EMbaRC

European Consortium of Microbial Resource Centres

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PU	**Public**	
PP	Restricted to **other programme participants** (including the Commission)	
RE	Restricted to a **group defined by the Consortium** (including the Commission)	

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Authors	David Smith		
Abstract	The EMbaRC road show replaced the workshop for endangered collections (Italy) which was cancelled because of lack of interest. The road show simply entails the delivery of oral presentations describing the EMbaRC project and its outputs tailored to suit the audience. The common elements of the road show presentation is presented on the EMbaRC web site www.embarc.eu. It describes the type of project and funding, introduces the objectives and main deliverables covering key elements of the, research, transnational access and network activities.		
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Abbreviation key

BRC	Biological Resource Centre
BTWC	Biological and Toxin Weapons Convention
CABRI	Common Access to Biological Resources and Information
CBRN	Chemical, Biological and Radio Nuclear
EBRCN	European Biological Resource Centres Network
ECCO	European Culture Collections' Organisation
EMbaRC	European Microbial Resources Consortium
EU	European Union
GBRCN	Global Biological Resource Centre Network
IAP	Inter-academy Panel
ISO	International Standards Organisation
IUMS	International Union of Microbiological Societies
mBRC	microbial domain Biological Resource Centre
OECD	Organisation for Economic Co-operation and Development
RG	Risk Group
VBM	Valuable Biological Materials
WFCC	World Federation for Culture Collections
WHO	World Health Organisation

1 Background and Objectives

The EMbaRC road show replaced the workshop for endangered collections (Italy) which was cancelled because of lack of interest. The road show simply entails the delivery of oral presentations describing the EMbaRC project and its outputs tailored to suit the audience. The common elements of the road show presentation is presented on the EMbaRC web site www.embarc.eu. It describes the type of project and funding, introduces the objectives and main deliverables covering key elements of the research, transnational access and network activities. Throughout the project life EMbaRC has been represented at 2 workshops, on 7 web sites, in 3 newsletters, with the transnational access promoted to 40 microbiological societies. Presentations have been made at 49 conferences in 15 countries, over 40 oral presentations and over 10 posters (see master table: TABLE A2 : LIST OF CONGRESSES / MEETING). In general the response has been good and although transnational access visits were mainly taken up towards the end of the project and completed in an extension to the project life this reflects how well it has been perceived. This is also demonstrated through publications including 11 papers, 10 in press and 4 electronic journal articles (see below). The project has also supported PhD studies with partial support by EMbaRC for Paula Cristina Azevedo Rodrigues and full support for Marta Filipa Jesus de Freitas Simões.

2 Content and layout of road show

The road show power point presentation was designed and tested by Nelson Lima (MUM) and Paul de Vos (LMG) and a short version designed by Smith for the EMbaRC web site. The set of slides are organised in a format that can be easily tailored to adapt to a given context and time.

2.1 Presentation overview

- Why culture collections? – BRCs?
- Why networks of culture collections are needed?
- Example of a cc network: EMbaRC
- Difficulties of preservation and access
- Why should nations preserve the microbial biodiversity?
- Future developments and plans

2.2 Why culture collections? – BRCs?

This section presented the importance of BRCs both to academic and industrial users particularly demonstrating how BRCs contribute to the developing bioeconomy. Examples of important cultures for the bio economy are presented.

2.3 Why networks of culture collections are needed?

This part of the presentation explains why EMbaRC was needed.

- **Previous networking initiatives: some examples**
  - **National level**
    - UK: UKNCC (1947), JP: JSCC (1951), BE: BCCM (1983), FR: CCRB (2001)
  - **European level**
    - ECCO (European Culture Collections' Organisation, 1981)
    - Projects since the 1980s: MINE, CABRI, EBRCN
  - **Global level**
    - WFCC (World Federation of Culture Collections, 1970)
    - GBRCN (Global Biological Resource Centre Network, 2008)
- **From Culture Collections to Biological Resource Centres**

OECD role in the recognition of BRCs in 2007: Best Practice Guidelines for Biological Resource Centres

2.4 Example of a CC network: EMbaRC

Here the EMbaRC project activities and expected outputs are described.

2.5 Difficulties of preservation and access

Methodologies of preservation are detailed and the need for optimisation to ensure reproducibility of organism properties is stressed. In this topic the 5:54 min video about "EMbaRC-Preservation techniques" was incorporated and tested as e-learning material (see D.3.21, formerly D.NA2.1.2)

2.6 Why should nations preserve the microbial biodiversity?

A comprehensive overview of reasons why nations need to preserve microbial diversity is presented with a focus on national commitments to:

- The Convention on Biological Diversity
- Bonn Guidelines on Access to genetic resources and fair and equitable sharing of the benefits arising out of their utilization
- Budapest treaty (IDA)
- Cartagena Protocol to the Convention on Biological Diversity
- Convention on International Trade in Endangered Species (CITES)
- EC Regulation 3381/94/EEC on the Control of Exports of Dual-Use Goods
- EC Directive on Legal Protection of biotechnological inventions
- EC Directive 90/219/EEC on the Contained use of GEMs
- EC Directive 90/220/EEC on the Deliberate Release of GEMs
- FAO International Treaty on Plant Genetic Resources for Food and Agriculture
- International Plant Protection Convention (IPPC)
- OECD Initiative on biotechnology for sustainable growth and development
- Sanitary and phytosanitary (SPS) agreement of the WTO.

An explanation of the process from collection in the field to storage and distribution for use is provided.

2.7 Future developments and plans

This section summarises the EMbaRC outputs and demonstrates how they can be used in developing common policy and improving accessibility of strains. It also highlights the legacy: Microbial Resources Research Infrastructure (MIRRI) in which the EMbaRC consortium supported efforts of the GBRCN and ECCO to deliver this research infrastructure to ESFRI and successfully establish it on the ESFRI road map.

