

## Microbe Division

### Yoshimi Benno Head of Division

#### Summary

**1. Achievements during the last three years (FY 2006 to FY 2008)—banking, research and development, international collaboration, public relations, training and education, and others**

● **Evaluation**

Achievements have generally exceeded.

**Specific Comments:**

- RIKEN brand is internationally accepted; among the world's top ranks as a "reliable" institution.
- World-leading achievement in collecting type strains of bacteria and archaea, despite the limited number of staff. This achievement is meaningful not only in terms of making a global academic contribution but also to securing biological resources in biodiversity of Japan. A delay in this field will result in irretrievable consequences, and for this reason it should be regarded as a high priority. Presentations and publications of the research results enhance the motivation of researchers and are highly regarded as the best means of publicity for demonstrating the high level of research and techniques.
- Notwithstanding any temporary stagnation in the research results, it is hoped that BRC will continue BRC's efforts with the goal of improving our brand value.
- When preserving and maintaining microbial strains, reference strains (for scientific research) should be increased in addition to type strains.
- Seeking cooperation from overseas, particularly from other Asian countries, Africa, and China, is an excellent idea.
- Acquisition of ISO certification can be recognized as a significant achievement.

● **Advice and suggestions**

- For the future development of the Japan Collection of Microorganisms (JCM), the promotion of its development in fields other than taxonomic study should be considered.
- More emphasis should be placed on public relations activities to make the public more

aware that bioresources are national intellectual properties. While it has been commonly accepted that water and safety are free of charge, an effort should be made to eliminate the tendency to apply this notion to bioresources.

- Basic PR activities should be improved to enhance the quality of public relations. (e.g. demonstration of the high levels of achievement in both academic and social terms that have resulted from the use of JCM strains)
- More efforts, in addition to the publication of papers, are required to promote international exchange and public relations. The publication of papers may introduce the researchers' faces, but in order to introduce the entire activities of the JCM as an organization a more comprehensive approach that integrates international exchange, public relations, and human resource development should be adopted.
- Further expansion of activities into Africa and South America, in addition to Asian countries, should be promoted.
- The number of microbial taxonomists has decreased significantly in Japan, for which RIKEN BRC bears great responsibility. A human resource development system should be established, maintained, and improved continuously and systematically, and should be further developed in the future.
- Human resource development requires long-term commitment. The employment of staff for which future demand has already been taken into account is a good idea.

## **2. Responses to issues raised in the Resource Committee meetings of the past three years (FY 2005 to FY 2007)**

### **● Evaluation**

Response was prompt and direct, results have been satisfactory, and BRC's operations have been furthered as a result.

### **Specific Comments:**

- The proposal of novel taxa, such as new genus and species, from RIKEN BRC itself can be highly evaluated. This will greatly help to demonstrate the uniqueness of RIKEN. If the BRC continues its efforts, the activity as Culture Collection will be more valuable.
- While there has been progress in type strains, many factors remain for numerous other reference strains before they can be made available for use. However, a system to facilitate is being established, which may in the near future enable us to use these strains as valuable property. In particular, the field of pathogenic bacteria (belong to biosafety level 2) is regarded as a field in which demonstrates uniqueness of RIKEN BRC, and BRC has made efforts in collecting the BSL2 strains. As the next step, the ingenuity and creativity of the

BRC should be focused on how to encourage people to associate BSL2 strains with “human health-related” bacteria.

- It was proposed that the BRC comply with the Convention on Biological Diversity (CBD) so that users can use microbial materials safely. In response, the RIKEN BRC is taking a leadership role in coordinating activities with Southeast Asian nations, a fact that can be highly evaluated.

