



WORLD FEDERATION FOR CULTURE COLLECTIONS Newsletter (No.48)–JULY 2010

NEWS FROM THE WFCC

World Federation for Culture Collections (WFCC) looks to secure the hosting and management of the WFCC World Data Centre for Microorganisms for the coming years

The WFCC is a Multidisciplinary Commission of the International Union of Biological Sciences (IUBS) and a Federation within the International Union of Microbiological Societies (IUMS). The WFCC is concerned with the collection, authentication, maintenance and distribution of cultures of microorganisms and cultured cells. Its aim is to promote and support the establishment of culture collections and related services, to provide liaison and set up an information network between the collections and their users, to organize workshops and conferences, publications and newsletters and work to ensure the long-term perpetuation of important collections.

The WFCC (through the activities of Professor Skerman, University of Queensland, Australia, and his colleagues in the 1960's) pioneered the development of an international database on culture resources worldwide. The result is the WFCC World Data Center for Microorganisms (WDCM). This data resource is now maintained by Professor Hideaki Sugawara at National Institute of Genetics (NIG), Japan and has records of 576 culture collections from 68 countries (as of June, 2010). The records contain data on the organization, management, services and scientific interests of the collections. Each of these records is linked to a second record containing the list of species held. The WDCM database forms an important information resource for all microbiological activity and also acts as a focus for data activities among WFCC members.

WDCM has to maintain global unique identifiers (GUIs) for culture collections worldwide and the portal site of WFCC. The GUI is the key to integrate information in diverse databases on microbiology, culture collections

and other subjects including the International Nucleotide Sequence Database (<http://www.insdc.org/>). The WFCC portal site is the hub of the culture collections and their customers.

WFCC aims at securing the future development of WDCM and open a call for proposals to host institutions and scientists to contribute technically and financially to this necessary underpinning of research in microbiology.

The applicant to host institution is required:

- to have active culture collections with a comparatively long history to demonstrate sustainability
- to secure long-term funding for WDCM
- to have experience of the development and management of regional and/or international networking of culture collections
- to have IT experts and microbiologists
- to have an efficient and flexible management system

Any institutes interested in hosting WDCM should submit their goals to develop and provide services that improve access to information for global biotechnology, bioindustry and bio-economy, and strengthen the capacity of WDCM to produce, acquire, exchange and utilize information not only in culture collections and BRCs but also biodiversity and genomics.

Scope and function of the WDCM

Scope

1. A global registry of public service culture collections – the collections must all be able to provide external access to holdings and data of catalogued strains – provide a function to enable tracking of biological materials through unique identifiers
2. Provider of metadata on all registered collections
3. Provide the web presence for the WFCC:
 - a. Metadata and contacts, links (where possible) to WFCC affiliated collections – distinct from the register



- b. WFCC web pages to deliver the functionality of the WFCC – information resources, Newsletters
- c. Culture Collections statistics
- 4. Links to other data providing initiatives

Functionality

The above scope defines what functions are needed centrally. Applicants may propose additional functions. Initially, the host institute is required to reproduce the current functionality described in the following so that the WDCM services are not interrupted during the relocation of WDCM. Later on, the host institute is expected to expand the Web site to be a portal to other useful information resources on microbiology and culture collections, e.g. straininfo (<http://www.straininfo.net/>), GBRN (<http://www.gbrn.org/>), Asian Network of Microbial Research and etc.

WDCM present features

- CCINFO provides the function for registered collections to update their metadata;
- CCINFO database enables users to find collections and services (and where possible, links directly to them); currently a species list exists and you can find collections that provide these species
- Tools to deliver collection statistics
- Links to regional and national culture collection networks
- Webmaster for WFCC web pages to ensure rapid and efficient publication of documents and notices on the web
- Catalogue of reference strains

WFCC Rules to be recommended to the ICC12 AGM

The WFCC affiliate culture collection members are expected to implement the WFCC Guidelines as stipulated in the WFCC statutes. It is by the implementation of best practice that WFCC affiliate member collections are distinguished from other culture collections. The WFCC Executive Board published a draft set of rules in the last issue of the Newsletter inviting member input and comment. There was a very disappointing level of response to this request. Please take a careful look at the draft presented here in preparation for the ICC12 General Assembly vote for adoption.

1. The member collection must accept and implement WFCC Guidelines on the establishment and operation of culture collections
2. The member collection shall implement WFCC guidance on Biosecurity (<http://www.wfcc.nig.ac.jp/NEWSLETTER/newsletter34/a1.html>) See below
3. The member collection shall provide access to the minimum level of data to facilitate the operation of the WDCM
4. The member collection shall implement the WFCC principles of Access and Benefit Sharing Regime agreed by WFCC General Meeting <http://www.wfcc.info/NEWSLETTER/GGTSPU-styx2.bba.de-31757-6599860-DAT/WFCC-NL-January-2009.pdf>
5. The member collection shall record details of the origin of material (including country of origin) and to whom it is despatched utilising material transfer agreements as far as practically possible so at the very least they know the route of deposit of the material into the member collection and who have received material from it
6. The collection shall protect and respect Intellectual Property Rights of the depositor and not claim ownership of the materials deposited subject to terms and conditions of prior informed consent (PIC) and MTAs. This does not preclude the member collection or its employees developing IPR associated with the biological materials deposited
7. Where appropriate and where spare capacity exists, back-up collections of important materials will be maintained this can be with another member collection subject to agreement
8. The member collection will be free to mention its membership in appropriate published material
9. Membership is subject to the approval of the WFCC Executive Board

There is still time to comment on the value and content of these rules please contact the WFCC Board via the Secretary Philippe Desmeth. They refer (Rule 1) to adoption of the WFCC Guidelines, please visit the WFCC web site and comment upon the 2010 version (Third Edition) of this guidance.



WFCC Resolutions and a perspective of the future

David Smith
President of the WFCC

The Twelfth International Conference for Culture Collections (ICCC12) rapidly approaches and information on this can be found at <http://www.iccc12.info>. One of the key outputs of the ICCC is a list of resolutions of the conference. These identify global issues from discussions and presentations that will form part of the WFCC work programmes between meetings. The WFCC Executive Board and the local ICCC11 Organising Committee supported by the conveners and chairs of the congress drew up a number of resolutions (listed below) as a result of the Eleventh ICCC held in Goslar, Germany. The resolutions addressed a number of challenges that the culture collections of today face and progress towards their delivery are discussed here.

1. **WFCC will take a leading role in the development of the Global Biological Resource Collections Network to facilitate collaboration between Culture Collections.**

The GBRCN Demonstration project has progressed well and the WFCC have collaborated in its development. The GBRCN Secretariat has recently presented its mid-term report to the German Federal Ministry of Education and Research (BMBF) and activities have been reported on the GBRCN website <http://www.gbrcn.org>. Presentations will be made at ICCC12 in Florianopolis but a key and most significant development is the submission of a proposal for a Microbial Resources Research Infrastructure (MIRRI) to the European Strategy Forum for Research Infrastructures (ESFRI) - see report in this Newsletter. This could help change the future networking of culture collections globally and contribute to their long-term sustainability. The WFCC continues to collaborate with the GBRCN Demonstration project and in the future, MIRRI.