3 List of EMbaRC publications

Casaregola, S. The genomes of fermentative Saccharomyces. Editions Scientfiques Médicales, Elsevier 334, 590-598.

Conrad L. Schocha, Keith A. Seifertb, Sabine Huhndorfc, Vincent Robert, John L. Spougea, C. André Levesque, Wen Chenb, and Fungal Barcoding Consortiuma (2012) Nuclear ribosomal internal transcribed spacer (ITS) region as a universal DNA barcode marker for Fungi. http://www.pnas.org/content/early/2012/03/29/1117018109.abstract

Cousin, S. (2012) *Lactobacillus gigeriorum* sl nov., isolated from chicken. International Journal of Systematics and Evolutionary Microbiology 62, 330-334.

Janssens, D., Arahal, D.R., Bizet, C. & Garay, E. (2010). The role of public biological resource centers in providing a basic infrastructure for microbial research. Research in Microbiology 161, 422-429.

Mallet, S., Weiss, S. (2012) Cycle of Yeasts from the CTG Clade revealed by the analysis of the Millerozyma (Pichia) farinose species complex. Plos ONE 7, e35842.

Rodrigues P, 2011. Mycobiota and aflatoxigenic profile of Portuguese almonds and chestnuts from production to commercialisation. PhD Thesis, Universidade do Minho, Braga, Portugal, 329 pp. Partial support by EMbaRC project on molecular biology work.

Rodrigues P, Santos C, Venâncio A, Lima N, 2011. Species identification of *Aspergillus* section *Flavi* isolates from Portuguese almonds using phenotypic, including MALDI-TOF ICMS, and molecular approaches. Journal of Applied Microbiology 111: 877-892. Partial support by EMbaRC project on molecular biology work.

Santos, C., Fraga, M.E., Kozakiewicz, Z. & Lima N. (2010) Fourier transform infrared as a powerful technique for the identification and characterization of filamentous fungi and Yeasts. Research in Microbiology 161, 168-175.

Santos, C. (2011) Matrix-assisted laser desorption/ionization time-of-flight intact cell mass spectrometry to detect emerging pathogenic Candida species. Diagn. Microbiol. Infect. Dis. 71, 304-308.

Santos, C. (2011) Species identification of Aspergillus section Flavi isolates from Portuguese almonds using phenotypic, including MALDI-TOF ICMS, and molecular approaches. Journal of Applied Microbiology 111, 877-892.

Smith, D. (2011). Biological Resource Research Infrastructures to drive innovation in microbiology. Microbe Vol: 6; No. 11 (November) p482. On line: http://www.microbemagazine.org/index.php/11-2011-home/4035-research-resources-help-to-drive-innovation-in-microbiology

Smith, D. (2012). Culture Collections. Advances in Applied Microbiology 79, 73–118.

Smith, D. (2012) A new look at Microorganisms. Insight Publications, Projects 20,18-19. http://viewer.zmags.com/publication/4c7a6b67#/4c7a6b67/19; Digital edition of Projects Magazine: http://viewer.zmags.com/publication/4c7a6b67#/4c7a6b67/1

Smith, D. & Day, P. (2012). European Consortium of Microbial Resource centres: Microbial

Resources Success Stories. EMbaRC, CABI, UK,

Smith, D. & Fritze, D. (2010) European Culture Collections - the future is MIRRI. Microbiology Today 37:4, 256-258.

Smith, D. & Ryan, M.J. (2012). Implementing Best Practices and Validation of Cryopreservation Techniques for Microorganisms. The Scientific World Journal, vol. 2012, Article ID 805659, 9 pages, doi:10.1100/2012/805659.

Stackebrandt, E. (2010). Diversification and focusing: strategies of microbial culture collections. Trends in Microbiology 18, 283–287

Stackebrandt, E. (2010). Responsibilities of culture collections. Microbiology Today 37:4, 259-260

Stackebrandt, E., Lortal, S., Bizet, C., Smith, D., Desmeth, P., Garay Aubán, E., Lima, N. and Stalpers, J. (2010) A strategy for improving the use of microbial Resource Centres (mBRCs). WFCC Newsletter 48, 5-7

Stackebrandt, E. (2011) Editorial. Arch Microbiol 193, 155-156

Stackebrandt, E. (2011) Letter to the Editor: Towards a strategy to enhance access to microbial diversity. Int J Syst Evol Microbiol 61: 479 – 481

Welti, S. (2012) Molecular phylogeny of and related genera and description of a new genus Leitrametes. Fungal diversity 55, 47-64.

In press:

Stackebrandt, E. (2011) Hinterlegung von Mikroorganismen: ein Dienst der Autoren und Ressourcenzentren an der Wissenschaft . BioSpektrum (in press)

Reginaldo Lima-Neto, Cledir Santos , Nelson Lima , Paula Sampaio, Célia Pais, Rejane P. Neves. New spectral MALDI-TOF ICMS identification of Candida clinical isolates versus classical phenotypic approaches. Partial support by EMbaRC project on molecular biology work.

Simões, M.F., Pereira, L., Santos, C. & Lima N. (2012) Polyphasic identification and preservation of fungal diversity: Concepts and applications. In: Management of Microbial Resources in the Environment (Malik A., Grohmann E. & Alves M. Eds.), Springer, New York (in press).

