1

Resource Centres

L. R. HILL, K. KOMAGATA and R. L. GHERNA

1.1 Nature of the resource

Living and authenticated cultures of bacteria are essential in virtually all practical applications of bacteriology, whether for routine work or for research. Such cultures are needed as controls, sources of special products, indicators of particular reactions or interactions; as representatives of their kind, or species (important for comparative identifications); as standards. Far from detracting from these 'classical' needs, the advent of the biotechnology of today has simply added more user needs, often, however, with a demand for greater amounts of information about the cultures.

There are three principal elements that convert a culture, or collection of cultures, into a 'resource'. First is the culture itself, successfully preserved in a viable state. If viability cannot be maintained, either technically or simply through default, then only the information that may have been published is a resource: to exploit this limited resource a new isolate has to be obtained. Second is the information recorded about the culture. This includes such documentation as the history of the culture, original source, and also a record of the properties of the culture. The information may be little or exhaustive, but the preservation of cultures without information means they form a substantially less useful resource. Third is the availability of the culture, to enable its further application. However well preserved and well documented, a culture cannot be regarded as a 'resource' if it is not available: at best, it is a resource solely for its owner. Availability may, of course, be subject to restrictions or conditions; for example, hazardous bacteria (see Chapter 4) or patent strains (see Chapter 6) may not be universally available.

Many cultures are resource materials precisely because they have particular, documented applications or properties; others may be representatives of new species, with no immediate practical utility. However, this does not exclude as a valuable resource the conservation of a selection of cultures for no immediately known purpose. We cannot guess today what materials may be useful in the future, nor for what purpose; we cannot predict what changes will occur in the general environment or special habitats, nor what effects such changes may ultimately have on bacterial genomes or extra-chromosomal elements. Thus, it is important to conserve for posterity exemplars of the bacterial spectrum of today and to include some about which our knowledge may be very limited and others of no known present application.

Living cultures that are documented and available are, then, the basic resource. Laboratories which make a deliberate effort to maintain the basic resource qualify as resource centres. These will range from small collections, where conservation is a secondary activity of the laboratory, to larger, perhaps specialised, collections with an increased effort to maintain the resource successfully, and finally to the nationally and internationally recognised service-supply culture collections where conservation is the primary function. Conservation of the genetic resources of today for posterity involves active accessioning policies, successful preservation of cultures, quality control procedures in addition to complete documentation and capacity to supply cultures to the scientific community.

Resource centres provide, to varying degrees, a further utility: their scientific expertise relative to the cultures under their curatorial responsibility. Even in the large service-supply culture collections, where the range of bacteria maintained is so wide it is impossible for in-house staff to be expert with all the species, the availability of scientific expertise is itself a valuable resource. This expertise may be direct, deriving from, for example, pertinent research programmes of the resource centre itself, or indirect, by knowledge of who elsewhere is likely to provide the answer to a particular query.

1.2 Biotechnological applications

There are many early and continuing biotechnological applications useful to mankind which use bacteria as agents in particular processes – some natural, some induced – or as sources of useful products. Modern biotechnology, however, concerns genetic engineer-

ing, manipulation of bacterial DNA to accommodate foreign DNA and thereby to change the properties of the bacterium in a way beneficial to man. This is not the place even to list the variety of applications actually or potentially carried out by altered bacteria in this rapidly expanding activity called 'biotechnology'. It is pertinent to note, however, that modern biotechnology demands high levels of scientific expertise to carry out manipulations, and technical expertise to transform a laboratory construct into an economic industrial process.

Each successful application represents a significant effort and the bacteriological end-product, namely the successfully manipulated bacterium, is a valuable commodity. Conservation of this commodity then becomes very important and deposit (for private safe-keeping, as open deposits, or as patent deposits) in a reliable resource centre becomes essential. The large service-supply culture collections have responded positively to this new biotechnological need.

Already biotechnology has made another impact on resource centres. The information content of collection catalogues, usually arranged systematically by genus and species names (which in themselves may convey a significant quantity of information on properties), giving the isolation-cultural 'pedigree' of cultures and, if appropriate, some special properties or uses, is adequate for many purposes. Modern biotechnology, however, places a demand for more detailed information on properties, often of a specialist kind. Where the resource centres have relevant information, additional to that appearing in catalogues, they are responding by constructing computer databases, and by means of computer networks are providing direct or indirect access to these (see Chapter 2).

1.3 Types of resource centres

1.3.1 *Service-supply culture collections*

Service-supply collections exist primarily to maintain and supply on demand catalogued, authenticated cultures. They are the primary sources of comparable materials, permitting workers in different times and/or places to work with the same materials, thus making their work to a degree standardised and comparable with others. Their utility to the scientific community has been long recognised and some of the largest service-supply collections were founded in the first quarter of this century. The American Type Culture Collection (ATCC, founded 1925) houses collections relevant to a wide range of microbiological subdisciplines and not solely bacteriology. Elsewhere, long

established and internationally well known service collections are specialised to differing degrees. In the case of bacteriology, the specialisation is often governed by areas of application, such as medical bacteriology, plant pathogenic bacteriology, food applications, industrial use, and so on. Table 1.1 lists the major bacterial culture collections.