2. **WFCC will improve its capacity building efforts exploring new tools (e.g. e-learning).**

The WFCC will benefit from CAB International's investment in developing *Managing Microbes* e learning modules. This is an 8-10 hour online course which

provides a comprehensive guide to technical, legislative and practical aspects of working with microorganisms in a laboratory. Each module provides opportunities for:

- Self-paced learning with practice activities in each topic
- Repeated review of the content and practice activities to embed concepts and enhance familiarity with key approaches
- Modular assessments to track overall progress.

The *Managing Microbes* course covers (see figure 1):

- The issues around establishing and managing a culture collection
- The methods of characterising and using various microorganisms
- Best practice with regard to identification, isolation, storage and growth
- Preservation techniques and their application for specific microorganisms
- Health and safety requirements for working with microorganisms
- Compliance with international standards of best practice

Further information can be obtained from CABI contact d.smith@cabi.org

Figure 1: An introductory screen from *Managing Microbes*

In addition, funding has been transferred from the UK Federation for Culture Collections for the WFCC to finance a video presentation on culture collection operations. The EMbaRC project is also working in this field and the WFCC will work with them on this activity.



3. WFCC will make an effort to propose a standard minimal MTA safeguarding the interest of all stakeholders

The European Culture Collection Organisation (ECCO) has prepared core text <http://eccosite.org> for implementation by collection members; this text should be considered by all WFCC member collections. A paper was submitted to COP10 to present the WFCC position (Smith & Desmeth, 2007) and Philippe Desmeth has represented WFCC at subsequent ABS meetings.

Smith, D. & Desmeth, P. (2007). Access and benefit sharing, a main preoccupation of the World Federation of Culture Collections. In: UNEP/CBD/WG-ABS/6/INF/3 13 December 2007 Compilation of submissions provided by parties, governments, indigenous and local communities and stakeholders on concrete options on substantive items on the agenda of the fifth and sixth meetings of the ad hoc open ended working group on access and benefit sharing. Canada: UNEP/CBD. p 68-70.

4. WFCC will make an effort to create a workable solution for curators to aid in risk assessment imposed by biosecurity regulations (dual-use).

Amongst all different legal areas within bio-legislation, biosecurity is probably the most complex and difficult aspect. As national controls are put in place through national legislation, for example the Patriot Act in the USA and Security Act in the UK, the lists of organisms of concern differ. In a spectrum of risk, spanning natural events, from emerging disease through man's intervention (e.g. laboratory accidents to deliberate acts, to bioterrorism) the greatest risk comes from emerging disease. Control of access to microorganisms and their safe handling has been in place for many years and is subject to national laws. The OECD Biological Resource Centre (BRC) Guidelines (OECD, 2007) includes guidance to deliver a practical approach that enables legitimate research and development but reduces the opportunity for misuse. The OECD BRC Task Force agreed that guidance is necessary but that it should not be bureaucratic and applied to situations that don't

require it. The OECD has created a web based information resource (<http://www.biosecurity.org>).

The WFCC is working with various project consortia and organisations to develop a practical way forward for collections in biosecurity risk assessment. The EMbaRC project <http://www.embarc.eu> funded under the EU 7th Framework Programme (Grant agreement number: FP7-228310) is designed to help deliver a code of conduct and mechanisms for risk assessment. The GBRCN is working with EMbaRC to help microbial resource collections implement biosecurity best practice. Together they hope to develop common methodologies for risk assessment and seek quantitative and qualitative tools and assessments that assist in completing appropriate and comparable risk assessment. A data base that BRCs may use as a reference will be developed leading to an increasingly harmonized framework of risk assessment and risk management. The GBRCN Demonstration Project web site provides on biosafety, biosecurity and transport (of biological materials) and the implementation of best practices amongst other items. Links to the GBRCN Information resource, Code of practice for International Depository Authorities, WHO Biosafety Manual and other key operational documents and information are given at: <http://www.gbrcn.org/project/further-reading.html>.

Additionally, partners were provided with the publication BG Chemie Merkblätter to help in the process of risk assessment. Both EMbaRC and GBRCN will provide information for the benefit of all WFCC collections. Further discussions will be held at ICC12.

5. WFCC will collaborate with initiatives such as Straininfo.net and Mycobank to improve the quality and validity of strain data placed in the public domain

An experiment is being carried out between straininfo.net and the EMbaRC and GBRCN projects to give access to WFCC, EMbaRC and GBRCN partner data via specific portals. This is paralleled by an experiment broadening the use of the Brazilian Network software SiCOL. The results of these experiments will be reported at ICC12. In addition, the Common Access to Biological Resources and Information (CABRI) guidelines for catalogue production will be converted into a community standard for culture collection data management and delivery.



6. **WFCC will work with ICSB to deposit long-term preserved type strains of fungi in minimal two different collections in different countries.**
7. **As type strains are the property of the international scientific community the WFCC will work to ensure they remain available to qualified workers without restrictions or impediment.**

The WFCC Board is working on a paper with Brian Tindal of the ICSP entitled *Access to Type strains and equivalent reference strains from service culture collections* which is yet to be submitted and covers aspects of resolutions 6 and 7.

There is still a lot of work to be done on these issues and it will continue under the new WFCC Board and the above mentioned project consortia as their projects and initiatives develop.

A strategy for improving the use of microbial Resource Centres (mBRCs)

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At a time of increasing control of use of biological materials by countries executing sovereign rights of researchers generating intellectual property a growing uneasiness can be observed among the providers and the users of microbial resources and the curators of public collections/BRCs (BRC and mBRC - see footnote). Within the group of provider we distinguish between researcher and author, although being aware that an author is also a researcher. Researchers complain

because mBRCs very often refuse acceptance of taxonomically poorly characterized strain assemblages, mostly isolated in the course of field work. Authors, requested to deposit into mBRCs selected strains included in the scientific literature, are lacking assistance regarding the number and taxon to deposit and they will face a negative response from resource centers unless the relevant strain ranges within the specific interest of a mBRC. There is also resistance to deposit strains into mBRCs, an attitude still in the process of being investigated. On the other hand, the user is increasingly dissatisfied with the range of resources offered by mBRCs. While there is excellent coverage for type and reference strains, specific

Footnote:

At this point, the mode and technicalities of the transformation of public collections sensu pre-OECD-best-practice-era into Biological Resource Centres (BRC) sensu post-OECD-best-practice-era (<http://www.gbrcn.org/project/further-reading.html>) are under discussion. For the ease of communication the term microbial Biological Resource Centres (mBRC), denoting a quality assured collection, will be used.

strains of current scientific interest, plasmids, phages and mutants included in research are hardly available. Alongside these issues, mBRCs are already working at the limits of financial capacity, available space, equipment, expertise and, consequently, expansion of holdings. Microbial RCs mainly concentrate either in providing a broad range of biodiversity, often restricted to type and reference strains, or they focus on a specific range of taxa with interest for medicine, agriculture, pharmaceutical or food sectors. There is even a fourth element impacting on this situation, namely the national granting bodies. Only today, almost 20 years after signing the Convention on Biological Diversity (<http://www.cbd.int/>), governments are slowly recognising the added value of a wide access to microorganisms, to those living resources for which associated bio-informatics data are already available, either by published sources or by data mining of networked information.