Smith, D. (2012). Culture collections. Encyclopaedia of Food Microbiology, 2nd Edition

Smith, D., Fritze, D., Thompson, F. & Stackebrandt, E. (2012). Public Service Collections and Biological Resource Centres of Microorganisms. In: The Prokaryotes. Springer

4 Conferences and meetings an EMbaRC road show was presented

EMbaRC Road Show			
Congress title	Location	Authors(s)	Project partner
Sessão EMbaRC do MicroBiotec'11	Braga, PT	Nelson Lima	7
MIRRI preparatory project meeting	Braga, PT	David Smith	4
European Culture Collections' Organisation XXXI annual meeting	Braga, PT	Matthew Ryan, CABI;	4
International Society for Microbial Ecology (ISME) Annual conference	Copenhagen, DK	Paul de Vos, BCCM/LMG; Erko Stackebrandt, DSMZ; David Smith, CABI	9, 3, 4

Conclusion

Through publications, conference participation and presentations, seminars and workshops the EMbaRC outputs have been delivered successfully to the user community. The publications are a legacy and provide tools for preservation and management of microbial resources. The networking activities will be carried forward in the Microbial Resources Research Infrastructure (MIRRI) which moves into its European Commission funded preparatory phase from 1st November 2012. See EMbaRC website **www.embarc.eu** to view the on line version a see outline copy prepared for adaption annexed to this document.

Significance of this deliverable

The EMbaRC partners planned to organise a workshop for endangered collections in Italy. This workshop was cancelled because of lack of interest. By the way of publications and different presentations of EMbaRC in several congresses, the EMbaRC partners had disseminated successfully about the project.

EMbaRC
European Consortium of Microbial Resource Centres

Meeting
Place
date

authors

Nelson Lima
MUM – University of Minho

Overview

- Why culture collections? – BRCs?
- Why networks of culture collections are needed?
- Example of a cc network: EMbaRC
- Difficulties of preservation and access
- Why should nations preserve the microbial biodiversity?
- Future developments and plans

Why Biological Resource Centers (BRCs)?

- **Academic importance**
  - **Reference organisms**

Bacterial taxonomy:

•Classification	(I) Ordening the organisms (bacteria) in taxonomic groups
•Nomenclature	(II) Naming the groups in (I)- binomial
•Identification	Process that determines to which group classified in (I) and named in (II) belongs

Why Biological Resource Centers (BRCs)?

- **Practical importance**
  - Identification: natural variation (medical, quarantine)
  - Quality control (authenticity, viability)

  - Bio economy:
    - Industrial application (e.g. enzym production)
    - Agricultural application (e.g. seed protection)
    - Patent description
    - Biological war fare

Examples of important cultures for bio economy (1)

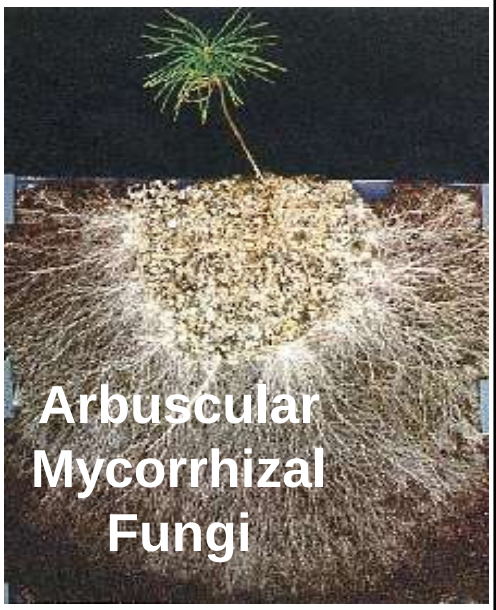
Bacteria of BCCM/LMG collection

- Starter cultures for dairy and meat products (LAB and *Staphylococcus*)
- Controle organism for detetection of toxinogenic components (*Vibrio*)
- Inactivated spores for testkit (*Bacillus*)
- Interlaboratory ring tests (plantpathogens)
- Fermentation of Cassava (LAB)
- Production of antigens
- Animal vaccin production

Examples of important cultures for bio economy (2)

GINCO the world largest collection of AMF *in vitro* (BCCM /MUCL)

- Obligate root symbionts
- Live in association with 80% of land plants
- Improve plant nutrition (yield)
- Increase plant resistance to abiotic and biotic stresses



Key role in biodiversity, productivity and functioning of ecosystem

Examples of important cultures for bio economy (2)

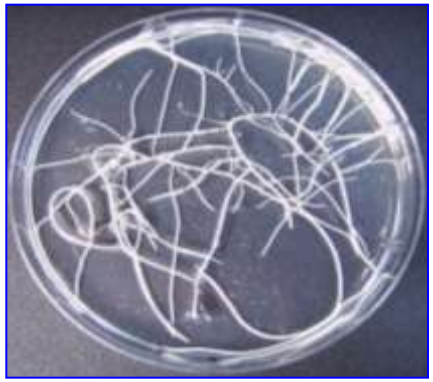
Fungi of BCCM/MUCL collection

AMF collection : strictly *in vivo* – on trap plants in greenhouse

- Time and space consuming
- Risk of contaminations

In 2001: creation of the *Glomeromycota* in vitro Collection

- 40 strains in vitro
- 400 strains in vivo
- Used in nature



Examples of important cultures for bio economy (2)

Agricultural applications

AMF (several strains of MUCL) are nowadays used for field application in the agronomic sector by several companies

- on potato in the Walloon region (in cooperation with farmers associations)
- on banana and Ananas in Cameroon to improve yield and health
- two other crops are under discussion
    - orchards in the Flanders
    - tomato in dry regions of Europe

- Why culture collections? – BRCs?
- **Why networks of culture collections are needed?**
- **Example of a cc network: EMbaRC**
- Difficulties of preservation and access
- Why should nations preserve the microbial biodiversity?
- Future developments and plans

Microbial diversity is very complex and demands specialised expertise

→ **EMbaRC**

Why EMbaRC?

