

Activities of World Federation for Culture Collections (WFCC) World Data Centre for Microorganisms (WDCM)

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Culture collections are the reservoir of invaluable microbial resources and information since the first service collection in Prague, the Král collection. They are now as diverse taxon-wide, application-wide and region-wide as microbes are. In the meantime, WDCM has provided a comprehensive view on culture collections and their holdings to the relevant communities.

In 1972, Dr. Stanley Morris Martin published the first edition of World Directory of Collections of Cultures of Microorganisms. Since then, WDCM was maintained by the University of Queensland. In 1982, the WDCM director, Professor V.B.D. Skerman who was the prominent microbiologist, issued the 2nd edition of the World Directory which covers not only the list of culture collections but also the list of names of the holdings.

In 1986, WFCC decided to move WDCM to RIKEN in Japan based on the result of the international bidding hosting WDCM. Under the leadership of Professor Kazuo Komagata, the World Directory became an on-line database in RIKEN, although the Internet was not available yet. One of the authors (HS) took over the directorship when Professor Komagata retired from RIKEN and transferred WDCM to the National Institute of Genetics (NIG) in Japan in 1997. WDCM in NIG started Web sites for both WDCM and WFCC. In 1999, WDCM organized a symposium with the title of "Microbial Resources Centers in 21st Century - New Paradigm" back to back the 1st OECD Meeting on Culture Collections. In the symposium and meeting, a new concept of biological resource center was proposed. OECD eventually published an official report for the implementation of biological resource centers in 2001.

In May 2011, the other author (JM) succeeded HS

and WDCM has been managed by a new host, namely, Information Center, Institute of Microbiology, Chinese Academy of Sciences since then. The 3rd generation of WDCM in Beijing will expand the services to culture collections and their customers, especially personalized service for WFCC members and WFCC registry collections. After the relocation of WDCM, WDCM has already worked out the new WFCC webpage (Fig. 1) and online reference strain catalog that will be introduced later in this article.

At the top of WFCC homepage, links to Web pages of "about WFCC", "WDCM", "WFCC Newsletter", "tools" and "contact us" are set in a horizontal bar. Under the bar, images of microbes are displayed one after another. The images in the Fig. 1 were kindly provided by BIOTEC, Thailand in October, 2011. WDCM expects that a variety of microbes show up in this section. You just click the menu of "Contribute Cover Picture" at the left bottom of Fig. 1 and upload images of your microbes.

In the left column, anchors to the following Web pages are set "for WFCC membership", "search



Fig. 1 New WFCC homepage

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WDCM databases”, “a comprehensive list of culture collections and their networks”, “publications by WFCC” and “the WFCC guideline”. The user also finds the information on the executive board and ICCG that is the key event for WFCC and culture collections.

Under the image, news form WFCC and culture collections worldwide will be uploaded from time to time. It will be stimulating for us to know what happen in other places and in other research fields, and you have an opportunity to share the experiences with others.

WDCM most welcomes feedback from culture collections and research labs: metadata of institutions, the list of holdings, images, news and proposals to WFCC. It is essential for WDCM and culture collections to keep updating CCINFO that is the on-line database. CCINFO archives detailed information about the funding, personnel, holdings and services of culture collections and includes information on 592 culture collections in 68 countries as of October, 2011. CCINFO also displays the geographical distribution of culture collection’s location integrated with Google earth.

Each culture collection is entitled to edit CCINFO by use of the user identifier and password given by WDCM.

REFERENCE STRAIN DATABASE

WDCM Reference Strain Catalogue (RSC) was defined by the ISO TC 34 SC 9 Joint Working Group 5 and by the Working Party on Culture Media of the International Committee on Food Microbiology and Hygiene (ICFMH-WPCM) in their publication Handbook of Culture Media for Food and Water Microbiology. It fulfills a need expressed by these

Table 1 Statistic summary of CCINFO

| | |
|--------------------|-----------|
| Culture collection | 592 |
| Countries | 68 |
| Microbial | 1,754,290 |
| Bacteria | 768,608 |
| Fungi | 507,792 |
| Virus | 19,148 |
| Cell line | 7,349 |

Table 2 Statistic of strains listed in WFCC RSC

| | |
|-------------------------|-----|
| Strains | 170 |
| Species | 114 |
| Culture Collection | 43 |
| ISO and other standards | 55 |

bodies for a unique system of identifiers for strains recommended for use in quality assurance. So far, the 22nd version of “REFERENCE STRAIN CATALOGUE PERTAINING TO ORGANISMS FOR PERFORMANCE TESTING CULTURE MEDIA” is published. Reference strain database provide a convenient access to the catalogue that is listed by species, WDCM number, culture collection and standard name.

ANALYZER OF BIO-RESOURCE CITATIONS

Addition to the update of CCINFO and inclusion of the reference strain database, WDCM is developing an analyzer of citations as a unique service to WFCC members and the microbiology communities, which provides overview on the activities of culture collections and usage of strains.

Analyzer of Bio-resource Citations (ABC) is a platform that captures and assembles publications that refer to strains preserved in each culture collection. Thus, it helps curators and researchers check the citations among publications, sequences and microbial resources, and observe the contribution of each cultural collection to science communities.

ABC routinely scans and mines full-text articles to identify strains studied including sequencing. The system is composed of full-text files, indexing by bio-resource terms and a mining engine, which automatically explores the citation information from publications and sequences. ABC provides:

- an interface for the curators of culture collections to check the citation information that is automatically extracted by the mining engine
- the summary and detailed statistics generated by the statistics module, which accurately demonstrate the state of bio-resources citations for each culture collection.
- search functions by countries, culture collections

Table 3 Statistic summary of ABC

| | |
|---------------------------------|--|
| Culture collections | This Analyzer collected information for strains of 573 culture collections from 68 countries. |
| Strains related to publications | 94,689 strains are described in 107,658 publications published in 2,827 journals (from 1953 January to 2011 November). |
| Strains related to genomes | 180 strains related to 367 genomes |
| Strains related to sequences | 9,127 strains related to 158,408 sequences. |

and accession numbers of strains.

ABC, at the end of November 2011, finished analysis 107,658 publications which cover 573 culture collections in the world.

FUTURE WORKS AND SERVICES OF WDCM

As noted in the first section, the 3rd generation of WDCM in Beijing will expand the services to culture collections and their customers, especially personalized service for WFCC members and WFCC registry collections, e.g.

- Customization and mail push of microbial information
- Online collaborative working platform
- Bioinformatics analysis platform
- Website and online catalogue for culture collection centers in need
- Video conferencing system for the efficient communication between WDCM and the communities

and in the communities.

In summary, WDCM foresees the virtuous cycle between WDCM and culture collections. WDCM will actually create services for culture collections counting on the support from culture collections.

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