

HISTORY AND ACHIEVEMENTS OF THE CULTURE COLLECTION AND PATENT MIRCEN BRAUNSCHWEIG [GERMANY]

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DSMZ - Deutsche Sammlung von Mikroorganismen und Zellkulturen German Collection of Microorganisms and Cell Cultures, Germany

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Summary

The DSM/DSMZ was founded following a ministerial decision in the late 1960ies to support the emerging discipline of biotechnology. Far-sightedly, it was recommended that the collection should, besides performing service functions, conduct also own research on the isolation, cultivation, characterization and taxonomy of the biological material held. One of the salient service functions for the support of biotechnology entrusted to DSM was to act as patent depository, the status of which was given to DSM in 1974 by the German and the European Patent Offices, followed by the recognition as International Depository Authority according to the Budapest Treaty in 1981 by WIPO. DSM joined the MIRCEN network as a *Culture Collections and Patents MIRCEN* in 1990.

Today, the DSMZ is the German national Biological Resource Centre in the field of biotechnology and biomedicine and holds living biological material such as Bacteria and Archaea (including plasmid bearing strains), filamentous fungi and yeasts, plant cell cultures, plant viruses, bacterial viruses and human and animal cell lines. A broad range of classical and modern taxonomic methods is available, from morphological,

physiological and chemotaxonomic to molecular genetic methodology. Areas of expertise at DSMZ are in the fields of taxonomy and systematics, authentication and identification, preservation, maintenance and supply of biological material including the various legal issues around, such as safe transport and packaging of biological material, access and benefit sharing and donor country rights. Staff members contribute to a number of international projects and activities dealing with the various aspects of microbial diversity, derived data and related quality. The latter of which is increasingly recognized as a prerequisite for academic research and industrial application and it is understood that there is need for the modernisation of microbial culture collections worldwide towards a technical, scientific, administrative and infrastructural level of quality that is required to meet the needs of future biotechnological and biomedical research and development.

1. Introduction

The acronym of MIRCEN (MIcrobial Resource CENTre) had been coined in the early 1970ies and with publication of the first MIRCEN Newsletter (MIRCEN NEWS No. 1) in August 1980, already 7 such centres had been nominated. The idea was, to subsume in a thematic network already actually existing academic and / or research institutes, both, in developed and developing countries. These centres would be able, through international cooperation and each in their specific fields, to contribute to the harnessing of the beneficial applications of the microbial world for human progress. It was finally in 1990, when the DSM joined this network as a 'Culture Collections and Patents' MIRCEN. At that time - due to Edgar DaSilva's continued efforts - 23 members were listed.

2. The Early Days of DSM

The DSM originated from a purely internal research collection of the Institute for Microbiology at the University of Göttingen. In the late 60ies, to support the still young discipline of biotechnology, a ministerial decision not only endorsed the plans for a separate microbiological institute (the first in Germany) but also strongly recommended the setting up of a microbial service collection. The concept was to design it as a distributed network and its nucleus, the 'Mikrobenbank' in Göttingen, was founded in 1969, with Dr. Dieter Claus being appointed as the person responsible to enlarge and shape it to the final distributed structure. At that time the collection was not much more than a refrigerator with cultures (though mostly already freeze-dried) and only one small laboratory. The central laboratory in Göttingen was first renamed 'Sammlung von Mikroorganismen Göttingen' (SMG) and from 1970 on, the network was developed under the name of 'Deutsche Sammlung von Mikroorganismen' (DSM). Two specialized collections, one in München and one in Berlin were added to the network in 1970. All activities were completely set up on project funding for 5 years, as part of the GSF. In 1971, 235 cultures had already been provided to users. In 1973 the final projected size was reached, with altogether 7 collections located at different sites and the first DSM catalogue was published in 1974. This drew the attention of the scientific user community to the fact that a national service collection had been established in Germany with the goal of supporting the further development of national (microbiology based) biotechnology.



Figure 1: Refrigerator at the 'Mikrobenbank' in Göttingen 1969 with Freeze-Dried Ampoules of Bacterial Strains

Sub-collections and areas of research interest in 1974 presented themselves already quite broad. These ranged from Gram-positive, non-spore forming bacteria, Gram-negative Eubacteria, aerobic endo-spore forming bacteria, anaerobic endo-spore and non-spore forming bacteria, phototrophic bacteria, phytopathogenic bacteria and fungi, other filamentous fungi and yeasts, Pseudomonadaceae and marine bacteria, as well as Actinomycetales. Scientific and technical services such as patent deposit, order placement and dispatch and an identification service for bacteria had already been built up. The preface of the first published catalogue of the DSM may serve as a representative example of the European biotechnological and biomedical spirit of optimism of that era:

'According to its programme for the advancement of biology, medicine and their related

technology, the Ministry of Research and Technology of the Federal Republic of Germany devoted special attention to the establishment of a Collection of Microorganisms. It is recommended that the collection conducts general research on the isolation, cultivation and taxonomy of microorganisms in addition to performing the service function of their preservation, identification and distribution..... '