- **Previous networking initiatives: some examples**
  - **National level**
    - UK: UKNCC (1947), JP: JSCC (1951), BE: BCCM (1983), FR: CCRB (2001)
  - **European level**
    - ECCO (European Culture Collections' Organisation, 1981)
    - Projects since the 1980s: MINE, CABRI, EBRCN
  - **Global level**
    - WFCC (World Federation of Culture Collections, 1970)
    - GBRCN (Global Biological Resource Centre Network, 2008)

Janssens et al. (2010), Res. Microbiol. 161(6)

- **From Culture Collections to Biological Resource Centres**
  - **OECD role in the recognition of BRCs in 2007: Best Practice Guidelines for Biological Resource Centres**

EMbaRC: what for?

- New tools in biological sciences « omics »
- Bio economy: economic sectors & society
- Need of improved acess to well preserved and characterized micro-organisms
- New means of funding for BRCs
- Partnerships with private sector
- Harmonisation and collaboration for competitive and cost-efficient BRCs

EMbaRC at a glance

- EU-funded Infrastructure “I3”project
- +3 years: 2009-2012
- 8 BRCs for micro-organisms: *bacteria, yeasts, filamentous fungi and plasmids*
- 7 countries
- +70 people involved
- Budget: €5.5m EU Grant: €4.2m
- 200,000 strains: 50% of EU public holdings
- Coordinator: Sylvie Lortal, INRA

INRA (CIRM), FR

Institut Pasteur (CIP), FR

DSMZ, DE

CABI, GB

UVEG (CECT), SP

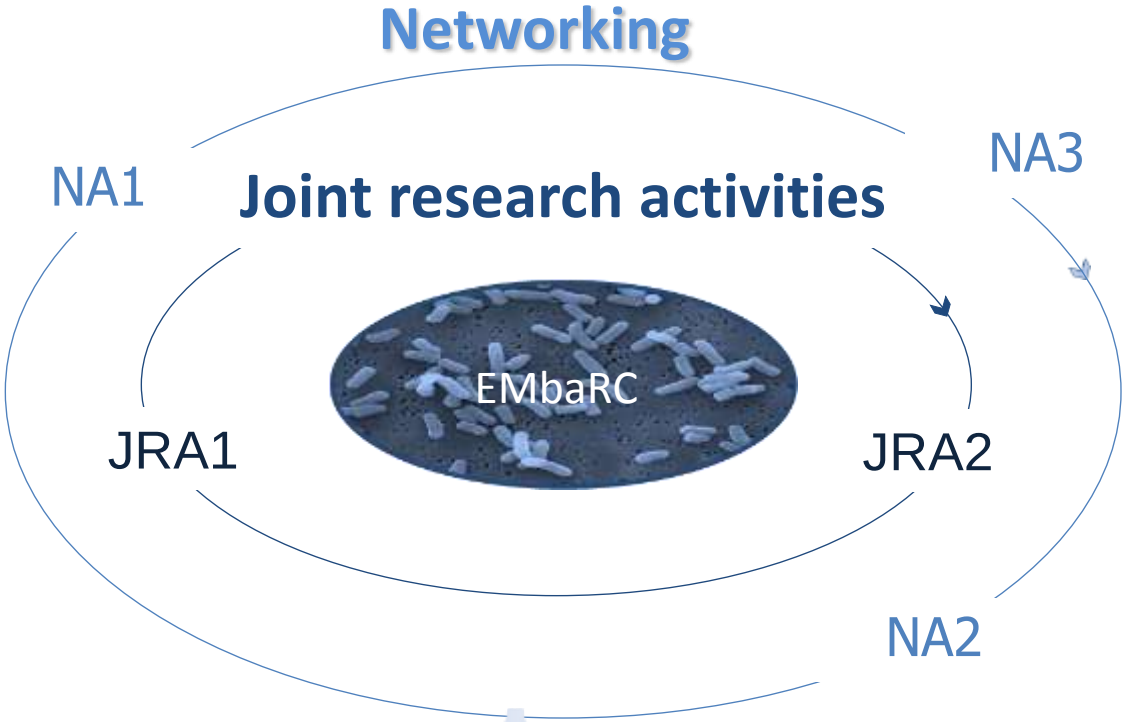
BCCM (LMG, LMBP, MUCL), BE

UMinho (MUM), PT

KNAW (CBS), NL

200,000 strains (50% of the strains held in EU National CCs)

bacteria, yeasts, filamentous fungi and plasmids



Contribution to standards

Biological material
Data & associated expertise

Call for transnational access
Training-High throughput screening
Species identification
Strain authentication

DISSEMINATION | OUTREACH | WEB PORTAL

Infrastructure users

Laboratories - Institutions - Private companies - Other collections

Networking activities

- Harmonizing methods ➢ Joint Quality Manual
- Contribution to standards ➢ Draft standard
- Biosecurity ➢ Code of Conduct
- Self-sustainability of BRCs ➢ MIRRI (ESFRI Roadmap)
- Dissemination events ➢ Workshops & Roadshow

