individual of African origin attains maturity in a short period and spawns thousands of eggs at the same time. *X. tropicalis* is the only species in Amphibia whose genome has been sequenced. The formal generic name of this species has not yet been determined, although this species was previously assigned to the genus *Xenopus*. However, after morphological observation, this species was considered to instead belong to the genus Silurana. On the other hand, the base sequence of rDNA has revealed that *X. tropicalis* is closely related to frogs that belong to the genus *Xenopus*. Therefore, an increasing number of researchers classify this species as *Xenopus (Silurana) tropicalis*.

X. tropicalis has attracted the attention of many researchers as a model animal in the post-genomic era and is considered suitable for ① multiple tasks in forward and reverse genetics, ② exhaustive analysis of molecular information possessed by living organisms, and ③ elucidation of the mechanism underlying the endocrine-disrupting effects of chemicals.

In order to benefit researchers who use *X. tropicalis* as a resource, the institute has 4 objectives as described below. The first objective is to distribute nonliving resources. To use *X. tropicalis*, which possesses excellent genetic characteristics, the preparation of genetic materials is essential. In particular, the institute verifies the quality of genetic materials by analyzing their expression patterns, prepares value-added and easy-to-use genetic materials, and distributes these materials to users (Fig. 3).

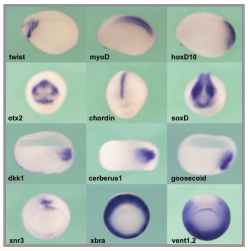


Fig. 3: An example of quality verification for a marker gene that has been distributed as a nonliving resource (the expression pattern was stained violet by using a whole-mount *in situ* hybridization method).

The second objective is to establish a new, open-access laboratory and to hold workshops for experimental techniques. Many researchers from universities and institutes all over the country use instruments in the open-access laboratory to acquire experimental techniques of *X. tropicalis* breeding and embryo manipulation (Fig. 4). The third objective is to exchange information through international cooperation. In cooperation with the National Xenopus Resource, Woods Hole, USA and the European Xenopus Resource Center, Portsmouth, UK, the institute has helped construct an international network of Xenopus resource centers. The fourth objective is to establish a new Web forum. This quickly publishes important information whenever necessary. Through these actions, the institute aims to be a research center for *Xenopus* species from around the world.

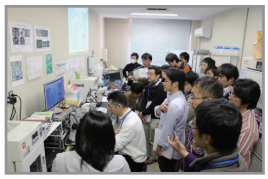


Fig. 4: A workshop for experimental techniques by using the open-access laboratory

2. Pathbreaking Amphibian Research Project: "Conservation of Endangered Amphibian Species and Development of a Target Gene Disruption Method"

This project aims to contribute to the development of basic research in life science and to establish an amphibian research and resource center. In this project, pioneer studies on the establishment of a method to effectively conserve domestic and foreign endangered amphibian species have been strategically performed to improve the understanding of genetic diversity. In addition, it has assisted in the development of a target gene disruption method for experimental animals in Amphibia. The project has already succeeded in breeding 5 amphibian species in captivity; these have been designated as endangered species and natural treasures. Further, the genetic diversity of field populations of these species has been explored using microsatellite markers. Regarding *Rana ishikawae*, which is considered to be the most esthetically pleasing frog species in Japan, the second generation was born in captivity at the institute. By using these breeding individuals, the project has studied the relationship between genetic diversity and fitness. In the future, the project will aim to continue performing such studies to be a so-called Noah's ark in Amphibia.

The project has also attempted to create mutant strains of *X. tropicalis* by using gene disruption techniques. At present, a gene that produces black pigments has been disrupted to generate frogs with a patchy pattern of black and white. By mating these frogs, white frogs (albinos) are born, which are experimentally useful (Fig.5).

