WORLD FEDERATION FOR CULTURE COLLECTIONS

WFCC

# Guidelines for the Establishment and Operation of Collections of Cultures of Microorganisms

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# GUIDELINES FOR THE ESTABLISHMENT AND OPERATION OF COLLECTIONS OF CULTURES OF MICROORGANISMS

*Prepared by the WFCC Standards Committee*

*Approved by the WFCC Executive Board*

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## FOREWORD

The World Federation for Culture Collections (WFCC) is a federation of the International Union of Microbiological Societies (IUMS) and a commission of the International Union of Biological Sciences (IUBS) with responsibility for the promotion and development of collections of cultures of microorganisms and cultured cells. As such, it has an on-going concern with all aspects of culture collection activity and in particular with the encouragement of new initiatives and improvement in the standards of scientific services provided to the international user community.

The increasing demands on culture collections for authenticated, reliable biological material - and associated information - have paralleled the growth of biotechnology. More recently, world wide recognition of the need to conserve the microbial gene pool for future study and exploitation by mankind has highlighted the need for centres of expertise in culture isolation, maintenance, identification and taxonomy.

These demands have alerted the WFCC to the need for providing recommendations for good practice in culture collections so that new collections have guidance and existing collections have approved standards of operation to adhere to or endeavour to attain. As a result the Standards Committee was set up and charged with the task of formulating WFCC *Guidelines* for culture collections. This booklet is the result of their endeavours, which have been endorsed by the Executive Board of the WFCC.

It is hoped that the *Guidelines* prove valuable and encouraging. The WFCC wishes to emphasize that high standards of scientific service can be achieved in laboratories with modest resources and sophisticated equipment is not a prerequisite for good microbiological practice; the principles listed in the *Guidelines* may be applied to any culture collection regardless of size or economic standing.

Our thanks are extended to members of the WFCC Standards Committee and the WFCC Executive Board for their time and effort, and to IUMS and UNESCO for financial support for the publication of these *Guidelines*.

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*Microbial Strain Data Network*
*Cambridge, UK*
*2 August 1990*



## CONTENTS

## INTRODUCTION

*1.1* The last decade has seen a hightened awareness of the value of collections of cultures of microorganisms in both the conservation of genetic resources and biodiversity, and further in providing the essential underpinning for emerging biotechnologically based projects and industries in both the developed and the developing world.

*1.2* Many countries and individual institutions are therefore establishing publically supported culture collections of microorganisms for the first time, either to provide services to their country or region or in support of their own research programmes.

*1.3* While a variety of publications offer advice on techniques and procedures (*See para 7.2*), and some guidelines have been published for national (Nakamura, 1989) and specific regional purposes (Hawksworth & Schipper, 1989), no internationally approved set of guidelines has hitherto been compiled.

*1.4* The objective of these *Guidelines* is to provide assistance to those collections of microorganisms offering services outside their own institution (service collections), but it is anticipated that many of the guidelines will be more generally applicable to in-house or research collections.

*1.5* It is the hope of the WFCC that wherever possible service collections will adopt the *Guidelines* enumerated in this booklet. However, such collections should be aware that the WFCC is discussing the desirability of revising the *Standards* for culture collections admitted as affiliates (see *International Journal of Systematic Bacteriology* **25**: 93, Table 2, 1975). This revision is expected to be based on the *Guidelines* now presented.

## ORGANIZATION

*2.1* The parent organization or board under which a service collection is established should be fully aware of and accept the responsibilities inherent in maintaining a public service to appropriate standards. Commitment to the maintenance of the collection and its services in the long-term should therefore be included in the strategic plans or objectives of the parent organization as appropriate. In the case of existing collections where this responsibility is not explicit, this aspect should be clarified with the Director of the parent institute, its Scientific Council, senior university officials, Governing Board, or other such authorities as may be appropriate.



## FUNDING

*3.1* Administration and funding arrangements for collections require a long-term commitment from the parent organization. Support solely in the form of short-term contracts and without any allocation of core funding is inappropriate for service collections aiming to provide long-term storage and supply services.

*3.2* It is important to consider the level of funding, both now, and likely to be forthcoming on an on-going basis. This must be adequate to provide the range of services being planned, and at a standard users would expect. If secure resources are limited, in general it is preferrable to restrict the primary objectives of the collection to those which it has a strong probablity of maintaining in the long-term.

## OBJECTIVES

*4.1* Collections require a clearly summarized general statement of their long-term objectives relating to the scope of their holdings, and to the range of outside services that are envisaged.

*4.2* In addition, it is often helpful for a collection to have more specific short-term objectives relating to the coming 1-, 3- or 5-year period. These can usefully include the numbers and groups of strains which it is planned to acquire in that time frame, and schedules for installing new facilities and services.