Joint Research activities

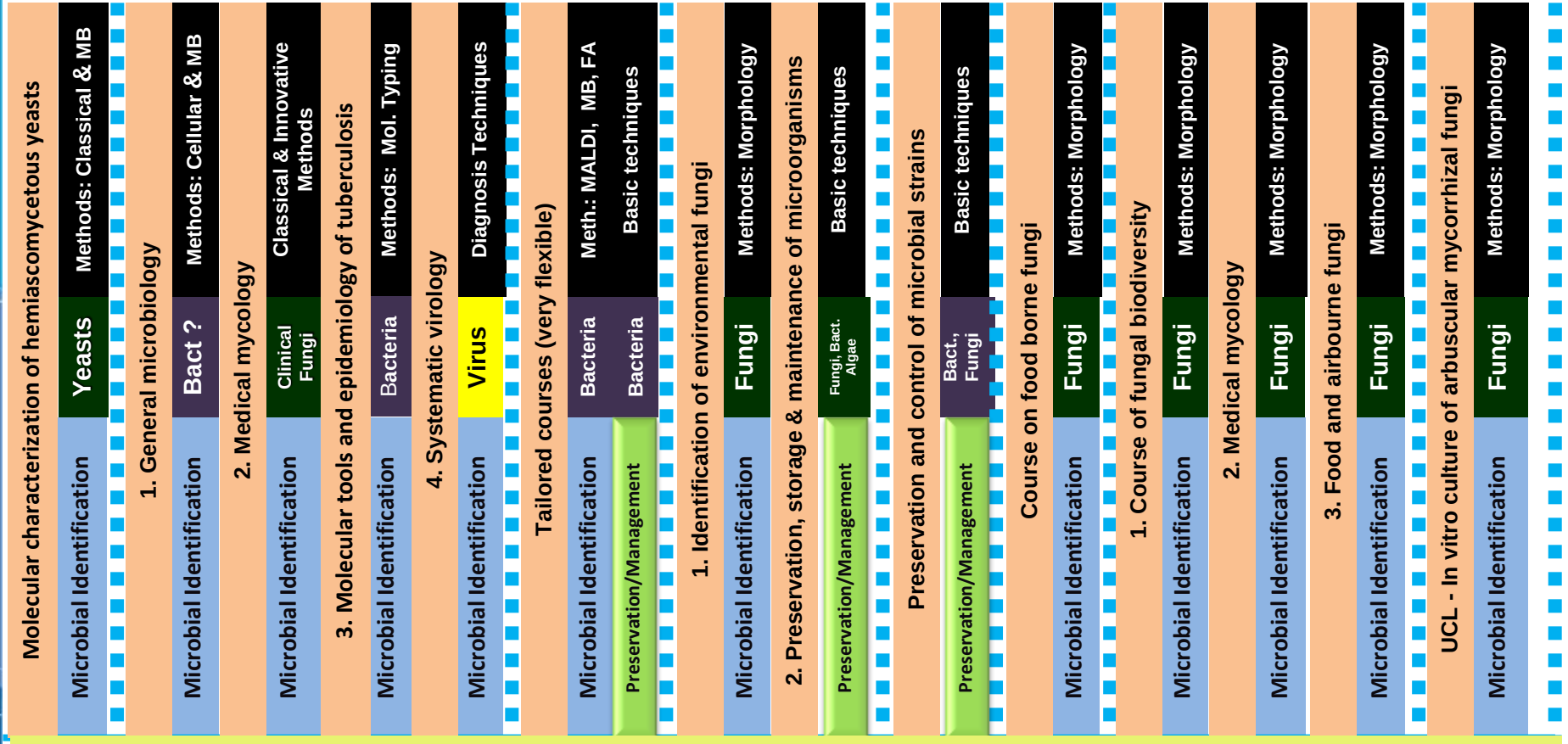
- Preservation ➢ Improved methods
- DNA bank ➢ EU DNA bank network
- Species identification ➢ New markers, databases

YeastIP database
http://genome.jouy.inra.fr/yeastip

- A comprehensive gene database for molecular taxonomy and phylogeny of yeasts
- 4119 sequences
- 60 clades
- 82 genera
- 906 species
- 10 markers

Advanced Courses

Training offered to users



12 courses of 14 related with Microbial ID
3 courses of 14 related with Preservation and Management
10 courses of 14 related with FUNGI
6 courses of 14 related with BACTERIA
1 course of 14 related with VIRUS