Obviously, this vicious circle needs to be forced open in order to satisfy all stakeholders involved. The question is at which point should the circle be cracked? Neither editors nor curators have the power to request mandatory strain deposition. As voluntary deposition does not work (as clearly shown by past and present experience), who then should be in the position to



advise the authors and other scientists which fraction of strains to deposit? It should be very clear that we are talking only about a fraction of published strains; it also goes without saying that without a qualified assessment of the strain selected for deposition resource centres would be overburdened in no time. The result of a recent questionnaire to authors (Stackebrandt, unpublished: see also below) on this matter made it very clear that authors, in concert with editors and curators of public collections should be responsible for the selection: authors, because they (mostly together with the host institution) own the intellectual property rights and they should have the right to exclude those 'scientifically hot' strains which are still under investigation; editors, because they should catalyze the connections between authors and curators, at least as long as a network of public collection accepting reference strains included in the literature has not been established; and curators, because they will evaluate the author's strains in the light of existing gaps in holdings of particular taxa. Interestingly, scientists would not like to see granting bodies to have a say in the selection of strains to deposit.

The evaluation of gaps in and strength of, individual collections requires a thorough screening of existing holdings and expertise at the international level. While certain national (e.g., Belgium, France UK, USA, Brazil, Japan, Korea) and regional networks (e.g., Europe, Asia) are presently in the process of inventorying and comparing their collections, the range of resource centres need to be broadened in order to be able to cope with the expected increase. A centralized professional secretariat, such as that presently being established for the Global Biological Resource Centre Network (GBRCN; <http://www.gbrcn.org/>) should be trustworthy and accepted by all partners. We hesitate to assign this role to the World Federation of Culture Collection (WFCC) as this IUMS Federation (<http://www.wfcc.info/index.html>) lacks a tightly organized structure needed to fulfil the role of a broker between various stakeholders. Whatever structure will emerge at the end, a gateway giving access to a centrally maintained database (AmBRCA: Access to microbial resource centres and Advice) is needed in order to guarantee a smooth dialog between partners involved. This database should comprise lists of (i) those mBRCs agreed to work towards a better coverage of microbial diversity; (ii) genera and species the participating mBRCs agree to cover; (iii) contact persons for rapid evaluation of external strain collections; and experts for advice on e. g., taxonomic questions, long

term storage, IP, MTA, biosafety and biosecurity, import/ export and shipping issues and strain identification approaches.

While a scientist in charge of a research collection should feel free to contact a collection anytime (either direct or via the AmBRCA), an author has to wait for the result of the reviewing process. Already at the first revision stage the editor should link the corresponding author with the AmBRCA webpage to trigger further actions. In an optimal situation, following the adaptation phase, advice on potential strains to deposit could also come from the reviewers, directed either to the editor or to the author by the revision report. Here, the journals could add a relevant item to the score sheet.

So far, the conceptual development of a multi-facet mechanism is just a construct of ideas that should work in principle. What is missing, however, is firstly the willingness of all stakeholders involved that the increased deposition and public provision of microbial resources adds value to scientific progress and stimulates the bio-economy. Secondly, each step in this network of interactions is costly in terms of time and expense. Maintenance of the AmBRCA network, strain identification, shipping, strain authentication long-term maintenance and electronic catalogue entries are fixed costs which differ from species to species and from mBRC to mBRC.

The question that immediately comes up is: who is going to pay for this (the reader has probably asked this question much earlier). The question concerning coverage of arising cost was asked in the above mentioned questionnaire and the response of the authors was univocal: additional costs for strain identification, shipping and partly for long-term maintenance should be covered by research grants, which mostly comes from national research agencies. It makes sense to allocate a certain fraction of grants for this purpose, as the professional maintenance of biological material, isolated with tax payers money, should be of national interest. Research agencies are in a powerful position to link the notification of the granting of funds with the obligation to firstly properly maintain strain collections for future adoption by mBRCs, and secondly to deposit relevant (depending on the outcome of the discussion at the AmBRCA level) strains included in the scientific literature in public mBRCs. Financial support for the necessary expansion of the latter institutes will not be covered by research grants but must come from the mother organisations or funding bodies of mBRCs (the responsibilities of



governments, having signed the CBD, to care for ex-situ conservation of their national biological material, could be used as an additional argument). It should be mentioned that the number of strains deposited outside the public domain, i.e., research collections as well as the number of strains covered annually in the scientific literature has not been evaluated but one can assume that they constitute a major addition to the about 1.240.000 bacteria and fungi deposited in those collection which are registered in the World Data Centre for Microorganisms (<http://www.wfcc.info/datacenter.html>). For the continuous functioning of mBRCs - and many of these are already now working at the limits of their capacities - financial support for technical and personnel expansion is absolutely essential. Acknowledgement of these essential preconditions by the relevant granting bodies for research and mBRCs is a *conditio sine qua non* for a successful implementation of the mechanisms outlined above.

This communication is an initiative of the European Consortium of Microbial Resource Centres (EMBARC), supported by the European Commission's Seventh Framework Programme (FP7, 2007– 2013), Research Infrastructures action, under the grant agreement No. FP7-228310.

Further reading

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NEWS FROM MEMBERS

New Head of the DSMZ *Jörg Overmann*



After retirement of Prof. Dr. Erko Stackebrandt in 2009, the DSMZ-Deutsche Sammlung von Mikroorganismen und Zellkulturen GmbH gladly announces the appointment of Professor Dr. Jörg Overmann (49) as director of the Leibniz-Institute German Collection of Microorganisms and Cell Cultures. Prof. Overmann was recipient of the VAAM-Promotionspreis Ph.D. award of the German Society of General and Applied Microbiology (VAAM) and of a postdoctoral research fellowship of the German Science Foundation in 1992. At the Carl von Ossietzky University in Oldenburg, Overmann qualified as a professor in 1999. Shortly thereafter, Overmann became professor at the Ludwig-Maximilians University in Munich, where he led the Department of Biology as director from 2003 to 2009. The research interests of Prof. Overmann comprise bacterial speciation, adaptations to energy limitation, and bacterial interactions. He is Member in the Editorial Boards of Applied and Environmental Microbiology, Archives of Microbiology and Environmental Microbiology. As scientific and administrative director of the DSMZ, Prof. Overmann will be responsible for the overall functioning of the scientific and service activities, and will act as public representative of the institution.

