

# BioResource Now!

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## Deposition of Barley Seeds in the Svalbard Global Seed Vault

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Hot News (NO. 46)

# Deposition of Barley Seeds in the Svalbard Global Seed Vault

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The Svalbard Global Seed Vault, the largest storehouse of seeds in the world, is located on Spitsbergen Island in the Svalbard Islands, which are situated at a latitude of 78° N (inside the Arctic Circle) (Fig. 1). On February 25, 2014, 575 barley strains preserved in Okayama University were the first Japanese seeds to be deposited in the Svalbard Global Seed Vault. The detailed story of this deposition is described below.

Okayama University personnel (person in charge of the deposition: Kazuhiro Sato, the Institute of Plant Science and Resources) prepared the seeds to be deposited according to the regulations provided in the MTA, which included using proper preparation methods, including preparing the preservation bag and box of seeds, packing 575 strains (native to Japan, the Korean Peninsula, China, and Nepal) into a box, and sending the box to Oslo Airport on February 7, 2014.



Photo 2: Carry-in route in the Svalbard Global Seed Vault



Fig.1: Spitsbergen Island

## Depositing the Seeds

Three Japanese members, including Kazuhiro Sato, left Haneda Airport on February 22, 2014 and arrived at Oslo Airport on the same day. On the following day, Professor Roland von Bothmer of the Nordic Genetic Resource Center arrived at Oslo from Sweden; he is a senior advisor of the Svalbard Global Seed Vault and was a Visiting Professor at the Institute of Plant Science and Resources, Okayama University, in 1997. We discussed the trip, and on February 24, we left Oslo for Spitsbergen Island by air.

On the morning of February 25, a felicitation ceremony for the deposition was held at the Svalbard Global Seed Vault with Marie Haga (Secretary General of the Global Crop Diversity Trust) and Michael Koch (Director of Finance Division of the Trust) in attendance, and the deposition of seeds in the Vault was seamlessly completed (Photo 3, 4).



Photo 3: Inside a storeroom in the Svalbard Global Seed Vault

## Process Leading to the Deposition

Okayama University pursued the deposition of barley strains in the Svalbard Global Seed Vault for approximately two years, while reporting the deposition to the Administration Committee of the NBRP and the Genetic Resource Committee of the National Institute of Genetics and obtaining their approval. Prior to the deposition, a material transfer agreement (MTA) was completed between National University Corporation Okayama University and the Ministry of Agriculture and Food of the Kingdom of Norway (represented by the Nordic Genetic Resource Center). The agreement clearly states that the depositor is responsible for transportation costs, and the Ministry of Agriculture and Food of the Kingdom of Norway is responsible for preservation costs.

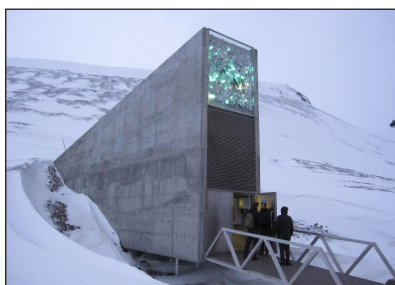


Photo 1: Delivery entrance of the Svalbard Global Seed Vault

On Spitsbergen Island, we met researcher Ola Westengen, who is a Norway national living in Oslo and in charge of business affairs at the Nordic Genetic Resource Center. We, along with Ola Westengen, were present for the inspection and transportation of the seeds to the Vault (Photo 1, 2).



Photo 4: Storage of seeds deposited in the Svalbard Global Seed Vault (Prof.Sato is in front)

Together with depositions from other organizations, our deposition was internationally released to the press on February 26.

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## Present State of the Svalbard Global Seed Vault

The Norwegian Government has spent approximately 900 million Japanese yen to establish the Svalbard Global Seed Vault. The Vault was launched to preserve seeds in 2008. At present, in cooperation with the Food and Agriculture Organization of the United Nations (FAO) and the Consultative Group on International Agricultural Research (CGIAR), the Vault is managed by the Global Crop Diversity Trust, which was established in 2004.

The Vault consists of three storehouses, each of which can store approximately 1 million seeds. At present, only one storehouse is in operation, and there are approximately 800,000 seeds, including our deposition, that are preserved. In the storehouse, many seeds have been deposited from the CGIAR, which is closely related to the Global Crop Diversity Trust, and some seeds were deposited from the U.S. Department of Agriculture, the Leibniz Institute of Plant Genetics and Crop Plant Research in Germany, the Agriculture and Agri-Food Canada,

and national seed storage facilities in North Korea and South Korea. The storage temperature is kept at  $-18^{\circ}\text{C}$ . The deposited seeds can be safely preserved without a cooling system, because the Vault is located approximately 120 m inside a geologically stable rock bed, which is approximately 130 m above sea level and in permafrost, with an average temperature of  $-3^{\circ}\text{C}$ .



## Automator for Mac OS

Many people use Mac computers in academia. In our October 2011 issue of the newsletter we introduced a command for easily resizing images on a Mac, as photographs of resources must be resized in order to publish them on the web. As a sequel to the previous article, in this issue we introduce an application called "Automator" and describe how it can be used to rename and assign sequential numbers to image files.

When you take photographs using a digital camera, files are typically assigned names such as IMG0001.jpg or DSC0001.jpg. However, nothing about the content of the images can be determined from such file names. Therefore, you might want to rename files based on, for example, strain identifiers. However, manually renaming each file is an arduous task if many files exist. This is when Automator, an application that comes preinstalled on Mac computers, is useful. This application can automate various tasks on the Mac including renaming and assigning sequential numbers to files. I will explain the steps to set up this automation.