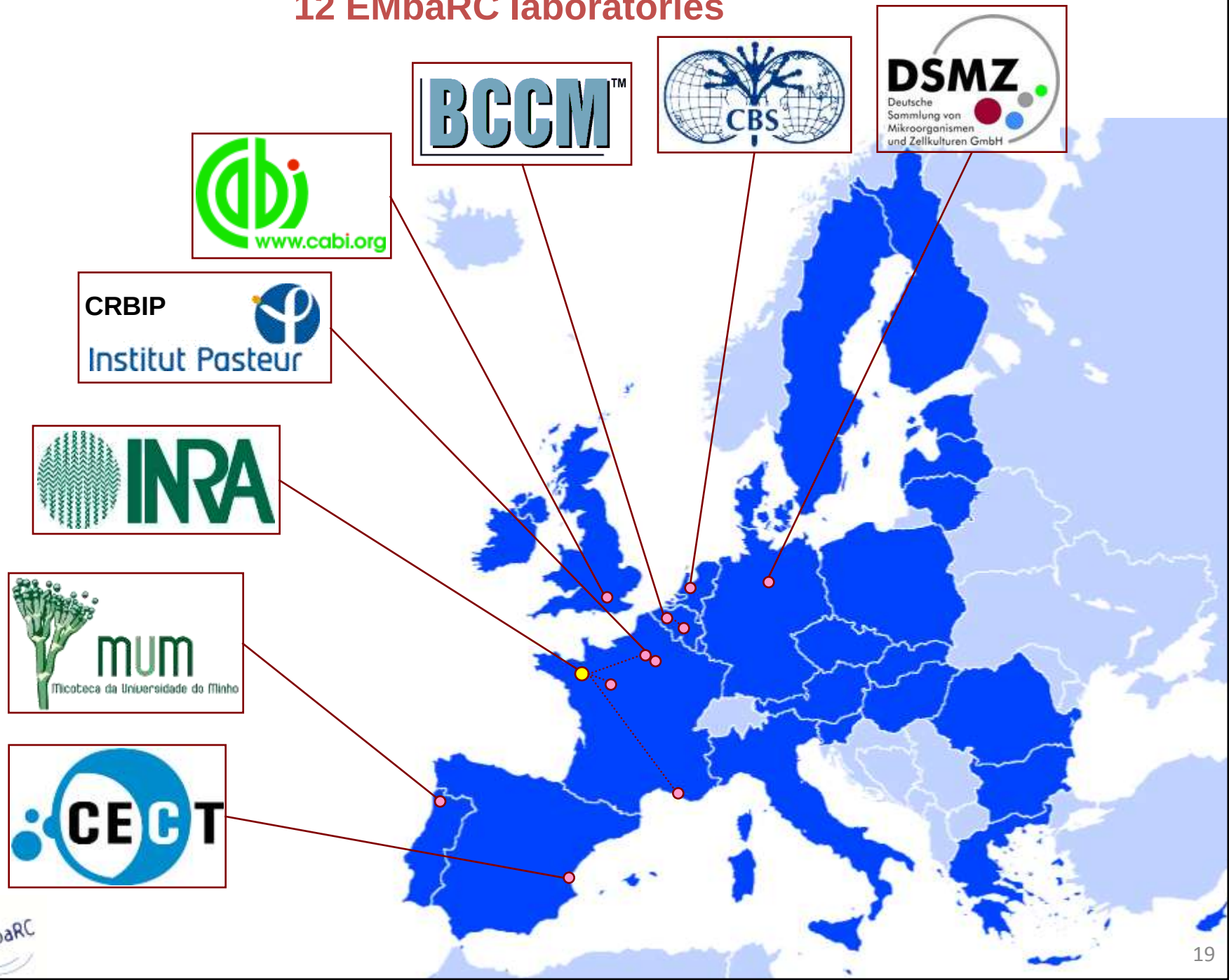
Transnational Access

Experimental study visits offered to users

- Biological resources
- Joint expertise
- Services
- Data

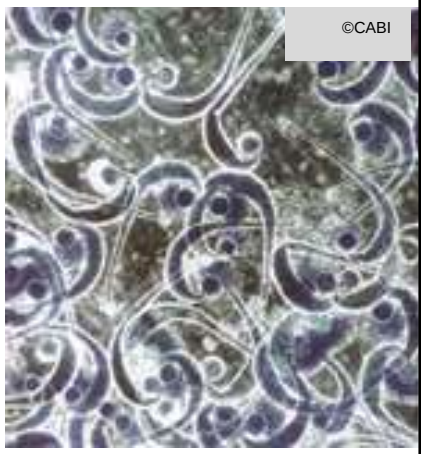
- **Training**
- **Species identification**
- **High throughput screening**
- **Strain typing, characterization**

12 EMbaRC laboratories



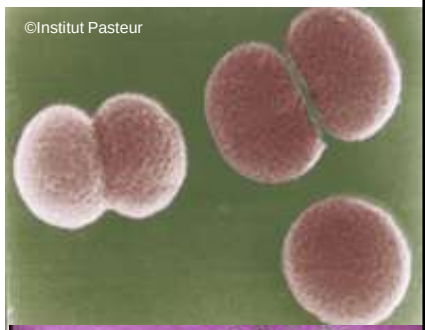
Culture Collection Management

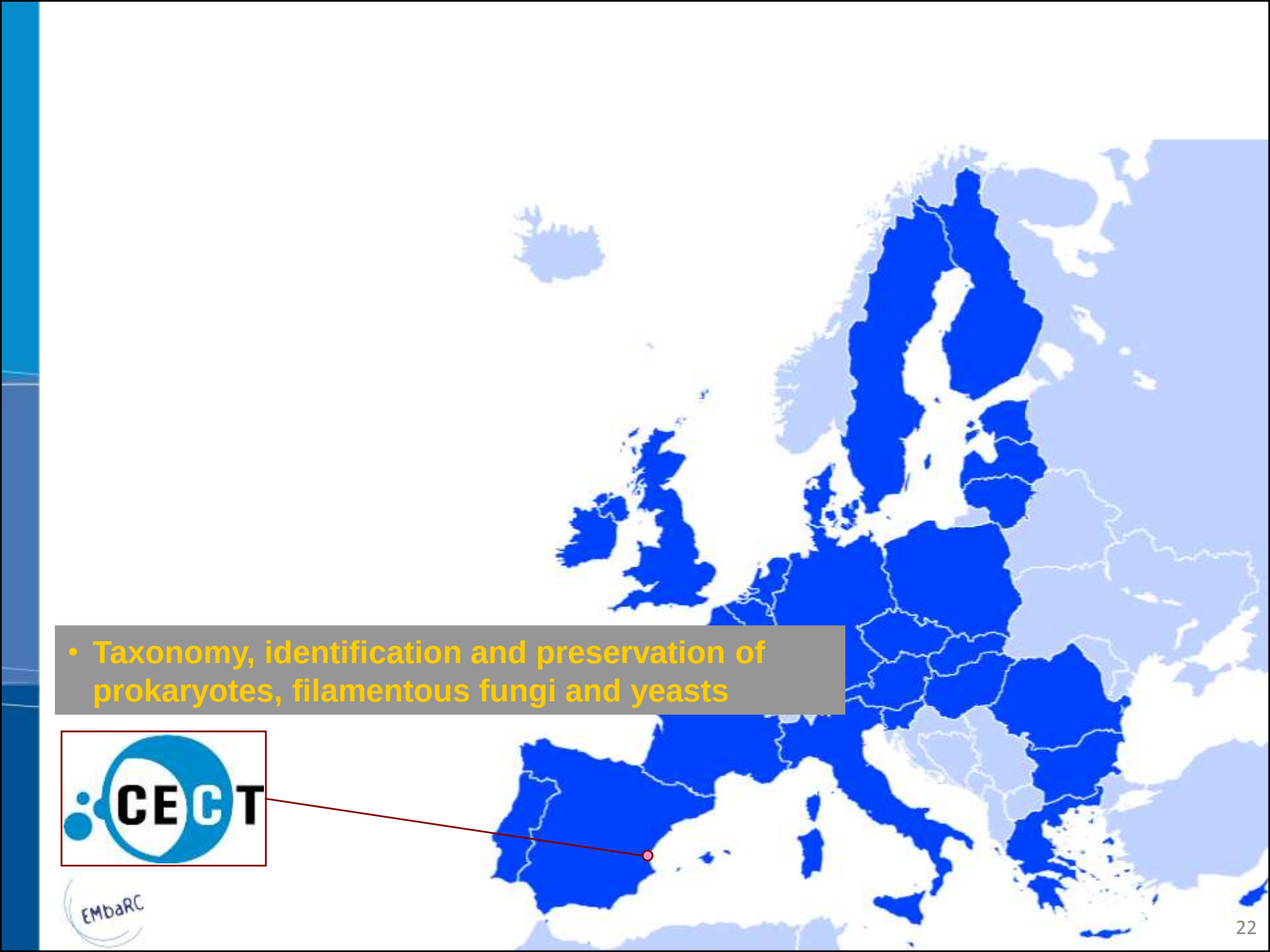
- Management of microbial strains in *ex situ* collections (CRBIP), France
- Preservation and storage of micro-organisms (CABI Bioservices), United Kingdom
- Preservation, collection management, database, identification (CBS), The Netherlands
- Theoretical, practical and regulatory aspects of a plasmid collection management (BCCM/LMBP), Belgium
- Operation of a bacterial collection & preservation of samples through freeze-drying (BCCM/LMG1), Belgium
- Fungal identification, preservation techniques and collection management (MUM), Portugal