Criteria for the accessioning of microbial cultures into DSM were formulated in a Mission Statement:

- Genera of technological relevance should be represented as completely as possible; also: genera of environmental significance or relevant to hygienic testing
- Type strains of all relevant species; if no type strain has been designated another representative or commonly used strain should be selected
- In addition to the type strain of a given species, additional strains should be collected if described in the literature as being used in the production/degradation of certain compounds, or which have been isolated in connection with spoilage
- Test strains for the detection of e.g. antibiotic compounds or vitamins, approval of disinfectants, or for the various applications in quality control
- Strains exhibiting special biochemical properties
- Strains commonly used for biochemical, genetic and other studies
- Strains used in education
- The reason why a specific strain is included in the catalogue should be indicated in the catalogue entry and should be documented by literature or through other reference.

This mission statement is valid still today for the Microbiology Department of DSMZ.

3. Further Development

After evaluation of the individual sub-projects, funding was terminated for 4 of the individual bacterial collections, because their activities did not meet expectations of the user communities, especially with a view to the service offered. At that time the number of staff in Göttingen was 4 scientists, 8 technical laboratory assistants and 4 further technical/office assistants.

The first considerable enlargement of DSM took place in 1986, reflecting the success of the management strategies of Dieter Claus. Five additional scientific/administrative working groups for plasmids/phages, medical microorganisms, patent deposit, identification and computation/data-base were established. Funds were provided to employ additional five scientists and five technical assistants, though again only on the basis of project funding. More laboratory and office space was needed and thus DSM moved into a new building in Braunschweig in 1987.

Organism groups covered by then represented an extensive range of bacterial and archaeal diversity: aerobic, anaerobic, phototrophic, chemolithotrophic, extremophiles, and many others. Only a smaller range of fungi and yeasts were accessioned because of

already existing major collections in Europe (e.g. CBS in the Netherlands or IMI, now CABI Bioscience in the UK). The main focus of biological material held was kept to cover biotechnological and environmental biodiversity, thus, e.g., Risk Group 3 organisms or higher were excluded from being accessioned.

In 1988 DSM was, for legal reasons, transformed into an independent, publicly funded institution (GmbH).

Based on recommendations, and in line with the Federal Government's programme in the area of applied biology and biotechnology, the collection received fundamental enlargement during the years 1989 – '90 by the addition of three new departments: a department for human and animal cells with 6 scientists and 6 technical assistants, a plant cell department with 2 scientists and 2 technical assistants, and a plant virus department with 2 scientists and 3 technical assistants. However, as before, this again was only on unstable project funding for the next 5 years.

The year 1991 saw the retirement of director Dr. Dieter Claus, who was followed by Prof. Dr. Reiner M. Kroppenstedt, interim director until 1993. Since '93 the new director of DSM is Prof. Dr. Erko Stackebrandt.

Then finally from 1996 on, DSM received institutional funding within the framework of the German '*Blaue Liste*' [Blue List] institutions; the costs being shared 50% by the federal government and 50% by all *Länder* [State] governments. At this stage a new name was necessary, because another institution in the '*Blaue Liste*' bearing the same acronym held senior rights. Thus a 'Z' was added to the acronym to reflect the animal, human and plant cell lines (in German: Zellkulturen) in the collection. Since 1996, when in Germany the 'Wissenschaftsgemeinschaft Gottfried Wilhelm Leibniz' (WGL) was founded, DSMZ was included as a member under the category *scientific service institution*.

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GBIF: www.gbif.org

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Biographical Sketch

Dr. Dagmar Fritze, DSMZ, Germany. From 1976 to '81 Dagmar Fritze studied in the Universities of Ulm and Göttingen, Germany, and Research Laboratories of Cadbury Schweppes, Reading, UK. She accomplished her Diploma 1981 - '82 (Thesis on Improvement and Miniaturisation of Preservation Methods for Bacteria) and her Doctor of Natural Sciences 1982 - '85 (Thesis on Taxonomy of Alkaliphilic *Bacillus* Strains), both at the University of Göttingen (under supervision of Prof. Hans-Günter Schlegel and Prof. Jan Remmer Andreesen) and at the DSM (under supervision of Dr. Dieter Claus). Since 1987 she is employed at DSMZ (then DSM) and was responsible for the patent depository until 2005. From 1989 to 2005 she was Curator for the group of Aerobic Endo-spore Forming Bacteria. Since 2005 she is responsible for collection related international affairs. Since 1994 she is a Member of the Subcommittee *Bacillus* and Related Genera of the International Committee on Systematics of Prokaryotes. 1996 - '99 she was Chair of the Technical Committee of the EU project Common Access to Biological Resources and Information (CABRI) and 1996 - 2000 Vice President of the World Federation for Culture Collections (WFCC). Since 2004 she is President of the European Culture Collections' Organisation (ECCO). 2004 - '06 she was a Member of the OECD-Task Force on Biological Resource Centres and in 2007 a Member of the OECD Global BRC Network (GBRCN) Workshop Steering Group.