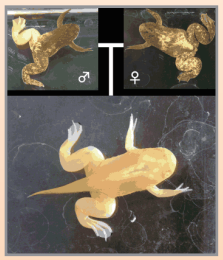


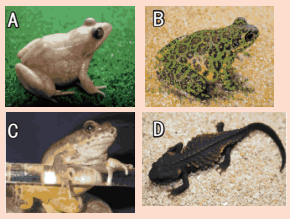
Fig. 5: Generation of albino *Xenopus tropicalis* created using gene disruption techniques

↳To the next page

3. Strain Conservation Team Conserves Various Amphibian Species as Research Resources

As a strain conservation project, the institute has presently conserved approximately 80 species, 200 strains, and more than 30,000 individuals belonging to wild, mutant, and genetically modified strains. The institute has already established natural and artificial color-mutant strains, wild-type breeding strains (inbred strains), transgenic strains, and gene disruption strains. In particular, the institute possesses an internationally unique facility that can stably breed terrestrial frogs. Research achievements obtained utilizing this facility have attracted the attention of many researchers. Recently, the institute has generated a transparent frog named "Skelpyon," and has succeeded in breeding *R. ishikawae*, which is the most aesthetically pleasing frog species in Japan, and *Tylototriton andersoni*, a living fossil, in captivity. The institute's descriptions of *Odorrana splendida*, a new species, and *Rugosa susurra* have attracted interest (Fig.6).

The institute has bred the twin spotted cricket (*Gryllus bimaculatus*), native to Southeast Asia, as feed for the aforementioned frog species. Other than living frogs, the institute has cryopreserved 9 families, 27 genera, 112 species, 320 groups, and more than 12,000 individuals, for use in genetic analysis. The institute has also conserved 12,000 fixed specimens including type specimens, with descriptions of new species. A database on these specimens has been constructed (DB-Hi-FROG) and published online.



A : *Skelpyon*
B : *Odorrana splendida*
C : *Rugosa susurra*
D : *Tylototriton andersoni*

Figure 6: Amphibian species whose strains were generated or conserved at the institute

4. The Institute is Open to Public as a Satellite Branch of Hiroshima University Museum

In 2012, the institute was launched as a satellite branch of Hiroshima University Museum. At present, the latest research topics and amphibian specimens are on exhibition in the first floor entrance lobby. In particular, type specimens of scientifically important new species, a specimen of Japanese giant salamander (*Andrias japonicus*), which is a protected species in Japan and the largest amphibian in the world, specimens of frogs generated using artificial parthenogenesis techniques, nucleo-cytoplasm hybrids, amphiploids, cancer-related strains, and foreign wild species are exhibited. This branch receives many visitors from inside and outside the university. Recently, His Imperial Highness Prince Akishino, Dr. Osamu Shimomura, and Dr. Toshihide Masukawa were guests of honor at the institute.

Ongoing Column [No. 80] 10min.

Backup Function of Windows 8

In this edition, I would like to introduce the backup features available in Windows 8. In addition to the traditional full backup function (now called "Windows 7 File Recovery," which creates a backup system image*1), Windows 8 includes a new backup feature called "File History."

With "File History," it is easy to create backup copies of file versions and to recover older versions of files. In addition, if you empty Trash by mistake, it can even be used to recover those files that were in it before it was emptied.

The traditional full backup feature is no longer recommended in Windows 8, and this feature may become unavailable in the future. The recommended methods of backup in Windows 8 are "File History," "Reset*2," and "Refresh*3." The "File History" backup feature is very easy to use, and I recommend it to everyone.

Here is how to use this feature.

1 Select "Save backup copies of your files with File History" from the "System and Security" category in Control Panel (Fig. 1).

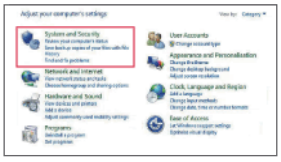


Fig. 1: Control Panel

2 Click on the [Turn on] button. In order to enable File History, more than two storage media must be connected to the computer. In other words, you need to have either two or more internal drives, an external hard drive, or a shared network drive. Once you have turned File History on, you are ready to begin making backups (Fig. 2).