Milena Wozniczka, Head of Public relations of DSMZ.
www.dsmz.de



Importance and Role of a Service Culture Collection



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A Service Culture Collection is very important for the conservation of microbial diversity for long term. Cultures for research in medical, agricultural, biotechnology and microbiology are carefully preserved under one roof and the loss of cultures is prevented. They supply strains to researchers and also provide services like identification of cultures, safe deposit and patent deposit. Catalogue of strains held by the collection is published.

A Service Culture Collection is of great importance in the conservation of microbial diversity for long term. The proper preservation of cultures by at least two different methods of preservation by a service collection ensures that microbial cultures are not lost. The provision of cultures for research in biotechnology and as reference strains for identification are amongst the many roles a service culture collections plays such as providing facilities like freeze drying of cultures, safe deposit and Patent Depository. Culture Collections also organize training programs in isolation, maintenance and characterization of microorganisms by morphological, biochemical, whole cell fatty acid analysis and molecular techniques. A list of service culture collections of the world can be found at <http://wdcm.nig.ac.jp/hpcc.html>. Most Service collections of microorganisms are members of the World Federation of Culture Collections (WFCC). For handling and processing pathogenic microorganisms special laboratories for safety are required. Depending on the degree of pathogenicity of the microorganisms P2

or P3 labs and Bio-safety Laboratories (BSL 3 or 4) are used. Negative pressure is maintained and air circulation is through HEPA filters in BSL. The entry to these BSLs by the workers is restricted and strict security is maintained to prevent misuse of these disease causing cultures. Entry cards to the bio-safety facility are provided only to authorized persons and close circuit cameras are fixed for electronically monitoring activity in the BSL area and on the entry/exit points.

Service culture collections publish a list of strains held in their collection in form of a catalogue of strain or online. The websites are usually interactive and a customer can find out whether the strain of their interest is available in a particular culture collection or not. Service Culture Collections have a collection of microbial cultures from varied environmental niches in one place under one roof. Personal Collections of microorganisms with researchers are very specialized that have a high risk of loss when the interest of the person changes or is transferred or retires from the job. Service Culture Collections are professionally managed and funded by the Government/other agencies for long term and thus, the microbial diversity is safe in the hand of a good service culture collection. Most collections must generate income to survive for example by providing different services mentioned above e.g. supplying and identifying cultures, and by safe deposits and Patent Depository. It is evident that Service Culture Collections are very important.



Institute of Microbial Technology' located in Sector 39A, Chandigarh, India



Table 1: Culture Collections in India

ABRC	WDCM912	Anaerobic Bacterial Resource Centre
AYL	WDCM934	WHYLABS RESOURCE CENTRE FOR MICROORGANISMS
CCDMBI	WDCM119	Culture Collection, Department of Microbiology
CIPDE	WDCM462	Collection of Insect Pathogens, Dept. of Entomology
DBV	WDCM173	Division of Standardisation
DMSRDE	WDCM166	DMSRDE Culture Collection
DUM	WDCM40	Delhi University Mycological Herbarium
GFCC	WDCM946	Goa University Fungus Culture Collection and Research Unit
ITCC	WDCM430	Indian Type Culture Collection
MCC	WDCM930	Microbial Culture Collection
MCM	WDCM561	MACS Collection of Microorganisms
MPKV	WDCM448	Biological Nitrogen Fixation Project College of Agriculture
MTCC	WDCM773	Microbial Type Culture Collection & Gene Bank
NCDC	WDCM775	National Collection of Dairy Cultures
NCIM	WDCM3	National Collection of Industrial Microorganisms
NFCCI	WDCM932	National Fungal Culture Collection of India
NIICC	WDCM961	NII Microbial Culture Collection
NTCCI	WDCM107	Culture Collection, Microbiology and Cell Biology Laboratory
RRJ	WDCM846	RRL, Jammu INDIA
UMFFTD	WDCM562	Food and Fermentation Technology Division, University of Mumbai
VBCCA	WDCM931	VISVA-BHARATI CULTURE COLLECTION OF ALGAE
VPCI	WDCM497	Fungal Culture Collection

Many countries have sometimes several culture collections that are service collections again demonstrating the vital roles they have in conserving

microbial diversity. It is very important to have a centralized culture collection for human pathogenic microorganisms/medically important strains with the appropriate BSL 3 or 4 facilities for research in combating diseases and human welfare. The microbial strains at the Institute of Microbial Technology from different environmental niches are being screened for bioactive molecules. Samples are collected from the two 'Hotspots' of biodiversity of India viz. the western Ghats and the Indo-Burma region. Apart from this samples are also collected from Rajasthan and areas in Himachal Pradesh and Leh & Ladakh. Exploration of Microbial Biodiversity has been initiated but to take care of the rich biodiversity of India and tap it, the activities have to be increased by sampling from many more interesting environments such as the Mangroves and marine ecosystems. The production of extracts and their analysis also needs to be increased to a higher level so that we get useful hits of high value compounds. Other activities at the Institute include: Environmental Biotechnology, Protein Science and Engineering, Genetics and Molecular Biology, Cell Biology and Immunology. Biochemical Engineering: Fermentation based Process Development, Bio-computing and Mathematical Modelling and Biosensors and Nanotechnology.

In India there are many culture collections. Twenty two of them are registered with the WDCM. As evident from the Table 1, the culture collections have diverse coverage of microorganisms ranging from industrial strains, cultures useful in agriculture, bioremediation, dairy, food to insect pathogens, anaerobic and algal cultures.

These culture collections apart from preserving cultures and providing services related to culture collections also undertake research projects in different areas like environmental biotechnology, ecology, taxonomy. The collections having medically important microbes are distributed all over the country. There is no centralized culture collection of medically important microbes. I have suggested to ICMR to have one such centralized culture collection of medically important microbes so that strains are housed in one central place and are easily accessible to researchers. Due to good team efforts, MTCC located in the Institute of Microbial Technology (IMTECH) Chandigarh has been elevated to an IDA on 4 October, 2002, thus becoming the first IDA in India. To increase exploration of Indian ecosystems and improve through put in screening programmes Indian researchers and collections should play their



part. Despite the rich biodiversity of India little is available in the culture collections (see Table 1). Awareness of the role and importance of strain deposits in culture collections must be raised by the government on a large scale. Further, publicly funded research should result in more of the Indian microbial diversity being available and deposited in the collections. Collaborations must be encouraged and well funded so that the exploratory work is enhanced in the various corners of the country. People with expertise in isolation and screening of microorganisms for useful compounds should work with researchers, to learn from their experiences and to ensure that the research heads in the right direction. The culture collections listed in Table 1 must gear up to take up the challenge to conserve and study the rich and possibly unique microbial biodiversity for production of novel compounds.