General and Applied Microbiology - Taxonomy

- State of the art techniques in Bacteriology (DSMZ), Germany
- Taxonomy, identification and preservation of prokaryotes, filamentous fungi and yeasts (CECT), Spain
- Taxonomy of pathogenic bacteria relevant in food safety (CIRM-BP22), France
- Taxonomy, identification and typing of prokaryotes (BCCM/LMG2), Belgium
- Strain identification on pathogenic bacteria (CIRM-BP1), France
- High Throughput Screening of food bacteria (CIRM-BIA), France
- High Throughput Screening of filamentous fungi (CIRM-CF), France
- Initiation to handling of microorganisms of group 3 (CIRM-BP21), France
- In vitro Culture of Arbuscular Mycorrhizal Fungi (BCCM/MUCL), Belgium





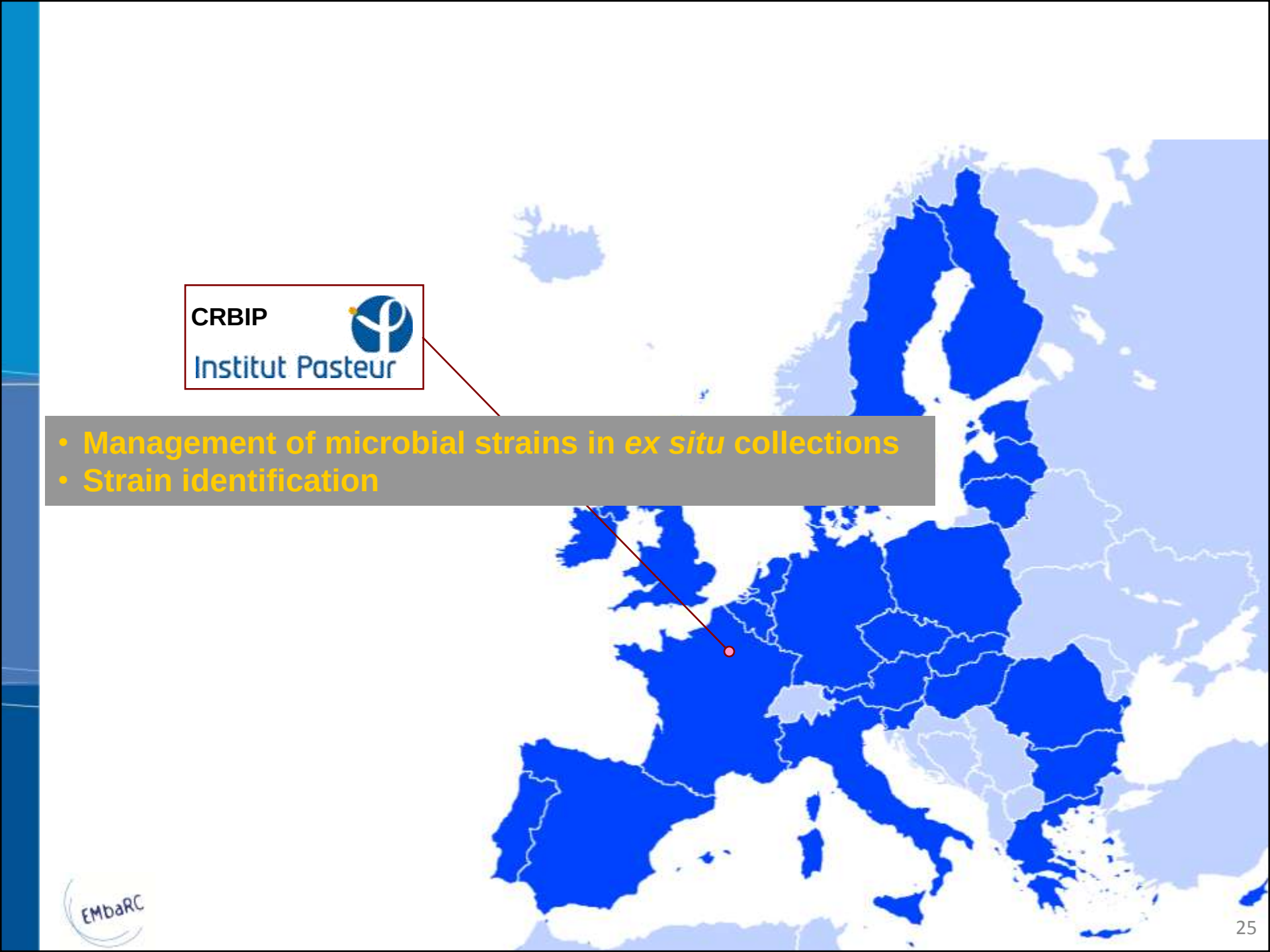
- **Taxonomy, identification and preservation of prokaryotes, filamentous fungi and yeasts**