*4.3* Where possible a mission statement in accordance with *4.1* and *4.2* should be prepared which is sufficiently short to reproduce in promotional and other material disseminated.

## HOLDINGS

*5.1* The scope of material and numbers of strains to be held requires careful consideration and merits discussion with the parent organization and any funding bodies concerned when the collection is being established, as this will have long-term financial implications.

*5.2* In addition to decisions on the groups of microorganisms to be maintained, and the numbers it is envisaged as being retained in the long-term, it is also necessary to have a clearly defined accessions policy on which new strains are to be taken into the collection. If this is not decided and many unsolicited strains are accepted uncritically without due regard to the collection's objectives, storage capacities, personnel and financial resources can soon become overstretched; at the same time, the range should not be so strictly defined as to limit the effectiveness of the services provided to the users.



*5.3* If strains are maintained that are potentially pathogenic to man, animals or plants or produce toxic or hallucinogenic compounds, those holdings should be clearly labelled and kept secure; adherence to any safety regulations in force is mandatory.

*5.4* Collections vary substantially in scope with regard to the groups of microorganisms held, geographical emphasis, and user-group orientation. It is beneficial to stress at an early stage areas in which the holdings are planned to become particularly rich as this will be of the utmost value to both potential depositors of strains and those wishing to acquire strains or requiring other services.

*5.5* In considering which strains to maintain, it is economically prudent to aim at complementing rather than duplicating those already available through other service collections. While it may be desirable for collections to include some authenticated internationally recognized reference strains, the WFCC wishes to discourage the unnecessary use of scarce resources. Wherever possible, new collections of microorganisms being established should collectively enrich the world's available genetic resources rather than duplicate those already existing.

*5.6* In determining which strengths a new collection should have with respect to its holdings, particular attention should be paid to those already present in that particular country or region as well as those providing international services. Information as to which collections already exist can be obtained from the *World Directory of Collections of Cultures of Micoorganisms* (Staines *et al.*, 1986) or for more up to date information from the WFCC World Data Center on Microorganisms (WDC). Some other specialist listings are also available (e.g., *Information Centre for European Culture Collections News* 1989 on; *see also* Selected Bibliography).

## STAFF

*6.1* Culture collections are necessarily labour-intensive. When determining the numbers of full- and part-time positions required it is important to consider how time-consuming the routine accessions, preservation, maintenance, and viability checking will become as the collection approaches its target strain numbers. Staff levels need to be sufficient not only for the incorporation and maintenance of cultures, but also to fulfill the anticipated level of culture supply and other services the collection is to offer.

*6.2* The effective curation and management of a culture collection is a demanding task. It requires knowledge not only of the organisms themselves, but also their growth and preservation requirements, properties and potential applications, and the provision of customer services. The key staff member(s)



recruited would be expected to have a higher degree in an appropriate field and some subsequent direct experience or special training in culture collection curation skills. In order to attract and retain sufficient calibre staff arrangements for ongoing employment should be made. Too frequent staff turnover will jeopardize the maintenance of standards in the collection and hence the quality and effectiveness of the services provided.

*6.3* Particular attention should be paid to the qualifications and experience of the person in charge of the Collection.

*6.4* While it is not always practical to have on staff specialists concerned with, for example, the identification and authentication of all systematic groups covered, some basic taxonomic skills are essential for quality control (*see para 8.1*). Where a need for specialist taxonomic support exists, especially if it relates to services such as identification being advertised, steps need to be taken to provide such expertise through collaborative arrangements within and(or) outside the collection's parent organization. As such specialist assistance might be required at short-notice, it is preferrable for such arrangements to be formalized rather than informal.

## PRESERVATION

*7.1* Different microorganisms often require special preservation methods in order to ensure optimal viability, storage, and purity. For security, and in order to minimize the probability of strains being lost, each strain should whenever practical be maintained by *at least two* different procedures. At least one of these should be by freeze-drying (lyophilization) or storage in liquid nitrogen (cryopreservation) where applicable; these are the best methods for minimizing the risks of genetic change. In some cases, for example cell lines, where only freezing is available, duplicates should be stored in separate refrigerators with different electrical supplies.

*7.2* While considerable experience is now available on the optimal preservation methods for many groups of microorganisms (Smith & Onions, 1983; Kirsop & Snell, 1984), this is not so for all. Particular care is needed with genera and species hitherto not preserved in culture collections when a greater range of procedures should be attempted or research carried out to determine optimal protocols (*See para 14.2*).