The author is a Fellow AMI, FNABS, NESAE Environmentalist and Member WFCC Task Groups. He joined MTCC/IMTECH in 1987 in the formative years. He dedicates the article to his father Mr. Darshan Singh, ex-Secretary Law & Justice and Legal Remembrancer.

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ANNOUNCEMENTS



Grants for access to leading EU Microbial Biological Resource Centres (BRCs)

The EMbaRC Training and Outreach Programme (TOP) is an opportunity for scientists* to stay at one of the EMbaRC centres and benefit from expert advice and advanced equipment. EMbaRC will cover the bench fees, travel and subsistence costs. For more information and application form, visit the TOP webpage at: www.embarc.eu

This unique opportunity for training in collection management, identification of bacteria and fungi by state-of-the-art techniques or phenotypic screening of a collection of strains is organised with the support of the Seventh Framework Programme, Research Infrastructures Action.

*scientists who work in a institution established in a EU Member State or FP7 Associated Country (Albania, Bosnia & Herzegovina, Croatia, Iceland, Israel, Liechtenstein, Former Yugoslav Republic of Macedonia, Montenegro, Norway, Serbia, Switzerland and Turkey).

www.embarc.eu

RETURN OF PHAGES

*Ipek Kurtboke
University of the Sunshine Coast
Australia*

Due to the increasing antibiotic resistance among pathogenic bacteria and emergence of pathogens bacteriophages have been in medicinal use in the former Soviet Union and Eastern Block countries are making a fascinating return to the West for applications. Eliava Institute in Tbilisi, Georgia has been one of the institutes around the world where the technology has been used even in most difficult times since 1923.

Currently many different Western research organizations



and commercial enterprises are including bacteriophages in their programs. I would like to a number of publications and announcements to the attention of the members;

- Bacteriophages and Biofilms: Ecology, Phage Therapy, Plaques (2010), Stephen T. Abedon (The Ohio State University, Mansfield, OH, USA) (Eds), NOVA Science Publishers, New York.
- Launch of a new journal on Bacteriophages <http://www.landesbioscience.com/journals/bacteriophage> (Editor in Chief: Alexander Sulakvelidze, Intralytix, Inc., Baltimore, MD).
- A literature review of the Practical application of bacteriophage research (2009). (Author, N. Chanishvili, Editor: R. Sharpe), George Eliava Institute of Bacteriophage, Microbiology and Virology, Tbilisi, Georgia.
- Contemporary Trends in Bacteriophage Research (HT Adams, Ed.). NOVA Science Publishers, New York.

Deposit of the phages in biological resource centres is now gaining importance for the advancement of bacteriophage research and applications in this field in the global arena. A call from the DSMZ is incorporated.

Continuous communication, generation of scholarly knowledge and information exchange will provide a sound platform for the effective future uses of bacteriophages in biotechnology and medicine.

CALL TO DEPOSIT BACTERIOPHAGES

Hans-Peter Klenk & Christine Rohde
 DSMZ-Deutsche Sammlung von Mikroorganismen und Zellkulturen GmbH
 Inhoffenstr. 7 B 38124 Braunschweig Germany

We would like to encourage researchers worldwide to deposit phages with DSMZ or with other experienced culture collections. We would like to inform the WFCC membership that we are willing to accept any interesting phages. In case a WFCC member colleague knows phage researchers: please draw the attention on phage deposition.

Phages are important in the world's biodiversity and highly regulatory factors in microbial ecology and communities, not to forget their future potential in medicine, biotechnology and basic research.

The DSMZ is member of P.H.A.G.E.
 (Phages for Human Applications Group Europe)
www.p-h-a-g-e.org

Members of P.H.A.G.E. share an interest in the development of phage knowledge and application.

This European association was founded in 2009 and has its seat in Brussels. It aims to develop a specific regulatory framework for the use of phages.

DSMZ-Deutsche Sammlung von Mikroorganismen und Zellkulturen

German Collection of Microorganisms and Cell Cultures

DSMZ -
A home for Phages



Dr. Hans-Peter Klenk
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 hpk@dsMZ.de
 +49(0)531/2616-227

Dr. Christine Rohde
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Inhoffenstr. 7 B
 38124 Braunschweig
 GERMANY

Fax: +49(0)531/2616-418
www.dsmz.de

To the colleagues in the phage research community

This call is to encourage researchers around the world to deposit phages with the DSMZ's public collection in order to improve the spectrum of phage versatility, as a service to the scientific community.

Phages should be kept safe & viable for following generations, scientific & applied research. Depositors may donate their biological material that will be distributed to authorised requestors for a fee. A Material Transfer Agreement between DSMZ and the depositor is possible and excludes commercial use of the material or distribution by requestors to a third party.

As one of Europe's most versatile scientific Biological Resource Centres, the DSMZ holds a large variety of bio-resources. DSMZ's growing phage collection focuses on phages for pathogenic hosts, but we also welcome the whole range of phage versatility.

DSMZ methods for long-term preservation of phages

- Suspensions in liquid nitrogen, very high long-term stability, phages ready-to-use, suspensions with known titre
- Vacuum-dried on filter paper good long-term stability, tested for most of our phages, preferred for long distance shipment

The DSMZ will enrich the phage collection in order to

- meet the needs of the scientific community & keep phages stable for the future
- contribute to better knowledge by further characterising phages
- use the expertise of DSMZ's working groups and the rich pool of their potential phage hosts

The DSMZ supplies phages for research, teaching, reference or detection purposes, teaching etc. Recipients of our bio-resources expect reliable quality: the phage must be pure (plaque tests, electron microscopy) and viable (high titre suspensions). Plaque photos are kept for each phage and can be sent to interested colleagues.

The DSMZ follows the CABRI Guidelines for Phages (CABRI = Common Access to Biological Resources and Information (www.cabri.org)). These reflect common strategies to ensure quality of the bio-resources, from accession to supply.

We welcome new phage donations and offer:

Deposit of phages and microorganisms with the DSMZ is of course free. Depositors will receive an equivalent number of other strains or phages of their choice free of charge.

Microbial Resources Research Infrastructure (MIRRI) a proposal for the European Strategy Forum for Research Infrastructures (ESFRI) road map

David Smith and Dagmar Fritze, GBRCN Secretariat

MIRRI brings together European microbial resource collections (MBRCs) with stakeholders (their users, policy makers, potential funders and the plethora of microbial research efforts) aiming at improving access to enhanced quality microbial resources in an appropriate



legal framework, thus underpinning and driving life sciences research. It will build the European platform within the future Global Biological Resource Centre Network (GBRCN) for microorganisms. Biological Resources, such as microorganisms and their derivatives, are the essential raw material for the advancement of biotechnology, human health and research and development in the Life Sciences. The European Strategy Forum for Research Infrastructures (ESFRI) are establishing pan-European structures to drive innovation to provide the resources, technologies and services as the basic tools necessary to underpin research. Having launched ten research infrastructures in the biological and medical science area Europe is laying down the foundation for a major push to harness biodiversity in its battle to overcome natural resource depletion and reduce mans' impact on our environment. A call in 2010 for a network to underpin agriculture and biotechnology development resulted in the GBRCN, EMbaRC - European Consortium for Microbial Resource Centres and ECCO - European Culture Collection's Organisation submitting a proposal to establish a microbial resource research infrastructure.