Table 1.1. *Major bacterial culture collections, listed alphabetically by continent and country*

Collections	Acronyms and World Data Center number (see Chapter 2)
AFRICA	
Rhizobium MIRCEN Department of Soil Sciences and Botany University of Nairobi PO Box 30197 Nairobi Kenya *Holding*: Rhizobia inoculants	
Rhizobium MIRCEN Centre National de Recherches Agronomiques Institut Sénégalais de Recherches Agricoles BP 51 Bambey Senegal *Holding*: Rhizobia	MAO WDC-53
AMERICA	
Fundacão Tropical de Pesquisas e Tecnologia 'André Tosello' Rua Latino Coelho, 1301 Caixa Postal 1889 13.100 Campinas, SP Brazil Telephone: (0192) 42-7022 Electronic mail: BT TYMNET 42:CDT0094 *Holding*: Industrial and general bacteriology	FTPT
Colecão de Culturas Adolfo Lutz Instituto Adolfo Lutz Av. Dr. Arnaldo, 355 CEP 7027 São Paulo Brazil Telephone: (011) 853-0111 *Holding*: General microbiology	IAL WDC-282

Table 1.1. (cont.)

Collections	Acronyms and World Data Center number (see Chapter 2)
AMERICA *(cont.)*	
Secão de Bacterias Fitopatogenicas **Instituto Biologico** Rodovia Heitor Penteado, km 4 Caixa Postal 70 13.100 Campinas, SP Brazil Telephone: (0192) 52-1657 *Holding*: Plant pathogenic bacteria	IBSBF
Instituto Nacional de Controle de Qualidade em Saude Fundacão Oswaldo Cruz Av. Brasil 4365 – Manguinhos Caixa Postal 926 20.000 Rio de Janeiro, RJ Brazil Telephone: (021) 270-1522 and 270-1072 *Holding*: Medical bacteriology	INCQS
Secão de Leite e Derivados **Instituto de Tecnologia de Alimentos** Av. Brazil 2880 13.100 Campinas, SP Brazil Telephone: (0192) 41-5222 *Holding*: Non-pathogenic bacteria	ITALSL
Secão de Microbiologia **Instituto de Tecnologia de Alimentos** Av. Brazil 2880 13.1000 Campinas, SP Brazil Telephone: (0192) 41-5222 *Holding*: Non-pathogenic bacteria	ITALSM
Instituto Zimotecnico **Departamento de Tecnologia Rural/ESALQ** Av. Padua Dias 11 Caixa Postal 9 13.400 Piracicaba, SP Brazil Telephone: (0194)33-0011 *Holding*: Non-pathogenic bacteria	IZ

Table 1.1. (cont.)

Collections	Acronyms and World Data Center number (see Chapter 2)
AMERICA *(cont.)*	
Laboratorio de Fisiologia Bacteriana **Fundacão Oswaldo Cruz** Av. Brasil 4365 Caixa Postal 926 20.000 Rio de Janeiro, RJ Brazil Telephone: (021) 270-6565 *Holding*: *Bacillus* spp.	LFB-FIOCRUZ
Equipe de Microbiologia do Solo **Instituto de Pesquisas Agronomicas (IPAGRO)** Rua Goncalves Dias, 570 90.000 Porto Alegre, RS Brazil Telephone: (0512) 33-5411 *Holding*: Rhizobia	SEMIA WDC-443
Departamento de Antibioticos **Universidade Federal de Pernambuco** Cidade Universitaria 50.00 Recife, PE Brazil Telephone: (081) 271-3628 *Holding*: Non-pathogenic bacteria	UFPEDA
Instituto de Microbiologia Departamento de Microbiologia Medica Universidade Federal do Rio de Janeiro Av. Brigadeiro Trampowski, s/n Ilha do Fundao 20.000 Rio de Janeiro, RJ Brazil Telephone: (021) 260-4193 *Holding*: Medical bacteriology	UFRJIM
Salmonella Genetic Stock Centre Department of Biology University of Calgary Calgary Alberta T2N 1N4 Canada *Holding*: *Salmonella* spp.	LSCC WDC-338
CIAT Rhizobium Collection Centro International de Agricultura Tropical AA 67-13 Cali Colombia *Holding*: Rhizobia	CIAT WDC-536

Table 1.1. (cont.)

