



## The World Federation for Culture Collections (WFCC) and biological resource centres

The World Federation for Culture Collections (WFCC) is the largest independent global organisation representing professional individuals and culture collections which preserve and utilise biodiversity. Member collections target living microorganisms, cell lines, viruses and parts and derivatives of them <sup>1</sup>. Key values are authenticity and genetic integrity of the material and validity of the information provided.

The WFCC was founded in 1963 and is an inter-union commission of the International Union of Microbiological Societies <sup>2</sup>. It seeks to promote activities that support the interests of culture collections and their users. Member collections of the WFCC register with the World Data Centre for Microorganisms (WDCM) and there are currently 480 member collections with over 2000 staff <sup>3</sup>.

The listed collections hold in excess of 1 million strains (Table 1); 44% are fungi, 43% bacteria, 2% viruses, 1% live cells, and 10% others (including plasmids, plant, animal cells and algae). The table reflects an imbalance between the



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numbers of collections, their holdings and where we expect most diversity to be found, with only 10 collections in Africa and only 22% of holdings from Asia. The figures for the Americas are

distorted further by the fact that there are 20 collections in the USA holding 200,300 of the 319,179 strains (63%). It is clear that more activity in the conservation and utilisation of microorganisms needs to be undertaken in tropical regions. Investment is being made by Japan and Thailand to see how culture collections can support biotechnology and can be utilised in the biodiscovery process.

Culture collections need to be established on a sound financial footing for long-term sustainability and not rely on continued government funding for their existence. Of 23 collections that were lost over recent years from the WDCM, 17 were government funded. Collections need to find innovative funding sources and develop added value to improve income from their holdings. It is also critical that this is done within the spirit of the Convention on Biological Diversity <sup>4</sup> and takes into account access and benefit sharing regimes such as the Bonn Guidelines <sup>5</sup>.

With such principles in mind, CABI has worked with local scientists isolating endophytic fungi from the Iwokrama forest in Guyana, helping them set up facilities, train staff and set up a collection. They isolated 2,492 cultures belonging to 64 fungal morphotaxa from 12 tree species <sup>6</sup>. Analysis of these fungi included ISSR-PCR and RAPD molecular fingerprinting techniques, rDNA ITS sequencing and morphological and cultural characterisation <sup>7</sup>. Eighty-four of these isolates yielded active extracts and have the potential for commercialisation (Figure 1).

**Table 1.** WDCM listed collections <sup>3</sup>.

Country	No. collections	No. strains	% of total no. strains
Africa	10	8,540	0.7
Asia	161	248,845	22
Europe	152	487,405	42
America	114	319,179	28
Oceania	43	88,206	7.3
Totals	480	1,152,175	



Bills *et al.*<sup>8</sup> reported on the screening of 13000 strains of tropical fungi from Costa Rica for antifungal, antibacterial, antibiotics, antivirals, insecticides, antihelminthic agents, cancer, diabetes mellitus, inflammation and endocrinology by two or four methods using two extracting solvents. On average, 13% yielded active compounds.

The importance of microorganisms as cell factories in producing active biomolecules is well documented<sup>9</sup>. Fungi are particularly well known for their capacity to produce bioactive compounds<sup>10</sup> and, since 15-30% of fungi are found in the tropics, the potential is enormous.

Culture collections have a key role in the development of the bioeconomy needed to alleviate poverty and improve human welfare in such regions. Culture collections:

- Conserve living organisms and cells.
- Supply material and related information to teaching, research and industry.
- Offer services related to their activities.
- Apply quality management and biosecurity control.

- Perform innovative research.

Biological resource centres (BRCs) are considered to be the next generation culture collection operating to agreed international criteria and offering more than a biological material and information resource. BRCs, as the OECD had intended them, do not yet exist. They are designated when they have met the criteria of membership of the Global Biological Resource Centre Network (GBRCN), which is still to be established. Not all culture collections will wish to join the GBRCN and become BRCs.