The mission of ESFRI is to support a coherent and strategy-led approach to policy-making on research infrastructures in Europe, and to facilitate multilateral initiatives leading to the better use and development of research infrastructures, at the EU and international level. The ESFRI strategy aims at overcoming the limits due to fragmentation of individual policies and provides Europe with the most up-to-date Research Infrastructures (RI), responding to the rapidly evolving Science frontiers, advancing also the knowledge-based technologies and their extended use. There are 44 research Infrastructures on the 2008 ESFRI road map each addressing a unique niche of research (http://www.ec.europa.eu/research/infrastructures/index_en.cfm?pg=esfri). Each RI is designed to deliver scientific and technological cutting edge and managerial excellence in research, education and technology and provide clear pan-European added value. They provide facilities which deliver top-level services attracting a widely diversified and international community of scientific users awarding free open access through international competition on the basis of excellence. They offer unique research services to users from different countries, attract young people to science, and help to shape scientific communities. RIs are at the centre of the knowledge triangle of research, education and innovation, producing knowledge through research,

diffusing it through education, and applying it through innovation.

The ground for such an RI was prepared by the OECD Biological Resource Centre Network initiative spanning 1999 to 2006 which has proved immensely important in providing best practice and the cornerstones for biological resource networking. The GBRCN is the envisaged global infrastructure that will draw together a currently fragmented support service for research. The GBRCN will continue to work closely with the WFCC complementing its activities through the implementation and networking of those collections wishing to become a BRC and deliver to common standards, strategies and policies. The OECD coined the term Biological Resource Centres (BRC) for biological collections operating to common high quality standards in a legal operational framework to facilitate access and exchange. It is evident that no one single collection or country, for that matter, can provide the resources needed on its own and therefore networks are needed to share the tasks.

The MIRRI proposal was submitted by the French delegate to ESFRI and supported by several other countries in its development. It will be co-ordinated by the GBRCN Secretariat based in Braunschweig. MIRRI integrates services and resources, bridging the gap between the organism and provision of innovative solutions and products for green, grey and white biotechnology. MIRRI provides coherence in the application of quality standards, homogeneity in data storage and management and sharing the workload to help to release the hidden potential of microorganisms. The ESFRI Biological and Medical Sciences working group have evaluated the proposal and are recommending it for the ESFRI road map. The full forum meets in September to decide on its acceptance. If accepted MIRRI will move into the first of the three phases, the preparatory, construction and operational phases. The preparatory phase focuses on governance and structure including technical, legal governance and financial issues. It establishes the links between the microbiological resource centre (MRC) community, its users, policy makers and potential funders. It builds on:

- The foundation set by the OECD BRC Task Force providing best practice¹
- The GBRCN demonstration and the EMbaRC projects
- Voluntary scientifically based collection network activities, such as WFCC and ECCO



MIRRI enhances existing European MRCs linking them to third country partners extending globally and will bring added value:

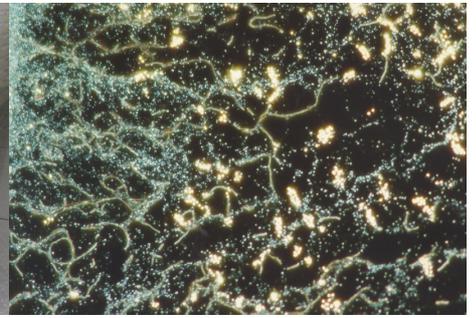
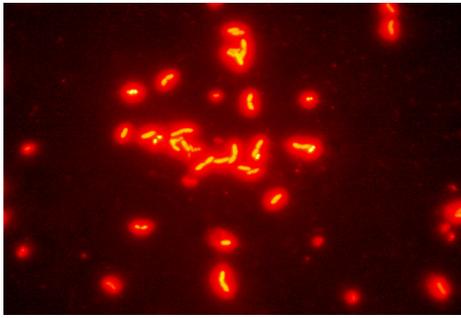
- The networking of the partners will enable a broader coverage of bioresources and services provided. The EMbaRC project - the European Consortium of Microbial Resource Centres project funded under the EU 7th Framework Programme (Grant agreement number: FP7-228310) has begun the process of establishing policy for deposit of microorganisms in microbial resource centres. Encouraging editors and research programme funders to make the organisms and information associated with them available for confirmation of results and for future work. MIRRI will identify gaps in coverage and develop a strategy to provide these resources.
- The prime delivery of MIRRI would be the co-ordinated approach to coverage of organisms, the expertise to handle them and the delivery of mechanisms to ensure implementation of best practice in the provision of the resources and services.
- MIRRI will establish a distributed platform for microbial taxonomy to ensure best use of the remaining expertise and to put in place a human resource development programme.
- MIRRI also tackles key obstacles to research needs in a co-ordinated way and above what is currently supplied by individual microbial resource collections:
 - i. Bringing together working groups to focus on delivery of resources that meet specific needs
 - ii. Implement common policies that work across international boundaries to facilitate access
 - iii. Help establish facilities and resources in countries or regions rich in microbial diversity but without resources and facilities to make them readily available for research
 - iv. Create linkages to data in other systems relevant for data mining and enabling targeting of specific microbial resources for specific tasks – bringing all microbial collection data together creates the critical mass to make this action meaningful

v. Establishment of a legal operational framework for legitimate and safe access

The network will focus efforts through the cluster model to deliver an improved resource to meet user needs. This can only be achieved via a co-ordinated effort such as MIRRI as current structures do not have the capacity. Close cooperation with other RI's such as the Biological and Biomedical Research Infrastructure (BBMRI) that have different user groups, will greatly serve the broad scientific user communities. User needs cannot normally be serviced by one collection alone and a co-ordinated response to their needs is required. International co-operation is needed to provide enhanced worldwide accessibility to information and biological material, - co-ordination of standards - linkage between scientific needs and government policies - a framework for regulatory initiatives - a linking mechanism for countries without BRCs - enhanced efficiency reducing redundancies, - improved transparency. MIRRI addresses these issues.

Experience shows with global and regional culture collection organisations such as WFCC, ECCO and national organisations that a small central body of staff is needed to implement network operation and co-ordinate activities. The ultimate size and function of the central secretariat will be developed as the MIRRI concept grows, but it will be kept mean and lean. Much of the work of the RI will be done by members working in specialised and focussed clusters, for example addressing legal and policy issues or taxonomic issues, or focus groups to provide solutions to global challenges. The secretariat will manage the day to day operations of the RI, reporting to the management board and advised by the scientific advisory board. Collaboration with other RIs and collection community organisations will reduce duplication of effort and share tasks to minimise the need for centralised activity. The decision date is the 24th September just as ICC12 gets underway.