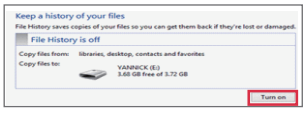


Fig. 2: Enabling File History

3 Click on [Run now] to create a "File History" folder on the specified drive; backup copies of files are created in this folder (Fig. 3).

Fig. 3: Running a backup

4 The default scope of the backup process covers all folders below the "Users" folder. If you would like to include additional folders in the scope, you will need to create a new library. To create a new library, right-click on the "Libraries" icon on the left-hand pane in Explorer, and select "New." The created library will then be included in the automatic backups (Fig. 4).

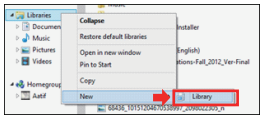


Fig. 4: Creating a new library

The destination for backup files can be specified by clicking on "Select Drive." To configure exclusions and backup frequency, click on "Advanced settings."

5 When needed, files can be recovered by selecting the "History" button from the ribbon in Explorer, or by copying the backup of the files from the backup media (Fig. 5).

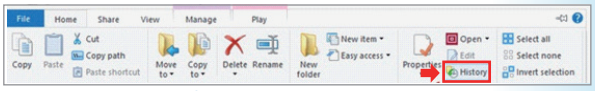


Fig. 5: Recovering a file

*1 : Although it is called "Windows 7 File Recovery," the function can create system images of Windows 8 computers as well.
*2 : A feature that allows you to reinstall all system files.
*3 : A feature that allows you to reinstall the system while leaving certain settings intact.

(Atsuki Aiba)

Database of This Month

National BioResource Project " Medaka "

Number of strains: 6,309
Number of genes: 1,294,060
Number of papers: 255
(as of June 2013)

DB name : Medaka
URL : http://www.shigen.nig.ac.jp/medaka/
Language : Japanese, English
Original contents :
- Medaka resources for research (wild, mutant, and inbred strains, cDNA, fosmid, etc.), Strain Image Gallery, BLAST search.
- Medaka book、Medaka Atlas、Medaka Tree、Medaka Genome Map、EST Virtual Display、Medaka in Wild、laboratory manual.

Features : Various morphologies of Medaka strains such as living organisms, frozen sperm, and eggs are provided (selectable morphologies differ according to the strain). Abundant images and animation data are prepared.
Cooperative DB : M-Base、Medaka Genome Project
DB construction group : NBRP Medaka, NBRP Information Management organization : Genetic Resource Center, NIG
Year of DB publication: 2005 Year of last DB update: 2013

Comment from a practicing developer: The NBRP Medaka was established in 2005 and is a relatively new database among those in the NBRP. However, many developers with different backgrounds have been engaged in the production of this database, which results in the provision of various services. The resource database, which is the most important service, is frequently updated, and new resources are added to the database almost every month. The developers strive to develop easy-to-use applications every day. Please feel free to use the database and do not hesitate to express your comments, questions, or opinions via the "Contact Us" link on the website.

Contact Address

Genetic Resource Center, National Institute of Genetics
1111 Yata, Mishima-shi, Shizuoka 411-8540, Japan
Tel.: 055-981-6885 (Yamazaki)
E-mail : brnews@shigen.info

Editor's Note

This month, the latest activities of the amphibian resource center, which had restarted in the third term of the NBPR, were introduced. The full scope of efforts of the staff can be gleaned from the article. Previously, the study of frogs was closely linked to embryology. At present, with the inclusion of genomic information, frogs have increasing value as experimental materials similar to mammals and other vertebrates in molecular genetics and molecular biology. This trend can also be detected in the institute's successful Web forum (Y. Y.).

BioResource Information

(NBRP) www.nbrp.jp/
(SHIGEN) www.shigen.nig.ac.jp/
(WGR) www.shigen.nig.ac.jp/wgr/
(JGR) www.shigen.nig.ac.jp/wgr/jgr/jgrUrlList.jsp

BioResource Now !
Issue Number 9 June 2013

"translated by ASL translatiaon service and proofread by Sharoh Yip"