*7.3* In order to minimize the risks to important genetic resources from fire, flooding, earthquakes, war or catastrophes, Collections should arrange to have duplicates of at least the most important and irreplacable strains (and also of their associated documentation) securely housed in a different building or ideally at a separate site.

## CULTURE AUTHENTICATION

*8.1* Scientists ordering cultures from Collections expect them to be correctly identified. If not, there is a danger of users employing the wrong organism in their investigations which could prove time-wasting, expensive, and lead to invalid published results. Moreover, without proper authentication noxious organisms could be inadvertently supplied. This places a grave responsibility on Collections and demands attention from the time the first cultures are received for preservation.

*8.2* When named cultures are received, the person making the original identification should be recorded. The Collection should confirm the identification and check that it agrees with published descriptions of the species. Alternatively, the Collection should confirm that it has been checked by a competent specialist.

*8.3* In the case of unidentified cultures received, the Collection should be wary of identifying material in groups in which it has no specialist taxonomist, and it should endeavour to have material checked by specialists prior to incorporation.

*8.4* In the case of microorganims which are recognizable from microscopic preparations or dried cultures (i.e. filamentous fungi, algae, protozoa), it is good practice to make such preparations when they are received for deposit. This facilitates the checking of whether a strain recovered from the collection conforms to that originally deposited.

*8.5* The first time cultures are recovered from the Collection, during maintenance or routine re-preservation work, or when they are being despatched, care should be taken to ensure they conform to the original deposit by carrying out appropriate tests, by comparative study (*See para 8.4*), or checking by a specialist.

*8.6* The need to authenticate cultures must be borne in mind when staff are recruited, and arrangements for access to specialists have to be made (*See para 6.4*).

## CULTURE SUPPLY

*9.1* Collections should be able to distribute cultures listed as available which are requested. Arrangements for culture supply vary according to the financial basis and policies of the legal owners of the Collection.

*9.2* Cultures listed as available in catalogues by Service Collections should normally be provided without prejudice to those requesting them, subject to any



import, quarantine or containment regulations that might apply, and to normal credit control procedures where charges are required to be made. It is recognized that charging policies and differential rates for users in particular regions or for different purposes (for example teaching vs. industry) may have to be applied in accordance with the policy of the parent organization or funding body.

*9.3* Many Service Collections for accession purposes exchange cultures with other Service Collections at no cost. Cultures for teaching and research purposes are also regularly made available at a reduced cost or on other preferential terms compared with ones supplied to industry or commerce.

*9.4* In offering a culture supply service, consideration needs to be given to the provision of sufficient staff to satisfy the numbers of requests it is likely to receive in a timely manner. Cultures that cannot be dispatched for technical reasons within a reasonable time of receipt of an order with any necessary permits, should be indicated in the *Catalogue*.

*9.5* Cultures which for any reason are not available for distribution should not be listed in catalogues or included in publically accessible databases; cultures with restricted distributions should be clearly marked.

*9.6* Strains which are pathogenic or toxic to plants, animals or man often are subject to regulations from health and(or) agriculture authorities. Scientists requesting strains may need to obtain permits to import material or to handle certain cultures. Where cultures are being supplied to a person or institution not known to the Collection, guarantees should be obtained on the credentials of the person concerned and other facilities of the institution before despatching cultures.

*9.7* Collections should maintain detailed records of recipients of cultures showing the material sent (with strain and batch numbers where appropriate), method and date of shipment, and name and address of the person to whom sent. In the case of unsatisfactory results or if it is necessary to supply subsequent information recipients can then be notified.

*9.8* In mailing cultures, attention needs to be given to pertinent postal regulations regarding packaging and labelling (Alexander & Brandon, 1986; *see* Selected Bibliography).

## OTHER SERVICES

*10.1* Service Culture Collections may be well placed to provide a variety of support services to the scientific and industrial community worldwide or in the



region they serve. If such extension services are contemplated, they need to be carefully planned as they frequently require additional expertise and facilities.

*10.2* If identification services are to be offered it should be considered whether appropriately trained personnel are available to undertake this demanding task, either in the collection or in an associated institution. Major problems can arise as a consequence of misidentifications (*See paras 6.4, 8.1*).

*10.3* Where patent depositary facilities are to be provided, these may be operated according to the procedures laid down in the Budapest Treaty on the International Recognition of the Deposit of Microorganisms for the Purposes of Patent Procedure (*Regulations*, 1977; *Guide to the Deposit of Microorganisms under the Budapest Treaty*, 1988 [both published by World Intellectual Property Organization, Geneva]). Even if registration under the Treaty as an International Depositary Authority is not contemplated the standards prescribed would be a good goal to attain.