¹OECD Best Practice Guidelines for Biological Resource Centres
http://www.oecd.org/document/36/0,3343,en_2649_34537_38777060_1_1_1_1,00.html
 See www.gbrcn.org; www.embarc.eu;
www.eccosite.org; www.wfcc.info



REFERENCE STRAIN CATALOGUE PERTAINING TO ORGANISMS FOR PERFORMANCE TESTING CULTURE MEDIA

One of the key functions of the WFCC member collections is to provide authentic reference strains for various purposes; one of the key areas is in proficiency testing and in the implementation of standards. The appropriate strains are held by many culture collections over the world but only a few strain numbers are referenced in the test specifications. It is essential that the strains used are appropriate and are stable lines of those originally selected. In response to a request by the ISO Joint Working Group 5 and the ICFMH-WPCM the WFCC have created an online catalogue to facilitate access to strains used for performance testing of culture media.

This catalogue was produced to enable broader and easier access to the reference strains listed by the ISO TC 34 SC 9 Joint Working Group 5 in the ISO 11133¹ 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*.² It fulfils a need expressed by these bodies for a unique system of identifiers for strains recommended for use in quality assurance. The WFCC and the WDCM have initiated a system that will help users find local sources of the reference strains by citing all collections and providing contact details and the collection's unique reference. Future publications of the ISO JWG 5 and ICFMH-WPCM groups will cite the WDCM reference number for each strain and this catalogue provides the collection acronyms and strain numbers of the relevant strains so that they may be found.

The catalogue is accessed via the WFCC web site and provides

1. List of Strains – listing WDCM unique identifiers and links to source collections
 - a. Bacteria

¹ ISO/CD 11133:2009, Annex E. Test microorganisms for commonly used culture media (giving information on the culture medium, culture conditions, test microorganisms, culture collection number of test organisms and the expected reactions)

² Corry, J E L, Curtis, G D W and Baird, R M (Eds) *Handbook of Culture Media for Food and Water Microbiology*. Royal Society of Chemistry, In preparation.

- b. Filamentous Fungi and Yeasts
2. Strains Listed by WDCM Number
3. List of Collections and contacts

If this works well the ISO joint working groups will consider broadening this use across other standards. Please visit the website and provide feedback to the WFCC Board.

CONFERENCES AND WORKSHOPS

ICCC-12 CONFERENCE

**Florianópolis, Santa Catarina, Brazil September
26-October 1, 2010**

<http://www.iccc12.info/index>



**16th INTERNATIONAL MEETING ON FRANKIA AND
ACTINORHIZAL PLANTS-2010 & INTERNATIONAL
SYMPOSIUM ON FRANKINEAE**

**5-8 September 2010
Porto, Portugal**

<http://www.ibmc.up.pt/frankia2010/>

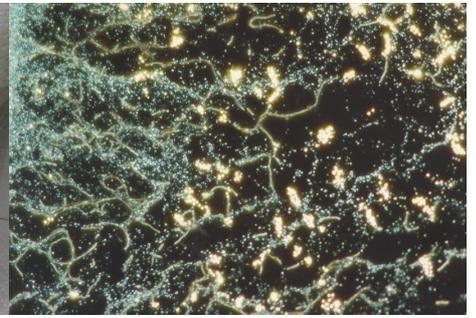
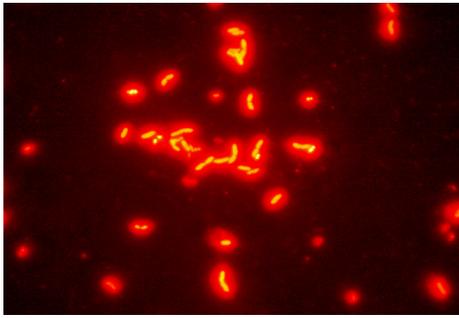
4th LYOPHILISATION CONFERENCE

7-9 September 2010

**The Window, 13 Windsor Street,
Islington, London, UK**

**Contact Information: Jacqueline Alvarado
Tel: +44 (0)20 7549 9946**

jacqueline.alvarado@vgpharma.com



IBBS DISINFECTION AND DECONTAMINATION CONFERENCE

28-29 September 2010
University of Central Lancashire, Preston, UK
www.ibbsonline.org

3rd INTERNATIONAL CONFERENCE ON DRUG DISCOVERY AND THERAPY

7-10 February 2011
Dubai, UAE
www.icddt3-02.com

ECCO NEWS

The 29th Meeting of the European Culture Collections' Organisation



1 - 2 July 2010, Istanbul, Turkey

Dagmar Fritze
ECCO Past-President

This year the annual meeting of ECCO took place in the wonderful city of Istanbul in the Marmara Hotel at Taksim Square. The local hosts took every chance to make this meeting a successful one - scientifically as well as socially.

The meeting was opened by the Vice President of Istanbul University, Çiğdem Kayaçan, followed by Professor Gürler, President of KÜKENS and Head of the local organising committee, and Dagmar Fritze, President of ECCO.

The organisers had compiled a very interesting programme spanning a wide range of scientific, organisational, regulatory and political topics.

Session 1 was devoted to presenting actual developments in Turkey with a view to microbial collections. The lectures covered purely scientific as well as application and production aspects of e.g. algae, and theoretical deliberations on how to structure regional collections and the relationship of general and national culture collections.

A **Round Table** was addressing the challenges microbial collections have to face in the areas of future scientific demands and increasing regulatory pressure. Representatives of microbial associations / federations discussed together with curators how to react to such challenges. Also discussed was how collections could make themselves, their services and know-how more visible, and how to further the dialogue with the various user communities.

An **Extra Session** made it possible to present plans for a major global project in the sequencing-of-full-genomes-area (MEP) in which ECCO collections were invited to participate. In cognition of the diversity of holdings and long tradition of efforts towards quality of material and data in European microbial collections, the consortium of MEP expressed their strong interest in collaboration with ECCO collections.

The **second Session** updated participants on a series of collection networking activities, such as GBRCN, EMbaRC and BBMRI as well as new collection relevant approaches, like the Material Accession Agreement and upcoming regulatory issues like Biorisk, and a new ESFRI based project, the MIRRI initiative.

Session 3 was devoted to modern developments in methodologies for strain determination, diagnosis, identification and typing; also an example of DNA-barcoding of strains was presented.