- **Advice and suggestions**

- It is necessary to establish cooperative relationships with relevant scientific societies and researchers in order to collect and preserve microbial strains, while taking into account microbiological trends in the next five to ten years in the fields of environment and human health.
- It is recommended to establish an external satellite laboratory (cooperative research group) to investigate the possibility of promoting the development of novel, and characteristic microbial strains (functional substances, physiologically active substances, etc.) and of adding genomic information to microbial strains.
- There are multiple Collection centers that preserve type strains as an aspect of risk management strategy. It is therefore not necessary to develop the uniqueness of RIKEN in preserving type strains. It is rather recommended to continue its efforts to expand the variety of reference strains.
- When human health- and environment-related microorganisms are used as resources, information of pathogenicity and function must be shown. As it is equipped with the RIKEN BRC’s functional infrastructure, the JCM is encouraged to promote a joint research with applied microbiologists in Japan and abroad.
- Pathogenic bacteria (BSL2) should be centrally controlled by RIKEN BRC, for which governmental support is essential. The information of characteristics possessed by the BSL2 strains should also be clearly described.
- The RIKEN BRC should play a leading role in Asia. As international cooperation with Asian countries in particular is already being promoted, efforts should also be made to promote cooperation with Eastern European countries. Much is expected of Japan. In order to respond to these high expectations, emphasis should be placed on the intellectual infrastructure in Japan when promoting international cooperation.

### **3. Are there any bioresources that are needed urgently within the next two to three years**

- **Advice and suggestions**

- More emphasis should be placed on the strategic collection of microorganisms.

- Cooperation with applied microbiologists in the environmental field should be promoted to grasp trends in applied microbiology and to clarify which microorganisms should be collected and preserved in order to develop the uniqueness of the JCM (e.g. microorganisms that will receive attention in future → oil-producing microorganisms, lignin-degrading microorganisms, recalcitrant-compound-degrading bacteria, etc.)
- Target resources should be selected from the materials shown in the power point, according to the appropriate priority.
- There may be some overlap between microorganisms for industrial use provided by the RIKEN BRC and those by the Biological Resource Center of the National Institute of Technology and Evaluation (NBRC). These should be distinguished by range (those for long-term research) and responsibility divided between the two organizations.
- Some measures should be adopted for using the environmental genes and metagenomes of microorganisms that are difficult to culture as bioresources protected under national intellectual property rights. It is recommended that RIKEN propose a universal standard for recognizing metagenomes as a bioresource.
- Archaea also inhabit all types of environments and play important roles in substances and environments. For this reason, more archaea should be classified and maintained.
- Environmental fungi should be identified clearly and the identified fungi should be classified and maintained.
- Intestinal bacteria (including those in the rumen) are a significant bioresource contributing to food and health. More progress needs to be made in the metagenomic approach of uncultured microorganisms.
- It is necessary to develop new microorganisms (bacteria, archaea, filamentous fungi) that can assist the development of health foods (e.g. bacteria that do not exist in Japan that are derived from fermented foods developed in China or other countries)
- Strains that can help produce hydrolases (including cellulase) for biomass conversion should be developed.
- Information on useful bacteria and pathogenicity should be gathered from around the world, including Africa and South America, with global perspectives to improve resources. (Traditional folk medicines have existed in Africa and South America since ancient times, the use of which has been confined to limited regions.)
- The taxonomy using 16S (18S) rRNA gene should be further developed into a more expansive biological taxonomy. For this purpose, training should be provided to researchers within RIKEN.
- As many genomic strains as possible should be analyzed and identified.
- Culture collections are generally supported by taxonomy, and it is true that taxonomy serves

as a basic technique for culture collection. However, considering that many users are not taxonomists, new “usable resources” and new users should be developed.

- It takes more than ten years for training to produce results. Because Asian partners and Japanese novice users are continuously using microorganisms as resources, they should be regarded as important targets of training.

#### **4. Others**

##### **● Advice and suggestions**

- In demonstrating an activity of RIKEN BRC,, staff members are required to communicate with leading researchers on an equal footing. RIKEN BRC staff should therefore be well aware of themselves as laboratory researchers as well as members who performs the activity, which will contribute to raising the social status of the RIKEN BRC.
- While closely cooperating with universities, NBRC and other external organizations from a nationwide viewpoint, joint research projects should be promoted to obtain synergic effects, allowing the BRC to further develop.
- In training researchers, cooperation with the University of Tsukuba should be strengthened.
- Consideration should be given to establishing a universally applicable standard unique to Japan (metagenomes, etc.).
- “A manual for taxonomic experiments” for specialists other than taxonomists should be published.
- The field dealt with by the International Journal of Systematic and Evolutionary Microbiology (IJSEM) is limited to “taxonomy.” The BRC should consider publishing an international journal that deals with resources from interdisciplinary perspectives.