In the growing bioeconomy, WFCC's members face increasing global demands for worldwide and controlled access to biological resources, public security, industrial quality of their holdings and associated data and long-term genetic stability of the material. It is imperative that there is a quality assurance and regulatory framework for the operations of collections.

To date, several initiatives have lead to the development of guidelines to ensure best practice. The WFCC have been helping collections in this respect for over 3 decades and have produced *Guidelines for the establishment and*

*operation of culture collections*<sup>11</sup>. In the 1990s, the UK National Culture Collection (UKNCC) initiative drew together a quality management system<sup>12</sup>. European collections collaborated similarly to produce the *Common Access to Biotechnological Resources Information (CABRI) Guidelines*<sup>13</sup>. As a result, strains of organisms are supplied from member collections with traceability, conform to national and international regulatory requirements, and are preserved in such a way as to retain their full potential. Such quality systems were harnessed by the Organization for Economic Cooperation and Development (OECD) BRC taskforce who drew up BRC operational criteria and reported in 2000<sup>14</sup>. The OECD BRC work programme is described in Chapter 7 and encompasses the establishment of BRCs and the creation of a GBRCN.

Industry demands authentic reference materials and certification or accreditation as a means to demonstrate quality and competence. This may be one driving force to adopt quality systems, but there is also an increasing requirement to satisfy the funding organisations who seek high quality science and solutions. The ability to demonstrate the competence to carry out and manage high quality research is being recognised by research councils and government departments in the UK<sup>15, 16</sup>. Third party evaluation through accreditation or certification may be the only way to demonstrate this.

Increasingly, molecular techniques are being used to characterise strains to assure their authenticity. Unfortunately, some databases contain erroneous data that can undermine research. A recent study<sup>17</sup> revealed that, of 206 named sequences of the ribosomal RNA gene cluster in fungi, up to 20% were considered unreliable. CABI has used PCR fingerprinting techniques to demonstrate that poor freeze-drying and cryopreservation technique can induce polymorphisms in preserved fungi<sup>18</sup>. Organisms, their

**Figure 1.** Iwokrama Forest Reserve, Guyana, the source of endophytic fungi producing active molecules. *By kind permission of Paul M Kirk, CABI Bioscience.*





products, components and derivatives are being used in drug and active molecule discovery programmes. Kurtböke & Swings<sup>19</sup> collate information on how this is being tackled, but the promise of a 'pot of gold' from microorganism exploitation is restricting deposition in public culture collections.

It is clear that, with the ever-increasing demands on collections, the WFCC must help reduce the burden in whatever way it can. The WFCC committee on postal, quarantine and safety regulations has worked with the European BRC Network partners (QLRT-2000-00221) to launch a number of information documents on the WFCC website to assist collections in understanding the impact of legislation and international regulations on the operations of culture collections. The WFCC continues to support the development and long-term sustainability

of culture collections and will help them transform into the BRCs required by today's users.

## References

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## ASM Annual Scientific Meeting – Adelaide 2007

The scientific program for the Adelaide ASM conference to be held in July 2007 is now being organised.

It is important that members provide information on potential topics and speakers for symposia to the appropriate Divisional Chairs. Symposia are organised by NSAC and are divided into four main divisions. Each division has a Chairman who oversees the organisation of 10 themed symposia, each with three speakers. Each division also represents a number of SIGs.

Please contact the following Chairs with any suggestions for topics and speakers.

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### Division 1 – Medical & Veterinary Microbiology

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### Division 2 – Virology

Virology

### Division 3 – General, Applied and Environmental Microbiology

Water Microbiology, Computers, Cosmetics and Pharmaceuticals, Culture Collections, Culture Media, Education, Food Microbiology, Laboratory Management, Microbial Ecology, Probiotic and Gut Microbiology, Rapid Methods, Students

### Division 4 – Microbial Genetics, Physiology and Pathogenesis

Microbial Physiology, Molecular Microbiology