Details of the Programme

Session 1: Culture Collections in Turkey; Chairs: Bülent Gürler, Seray Özensoy Toz
Genotypic Differences of Leishmania Strains Isolated From Turkey; Seray Özensoy Toz
A Strategy for Structuring Regional Culture Collection of Clinical Origin; İ. Çağatay Acuner
Importance of the National Culture Collections; Demet Yumuşak
Ege University Microalgal Culture Collection (Ege-MACC) and Research Fields; Meltem Conk Dalay



Round Table: Challenges for the Microbial Resource Centres in the XXI Century; Chairs: Esperanza Garay, Gerard Verkleij; Guests: Zeynep Gulay, Milton Da Costa.

Extra Session: A Project of Full-Genome Sequencing - Microbial Earth Project - MEP
Introduction by Hans-Peter Klenk, Followed by a Working Meeting of ECCO Collections Interested in Collaboration

Session 2: Networking of collections - progress of European Initiatives; Chairs: Dagmar Fritze, Esperanza Garay

GBRCN - Recent Developments; Dagmar Fritze
EMbaRC - Recent Results; Sylvie Lortal
BBMRI - Recent Developments; Barbara Parodi
Approach to a Harmonized Accession Procedure - An MAA; Esperanza Garay
Biorisk - Recent Developments; Christine Rohde
Update on the MIRRI Proposal; Dagmar Fritze

Session 3

Molecular Identification in Culture Collections; Chairs: G. Verkleij, Aysegul Karahasan Yagci
Influenza Viruses: From Isolate to Strain Determination and Strain Selection for Vaccine Composition; Meral Ciblak
Molecular Techniques, Fungi Diagnosis and Collection, Preservation of Fungal Genomic DNA; Serdar Susever
Use of MALDI-TOF ICMS to identify Candida Species with Clinical Relevance; Cledir Santos
Trends in Molecular Typing for Bacterial Pathogens; Aysegul Karahasan Yagci
DNA-Barcoding at CBS; Gerard Verkleij

During this year's Annual General Meeting of ECCO the elections took place for the positions of President (Dagmar Fritze, Braunschweig, Germany) and Secretary (Isabel Santos, Braga, Portugal), which had fallen vacant because both incumbents were not able to continue in the respective positions. The new President is now Daina Eze, Riga, Latvia and the new Secretary is Danielle Janssens, Gent, Belgium.

This year again prizes were awarded to the three best posters presented: (3) Casaregola et al.; (2) Misiewicz et al.; (1) Turcetti et al. The Poster Prize Committee stressed that all of the posters shown were of high quality and that it had been difficult to decide against any of them.

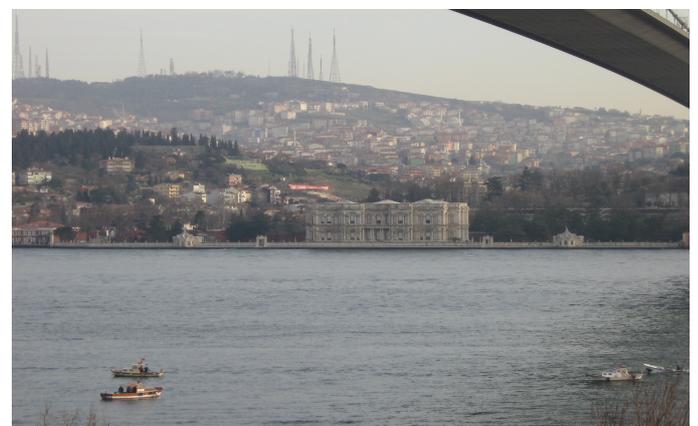


Bosphorus Bridge connecting Europe to Asia

The next meeting of ECCO will take place 2011 in Utrecht, The Netherlands under the guidance of the local host CBS (exact date to be decided).

The scientific parts of the meeting were perfectly matched by the social aspects: the delicious and tasty food that was served for meals, the friendly and helpful organising team, perfect organisation and - last but not least - the wonderful evening Boat Tour full of atmosphere on the famous Bosphorus.

A big "Thank You" to our Turkish hosts and certainly many of the participants will come back one day to the magic city of Istanbul that is bridging the two continents of Europe and Asia.

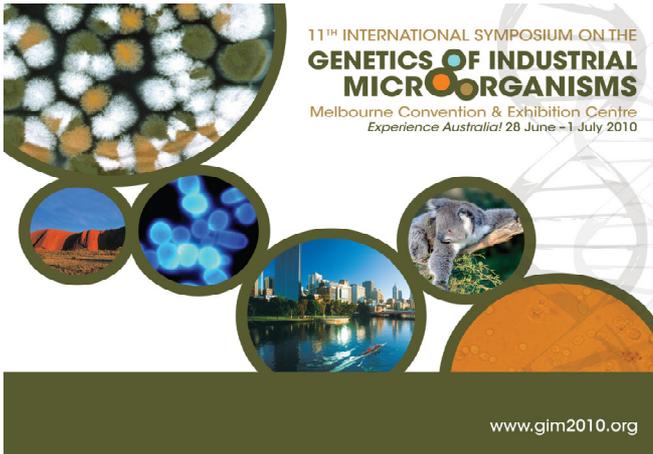


Asian shores as viewed from European side



GIM2010 NEWS

*Ipek Kurtböke
(Program Chair)*



The conference on Genetics of Industrial Microorganisms took place in Melbourne (28 June to 1st of July, 2010), the Biotechnology Capital of Australia and was proudly sponsored by the Victorian Government. The conference successfully combined advances in microbial genetics with advances in industrial technologies.



Prof. Julian Davies, Prof. Arnold Demain and Dr Ipek Kurtböke

The conference also explored related themes such as microbial systematics and sustainable use of microbial genetic resources. This section of the Conference was kindly sponsored by the Department of Innovation, Industry, Science and Research as well as the Department of the Environment, Water, Heritage and

Arts of the Australian Government. Microbial Systematics symposium placed emphasis on the importance of advance microbial classification methods and "omics" in biodiscovery. Also a second symposium titled "Access to microbial genetic resources and biodiscovery" brought a broader perspective and promoted greater understanding on the importance of "Networking biological resource centres to underpin the bioeconomy" as well as the legislative roles governments play in "Facilitating access to genetic resources".

I would like to express our thanks to Dr Ben Phillips and his team at the Genetic Resources Management Section, Department of the Environment, Water, Heritage and the Arts of the Australian Government for their continuous support of ongoing scientific efforts for the mapping and documentation of Australian microbial resources to ensure their sustainable use in biodiscovery operations.

Symposium talks included:

- Ben Phillips (Facilitating access to genetic resources) (Australia)
- David Smith (Networking biological resource centres to underpin the bioeconomy) (UK)
- Lindsay Sly (Access to microbial genetic resources and biodiscovery) (Australia)
- Gwo-Fan Yuan (Access to microbial genetic resources in BCRC for biodiscovery) (Taiwan)
- Libby-Evans-Illidge (Management of access to marine genetic resources) (Australia)



Prof. Lindsay Sly, Dr. David Smith, Dr. Gwo-Fan Yuan and Dr. Ben Phillips at the GIM2010