*10.4* If consultancy, advisory or investigation services are to be offered, attention must be given to the provision of appropriate facilities and properly trained personnel (*See para 8.1*).

## DOCUMENTATION

*11.1* Records need to be kept for each strain held and should include the following categories of information: place, substrate or host and date of isolation, name or person isolating the strain, depositor (or other source of the strain, such as from another Collection), name of the person identifying the strain, preservation procedures used, optimal growth media and temperatures, any data on biochemical or other characteristics, and any regulatory conditions applying (relating for example to quarantine, containment levels, and patent status).

*11.2* Whenever resources permit, the records should be computerized. Collections are encouraged to adopt a field structure and field definitions which will enable the data to be integrated into the international and major regional schemes now in operation [e.g. *Microbial Strain Data Network* (MSDN), *Mibrocial Information Network Europe* (MINE)]. Several compatible programmes exist and the WFCC, MSDN, *WFCC World Data Center on Microorganisms* (WDC), and MINE can provide helpful information and suggestions on appropriate levels of management of this information. Even if data exchange is not being planned in the short-term, it is wasteful of resources to develop independent systems that already exist.

*11.3* For security, duplicate computer files or photocopies of records should be kept separately, perhaps deposited with duplicate strains (*See para 7.3*).



*11.4* Where records are computerized, several of the Collection's staff should be familiar with the operation of the system in order to provide cover during periods of absence.

## CATALOGUES

*12.1* Printed catalogues of the strains available for distribution should be produced at not too infrequent intervals. While annual catalogues are rarely justified, gaps of five or more years would be too great to be useful. Printed catalogues complement computerized catalogues.

*12.2* Where the data are computerized, camera-ready copy for printing catalogues can be produced readily. This should be considered during selection of the computer software.

*12.3* Computerized information acts as a machine-readable catalogue and can be made available on disc or on-line through telecommunications systems. If the data are organized according to the formats recommended for international systems, it would facilitate international access and exchange (*See para 11.2.*).

## RESEARCH

*13.1* Research programmes should be a part of every Collection's activity. It not only helps attract the staff of high calibre required, but can make important contributions to knowledge of the morphology, taxonomy, physiology, biochemistry, and genetics of the groups of organisms maintained. Research activities also ensure that staff keep abreast of current developments and are aware of the needs of the user community.

*13.2* Collections are also well-placed to develop screening procedures for particular organisms, preservation protocols for strains difficult to preserve by routine procedures, and optimal cultural media and conditions for growth.

## TRAINING

*14.1* While Collection staff require appropriate training themselves, once they have become skilled they are well-placed to train others in techniques relating to culture preservation, growth, and identification.

*14.2* If training is to be provided, it is important to ensure that adequate provision is made for teaching facilities and supervision.

## SAFETY

*15.1* Safety aspects of all operations carried out in the Collection need to be carefully scrutinized with respect not only to national health and safety regulations, but also with regard to good laboratory practice.

*15.2* Particular attention needs to be given to the containment and security aspects of strains which are potentially harmful to man, animals or crops.

*15.3* Facilities will be required for the safe opening of packages containing new deposits or material for identification which could contain harmful organisms.

## NATIONAL AND INTERNATIONAL COLLABORATION

*16.1* Many countries have formal or informal associations or federations of the Collections within them. These provide excellent opportunities for exchange of information and discussions of mutual problems, and Collections should be encouraged to support them.

*16.2* Similarly, the establishment of formal or informal links with any regional groups active in adjacent countries should be encouraged. Examples of such links are the *European Culture Collection Organization* (ECCO), and the Microbial Resource Centres (MIRCEN) network.

*16.3* In order to make their holdings widely known, Collections are encouraged to register with the *WFCC World Data Center on Microorganisms* (WDC). Collaboration with the *Microbial Strain Data Network* (MSDN) is also recommended to facilitate international communication and data exchange.

*16.4* Collections and individual senior staff within Collections may join the *World Federation for Culture Collections* (WFCC). This has committees concerned with education, patents, postal regulations, endangered collections, and standards which all provide information that may be of assistance to new and established Collections. The WFCC holds a major international congress every four years which provides a unique forum for the consideration of all aspects of the activity of culture Collections. A *Newsletter* is produced, and training schemes and courses are operated. Collection staff should be encouraged to actively participate in the affairs of the WFCC.

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### Useful Addresses

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Microbial Strain Data Network (Institute of Biotechnology, University of Cambridge, 307 Huntingdon Road, Cambridge, CB3 0JX. UK. Tel: 0223 276622. Fax: 0223 277605. Telex: 811240 CAMSPL G. Telecom Gold/Dialcom: 75:DBI0001).

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