- 1 First, create a folder named "Processed Folder" on your computer desktop.
- 2 Launch the "Automator" application from the Applications folder.
- 3 In the "Choose a type for your document" dialog box, choose "Workflow."



Automator's icon

- 4 In Automator, in the panel on the right (that is, the panel labeled "Drag actions or files here to build your workflow"), drag and drop all the image files. Next, select and drag the action items labeled "Copy Finder Items" and "Rename Finder Items" from the left panel to the right panel (as shown in Fig. 1).

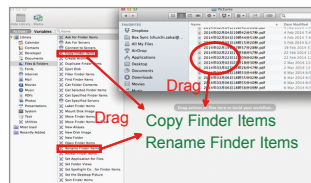


Fig. 1. Creating a workflow.

- 5 Next, in the central window on the right panel entitled "Copy Finder Items," specify "Processed Folder" (created in Step 1) in the "To" dropdown list (Fig. 2-A). Then, in the bottom window entitled "Rename Finder Items," click on "Make Sequential," check the "new name" radio button, and type "STRAIN\_A" as the name of the strain. Choose "underscore" in the "separated by" field and set "make all numbers" to "3 digits long" (Fig. 2-B).

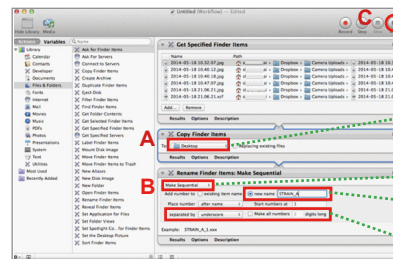


Fig. 2. Workflow to rename files and add sequential numbering.

"Run" button

Select "Processed Folder"

Select "Make Sequential"

Enter "new name"

Select "underscore" for "separated by" and set "Make all numbers" to "3 digits long"

- 6 This completes the creation of a workflow for renaming images after they have been copied to the folder called "Processed Folder." Click on the "Run" button on the top right of the Automator window (Fig. 2-C) to execute the workflow that renames and assigns sequential numbers to files.

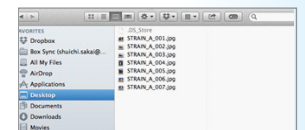


Fig. 3. Results of renaming and assigning sequential numbers to files

Automator is relatively unknown amongst standard applications that come installed on a Mac, and you may find it difficult to use at first. However, the tool can be extremely powerful for people who take many photographs of resources, even if it is used only for renaming files and assigning sequential numbers. Why not give it a try? (Masakazu Saga)

## Database of this Month

### National BioResource Project "Nenkin"



DB name : NBRP Nenkin  
 URL : <http://nenkin.lab.nig.ac.jp/>  
 Languages : Japanese, English  
 Original contents :  
 • Information about strains of cellular slime molds and genetic resources  
 • Various expression vectors and a list of compounds derived from cellular slime molds  
 • Beginner guidance, NBRP-nenkin News, etc.  
 Features :  
 • Strains and cDNA clones can be ordered from the website.  
 • Content for beginners is substantial.  
 • Plasmids can be ordered through this database.  
 Cooperative DB : Dictybase, RRC  
 DB construction group : NBRP Nenkin, NBRP Information Management organization : Genetic Resource Center, NIG  
 Year of first DB publication : 2007 Year of last DB update : 2014

Number of strains : 875  
 Number of genes : 11277  
 (As of May 2014)

**Comment from a developer :** NBRP Nenkin was open to the public from the University of Tsukuba in 2007. When it reopened in 2010 after including the function of distributing strains and cDNA clones, NBRP Nenkin was transferred to the Genetic Resource Center, National Institute of Genetics. The main difference between NBRP Nenkin and other projects is that NBRP Nenkin used Ruby as its programming language when it was developed and adopted Ruby on Rails (RoR) when it was reopened. RoR is a framework (the foundation of development environment) for which various devices have been adopted, and it has increased the development efficiency. However, the requirements for NBRP Nenkin at present greatly differ from those when it was developed. This year, we will change the framework to satisfy the current requirements and introduce the latest technologies. We will continuously add functions to improve the usability of NBRP Nenkin. Please feel free to use our database and do not hesitate to send us your comments, questions, or opinions using the "Contact Us" option on the top menu.

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## Editor's Note

This month, Professor Kazuhiro Sato discussed the topic of preserving Japanese barley seeds using a global-scale seed storehouse inside the Arctic Circle, which is a fantastic story. In fact, Professor Takashi Endo of Kyoto University introduced the Global Crop Diversity Trust in his article in this newsletter (Vol. 2 No. 6 in 2006), which described that, "at that time, we discussed how to realize the long-term preservation of strains effectively at a global level." Indeed, the Svalbard Global Seed Vault embodies the dreams of researchers in the field of genetic resources. If you want to know more about the Svalbard Global Seed Vault, please visit the following websites (Y. Y.).  
[https://www.youtube.com/watch?v=BYK11SjZjK&feature=youtuve\\_gdata\\_player](https://www.youtube.com/watch?v=BYK11SjZjK&feature=youtuve_gdata_player)  
[http://en.wikipedia.org/wiki/Svalbard\\_Global\\_Seed\\_Vault](http://en.wikipedia.org/wiki/Svalbard_Global_Seed_Vault)

## BioResource Information

(NBRP) [www.nbrp.jp/](http://www.nbrp.jp/)  
 (SHIGEN) [www.shigen.nig.ac.jp/](http://www.shigen.nig.ac.jp/)  
 (WGR) [www.shigen.nig.ac.jp/wgr/](http://www.shigen.nig.ac.jp/wgr/)  
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