THE THAILAND NETWORK ON CULTURE COLLECTIONS (TNCC): A VIRTUAL BIORESOURCE CENTER

Microbial culture collections are recognized as important resources that have been providing the scientific community with living organisms for education, research, and industrial application for over 50 years. At present, several culture collections have been established worldwide. In May 2009, the World Data Center of Microorganisms (WDCM) recorded 550 culture collections in 68 countries, comprising of a total number of 1,420,220 strains of bacteria (40%), fungi (34%), viruses (1%), cell lines (0.8%) and other kinds of microorganisms (23%). The principle role of culture collections is to provide scientists with authenticated strains of microbes as well as to act as a depository for newly - discovered or industrially - relevant ones.

Establishment of TNCC

According to the WDCM homepage, Thailand has over 50 culture collections containing a total of more than 42,000 microbial cultures. Most of these are research-based or individual collections that are hosted at universities and governmental organizations. Among these collections, four have the necessary equipment and specialized personnel and have been given the mandate to support the culture collection activities of the country. These four collections are the BIOTEC Culture Collection (BCC), Department of Medical Science (DMST) Culture Collection, Department of Agriculture (DOA) Culture Collection and Thailand Institute of Scientific and Technological Research (TISTR) Culture Collection. In 2001, these four collections came together to form the Thailand Network on Culture Collections (TNCC). The major aim of this collaborative network is to set up a common and standardized system in microbial resources management in Thailand.

Management of Cultures

The microbial cultures and their associated information are maintained by each culture collection member. Well-characterized cultures are selected from each collection and made available for public access. Information about these cultures is published on the TNCC homepage (http://tncc.biotec.or.th) which is managed by BCC, the secretariat of the network. At present, 5,550 strains of bacteria (1744); fungi (3181); and yeasts (625) are available for public access and use.

The access to and distribution of cultures are managed in a manner that is compliant with the Convention on Biological Diversity (CBD). The relationships between the culture collections and its culture depositors and potential users are defined by the following documents:

(1) Material Acquisition Agreement (MAA) is the agreement between the collection and a depositor in which the specific conditions for the deposit is laid out in detail e.g. public access, patent position, etc.

(2) Material Transfer Agreement (MTA) is an agreement for the release of biological material between the collection and the user. Important issues are clarified within
TNCC members, depending on their specialization, provide specific services to the scientific community including deposit (general and patent accepted strains) and provision of cultures, identification of strains, on-the-job training on preservation techniques and management of culture collection and safe deposit of patent accepted strains. Details of these services can be found at http://tncc.biotec.or.th

1 http://www.ukncc.co.uk
2 http://wdcm.nig.ac.jp/statistics.html

TNCC Members

(1) BIOTEC Culture Collection (BCC)

The BIOTEC Culture Collection (BCC) was established in 1996 at the National Center for Genetic Engineering and Biotechnology (BIOTEC), National Science and Technology Development Agency (NSTDA) to support the national biodiversity policy in conservation and sustainable use of microbial resources in Thailand. It has been an ISO 9001:2000 certified service provider since 2005.

The primary objectives of the collection are to collect and preserve microbial cultures, other biomaterials (plasmids) and related information to support in-house research programs focusing on bioresource utilization (e.g. screening for bioactive compounds and enzyme for industrial application), technical research on isolation, identification and preservation of microorganisms. Initially, the focus of the collection was on insect pathogenic fungi. This was later expanded to other groups such as wood rot, seed, soil, fresh water and marine habitats.

As of 2009, the collection holds about 30,000 strains (1446 species of 910 genera) which include 22,000 filamentous fungi (899 species of 718 genera), 2,013 yeasts (524 species of 56 genera), 5,800 bacteria (219 species of 98 genera) and 70 plasmids. This collection also houses various strains producing a variety of enzymes (2,300 strains) and bioactive substances (4767 strains). These bioactive substances have properties including anti-cancer, anti-fungal, anti-HSV-1, anti-malaria and anti-TB.

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(2) DMST Culture Collection

The DMST Culture collection is a collection of medically important strains. It was established in 1978 in the Department of Medical Science within the Ministry of Public Health. Currently, the collection houses over 20,000 strains of bacteria fungi yeasts, cell lines and protis (91 genera, 490 species).

One key objective of the collection is to be a distributor of medically important microorganisms used for quality control, production of biological product and research. It also acts as a center for deposition and preservation of microorganisms to maintain the microbial resources for sustainable utilization and to be an information center for medical microbial taxonomy.

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**3) DOA Culture Collection**

The DOA Culture Collection was established in 1972 in the Plant Pathology and Microbiology Division within the Department of Agriculture under the Ministry of Agriculture and Cooperatives. The DOA culture collection was initially set up as a working collection to serve research needs within the institution. It was a collection of agriculturally-important microorganisms comprising mainly of plant pathogens and biofertilizer producing microbial strains.

Currently, the DOA culture collection functions as a microbial resource centre of agriculturally-important cultures, including fungi and bacteria both pre- and post-harvest, bio-agent microorganisms and native mushrooms found in Thailand. In addition, it is a centre for culture supply or exchange with other culture collections.

At present, 3,193 isolates of agriculturally-important microorganisms have been preserved at the DOA culture collection. These are 50 strains of algae, 1,560 strains of bacteria, and 1,583 strains of fungi.

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**4) TISTR Culture Collection**

The TISTR Culture Collection or Microbiological Resources Center for Southeast Asia (Bangkok MIRCEN) was established in 1976 at the Thailand Institute of Scientific and Technological Research, which is under the Ministry of Science and Technology. This collection has been an ISO 9001:2000 certified service provider since 2004.