The European initiatives MINE, CABRI, EBRCN and ENBI

Worldwide development of biotechnology results increasingly in the recognition of the importance of microbial culture collections and their holdings. In particular, it is recognised that the knowledge on these holdings accumulated in culture collections should be put more easily at the use of researchers. Far sighted scientists, under the leadership of the late VBD Skerman, had set up, already from the mid 1960s on, activities to catalogue culture collections and their holdings [1, 2].

To meet the increasing needs of the scientific community for comprehensive, up-to-date and easy-to-access information on living biological material that is held in microbial culture collections, a sequence of coordinated activities had been initiated in the European Union. Based on the scientific and technical cooperation within the European Culture Collections Organization (ECCO) inspiring confidence among microbial culture collections, a number of service culture collections from various European countries collaborated in these efforts.

While laying emphasis on different subjects, these activities have some important goals in common:

- Provide platforms for cooperation and exchange among holders of biological diversity.
- Improve presentation and quality of data.
- Facilitate access to data and to ex-situ living biological material.
- Increase quality and visibility of quality of biological material.

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In this context, the contemporary development in microbial taxonomy needs to be mentioned – the compilation of the Approved Lists of Bacterial Names in 1980 [3, 4], and the formulation of the Bacteriological Code of Nomenclature [5, 6]. Numerous taxonomic experts worked towards the approved lists, reviewing about 40,000 bacterial species according to more stringent, modern taxonomical cognition. Only those names of taxa were accepted for the lists which were adequately described, and for which there was a type, neotype or reference strain available. The result of the work was that only about 4,000, but well documented, species were retained in the approved lists.

The advantage is that today, when a new species is described, only those names of species appearing in the lists need to be taken into consideration. Thus, the approved lists constitute a new basis and a new starting point for bacterial nomenclature. A regularly updated database [7] and complete list [8] of validly published names of bacterial species is available.

Of the rules laid down in the bacteriological code of nomenclature, one is of specific importance here, i.e. "the type strain of a given species must be deposited with two public service culture collections, located in two different countries, preferably in two different regions in the world".

Two principles emerged from these taxonomical enterprises, which are maintained as a guidance for future microbial data related activities:

- Information needs to be related to living biological material which needs to be readily available for further research.
- This biological material should be described according to up to date taxonomy.

Microbial Information Network Europe (MINE)

The MINE project was an ambitious, taxonomy based, and database entry orientated start (1986-1989 and 1990-93) [9-12] initiated by service culture collections from 12 European countries curating a vast range of eukaryotic (including fungi, algae, plant cell cultures, human and animal cell lines) and prokaryotic (including bacteria, archaea and viruses) material.

This project was designed to harmonise and digitise data of 150,000 cultures for availability online and to develop a common database. Requirements for the maintenance of microorganisms and efficient data recording were established, together with details of the data structure used, hard- and software configurations, data entry procedures and online access. While the database itself is of no use anymore, the main merits of MINE lie in the development of an internationally agreed format – 135 fields for fungi and yeasts and 145 fields for bacteria which cover the most important aspects of microbial taxonomy, ecology, physiology, and biochemistry, including also data pertaining to the practical applications of microorganisms.

At the outset of the project, the various potential structures of the future database were discussed (centralised system, centralised database with decentralised access, central directory with decentralised databases, or online interconnected and distributed databases) with a view to advantages or disadvantages, costs and feasibility.

While the latter structure was considered most attractive from the point of view of both providers and users, it had to be accepted that this was, for the time being, technically not possible – especially with a view to data retrieval. The then limited level of computerisation in general, the limited financial resources at culture collections in particular, the total lack of standardisation in the raising of data and nothing comparable to today's internet, made the decision towards a centralised database necessary and emphasis was laid on standardisation of formats and contents of database fields under the leading issue of reflection of sound, up to date systematics and taxonomy.

Common Access to Biological Resources and Information (CABRI)

Through the work of MINE, an important basis of experience was laid for the more user-orientated, internet-accessible CABRI project (1996-1999) [13], in which the culture collections are supported by additional IT partners. This project is today, after termination of EU funding, carried on as a self-sustainable service by the members.

CABRI has received worldwide acknowledgement as a prototype of an easily accessible, integrated, while distributed database offering biological specimen related data. Present members holding biological resources are BCCM (B), CBS (NL), DSMZ (D), ECACC (UK), ICLC (I), CABI (UK) CIP (F) and NCIMB (UK). Supporting database specialists are ABC (I), CERDIC (F) and INSERM (F). The 'biological' partners are microbial service culture collections holding and offering living biological material such as bacteria, archaea, fungi, yeasts, animal, human and plant cell lines, plant viruses, phages, plasmids and other DNA material.