Collections	Acronyms and World Data Center number (see Chapter 2)
AMERICA *(cont.)*	
***E. coli* Genetic Stock Center** Department of Human Genetics Yale University School of Medicine PO Box 3333 333 Cedar Street New Haven Connecticut 06510 USA Telephone: (203) 785-2687 *Holding*: *E. coli*, particularly K-12 derivatives, Hfr and F′ strains	
Agricultural Research Service Culture Collection Northern Regional Research Center Agricultural Research Service, US Department of Agriculture 1815 North University Street Peoria Illinois 61604 USA Telephone: (309) 685-4011 Electronic mail: BT TYMNET 42:CDT0404 *Holding*: Mainly *Streptomyces*, *Bacillus* spp. *IDA status*	NRRL WDC-97
American Type Culture Collection 12301 Parklawn Drive Rockville Maryland 20852 USA Telephone: (301) 881-2600 Telex: 898055 ATCC NORTH Electronic mail: BT TYMNET 42:CDT0109 *Holding*: General microbiology *IDA Status*	ATCC WDC-1
Bacillus Genetic Stock Center Department of Biochemistry Ohio State University 484 West 12th Avenue Columbus Ohio 43210 USA Telephone: (614) 292-5550 *Holding*: Genetic strains of *Bacillus* spp., wild types and mutants	BGSC

Table 1.1. (cont.)

Collections	Acronyms and World Data Center number (see Chapter 2)
AMERICA *(cont.)*	
Neisseria Reference Laboratory Division of Infectious Diseases United States Public Health Hospital 1131 14th Ave S. Seattle Washington 98114 USA *Holding*: *Neisseria* spp.	NRL
NIFTAL Rhizobium Germplasm Resource NIFTAL Project PO Box 0 Paia Hawaii 96779 USA *Holding*: Rhizobia	TAL WDC-506
USDA Rhizobium Culture Collection United States Department of Agriculture Beltsville Agricultural Research Center Beltsville Maryland 20705 USA *Holding*: Rhizobia	BRCC WDC-540
In Vitro International Inc. 611(P) Hammonds Ferry Road Linthicum Maryland 21090 USA *Holding*: General microbiology *IDA status*	IVI
ASIA AND OCEANIA	
China Committee for Culture Collection of Microorganisms Chinese Academy of Sciences Institute of Microbiology Zhongguancun Beijing 100080 People's Republic of China *Holding*: General microbiology	CCCCM WDC-550

Table 1.1. (cont.)

Collections	Acronyms and World Data Center number (see Chapter 2)
ASIA AND OCEANIA *(cont.)*	
Food Industry Research and Development Institute PO Box 246 Hsinchu 300 Taiwan Telephone: (035) 223191-6 *Holding*: General bacteriology	FIRDI
Persian Type Culture Collection Iranian Research Organisation for Science and Technology 118 Felestine Ave., Opp Kalantary 7 Tehran Iran Telephone: (021) 666777 Telex: TPBA 212918 *Holding*: General bacteriology	PTCC
Agency of Industrial Science and Technology Ministry of International Trade and Industry 1-3, Higashi 1-chome Tsukaba-gun Ibaraki-ken 305 Japan Telephone: (0298)54-6029 Telex: 3652570 AIST J *Holding*: General microbiology (excluding human pathogens) *IDA status*	FRI
Culture Collection of the Institute for Fermentation Osaka Institute for Fermentation Osaka 17-85 Juso-Honmachi 2-chome Yodogawa-ku Osaka Japan *Holding*: General microbiology	IFO WDC-191
Kansai Medical School Culture Collection Kansai Medical School, Department of Microbiology Fumizono-Cho Osaka Japan *Holding*: General bacteriology	KMS WDC-305

Table 1.1. (cont.)

Collections	Acronyms and World Data Center number (see Chapter 2)
ASIA AND OCEANIA *(cont.)*	
Japan Collection of Microorganisms RIKEN Wako Saitama 351-01 Japan Telephone: (484) 62-1111 Telex: 2962818 RIKEN J Cable: RIKAGAKUINST Electronic mail: BT TYMNET 42:CDT0007 *Holding*: General microbiology	JCM WDC-567
Institute of Applied Microbiology University of Tokyo Yayoi 1-1-1, Bunkyo-ku Tokyo 113 Japan Telephone: 3812-2111 *Holding*: General and applied microbiology	IAM WDC-190
Philippine Type Culture Collection Bureau of Research and Laboratories Department of Health PO Box 911 Manila Philippines *Holding*: Medical bacteriology	PTCC WDC-46
TISTR Culture Collection Thailand Institute of Scientific and Technological Research 196 Phahonyothin Road Bangkhen Bangkok 9 Thailand Telephone: 5791121-30 Telex:21392 TISTR TH Electronic mail: BT TYMNET 75:DBI0275 *Holding*: General microbiology	TISTR WDC-383
AUSTRALASIA **Department of Microbiology** **University of Queensland** St Lucia Queensland 4067 Australia Telephone: (010617) 377-1111 Telex: 40315 UNIVQLD AA Electronic mail: BT TYMNET 42:CDT0113 *Holding*: General microbiology	UQM WDC-13