The most important achievements are the CABRI data quality standards. For the project, a 'minimal data set', a 'recommended data set' and an optional 'full data set' were extracted from the full MINE format, which were declared as being the basis for judging cultures for their suitability for inclusion into online catalogues. Common standards for quality control in data handling, especially with a view to tracking changes and up-dates, have been established.

An additional important achievement is the development and subsequent publication of agreed quality standards for laboratory work and related data handling. These manuals serve to integrate collections into a general European biotech/bioinformatics structure of quality, enabling them to fulfill their central role in the qualified support of research and development.

European Biological Resource Centres Network (EBRCN)

CABRI was later incorporated as a core activity into the still ongoing approach EBRCN (2001-2004) [14]. This project was built up as an instrument to facilitate the transfer of collections into resource centres (see OECD-BRC project) and to form the European focal point from which a virtual European BRC may be developed using the CABRI database.

One of the tasks of EBRCN is to encourage European collections to develop towards and implement CABRI quality criteria. Eventually, a common European standard for BRCs may be formulated, based on the existing collection quality management systems. EBRCN is also an ideal platform to further cooperation between collections to maximise complementarity and minimise unnecessary duplication of holdings of European BRCs.

Additionally, this platform facilitates the collation of information on legislation on access to, and distribution of, living organisms and health and safety, as well as its dissemination to BRCs and users through a central website. Presently, there are 12 European microbial collections cooperating in the project.

European Network for Biodiversity Information (ENBI)

ENBI (2003-2006) [15] is a new, independent and much wider European approach, which is driven mainly by botanical and zoological systematists. This cooperation understands itself as a regional complementation to GBIF, forming a platform between the global and the

national levels. Membership is open to all kinds of biodiversity information related organisations from the European western palearctic biogeographic region and is presently composed mainly of botanical and zoological institutions, with CABRI and EBRCN being representatives of two regional microbial initiatives.

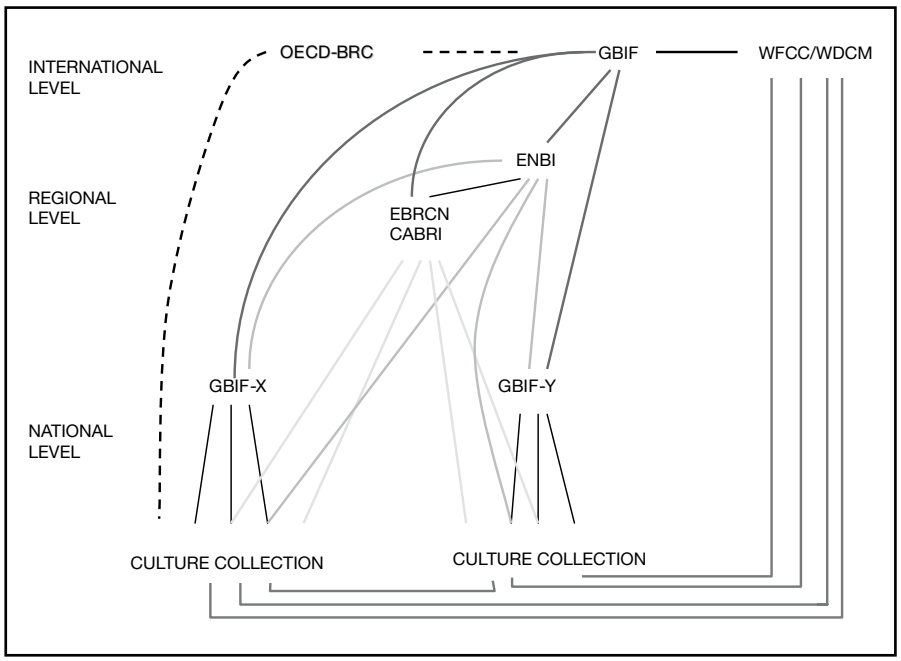
Participation of national GBIF nodes and existing European biodiversity networks and projects is strongly encouraged. Responsibilities for ENBI are seen in the coordination of national European initiatives and in the provision of a discussion forum for the development of concerted European actions and for increasing communication and cooperation.

Conclusions

All of these initiatives (Figure 1) have one common goal – that the enormous amount and range of invaluable data pertaining to living, pure and authentic biological material, (both of which are, material and data, held at expert centres) are placed at a more rapid disposal of researchers in academia and industry by making use of the increasing abilities of the electronic technologies. However, it appears that many more of such regional and international activities will be needed to fully exploit the potential that is available from microbial culture collections.

The concomitant increase in confidentiality in the services of a microbial culture collection will – not least – be furthered by its transformation into a BRC as discussed in the OECD-BRC project. Building up a system of peer-reviewed deposit and supply of living biological material, as well as the supply of peer-reviewed information on this biological material, will have an important impact on the development of biotechnology and biomedicine.

Figure 1. Interlinkage of microbial resources.



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