CECT

EMbaRC

- **Fungal identification, preservation techniques and collection management**

- High Throughput Screening of food bacteria
- Strain identification on pathogenic bacteria
- Initiation to handling of microorganisms of group 3
- Taxonomy of pathogenic bacteria relevant in food safety
- High Throughput Screening of filamentous fungi


CRBIP
Institut Pasteur
• Management of microbial strains in *ex situ* collections
• Strain identification
EMbaRC

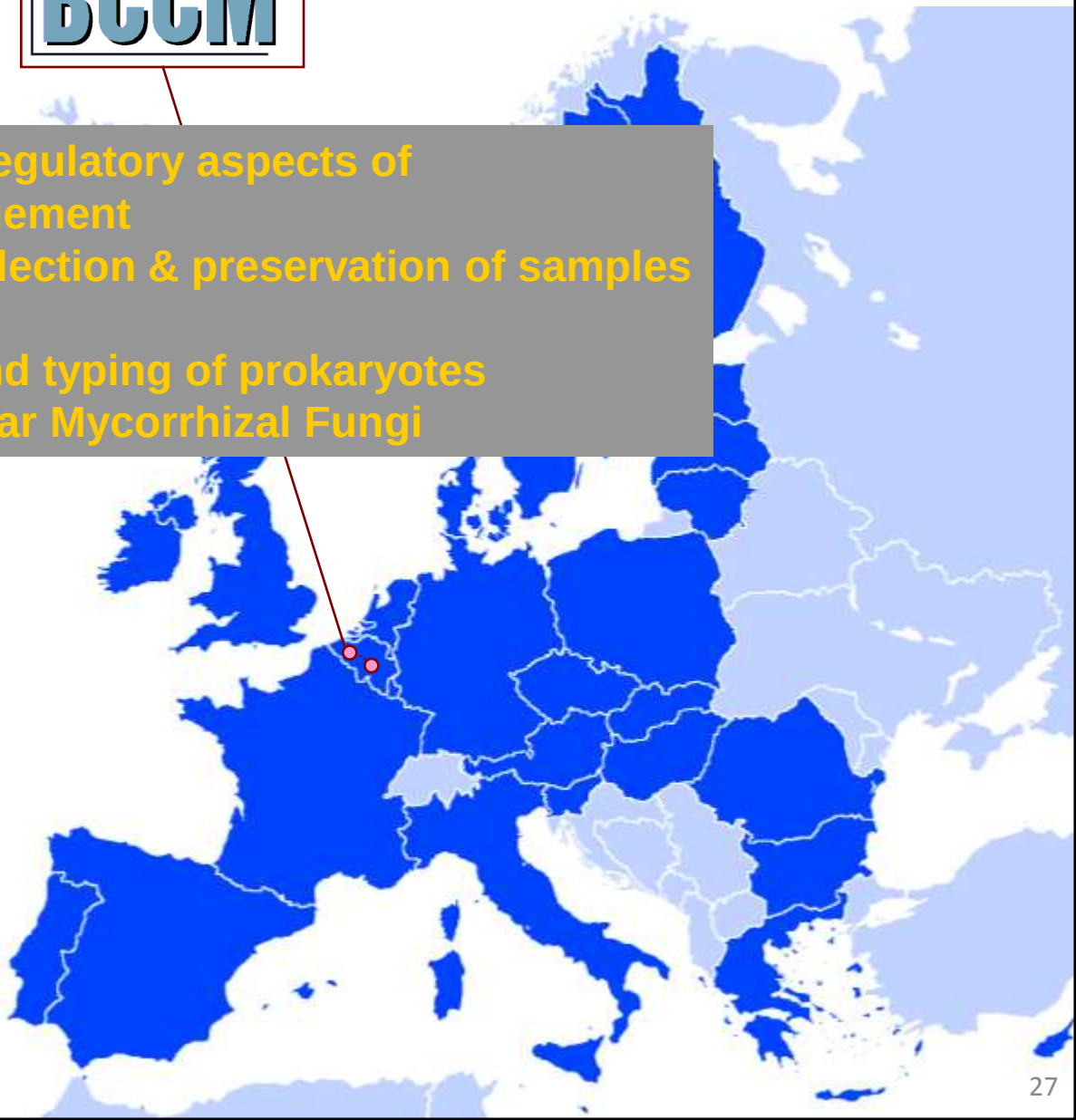
www.cabi.org

Preservation and storage of micro-organisms

EMbaRC

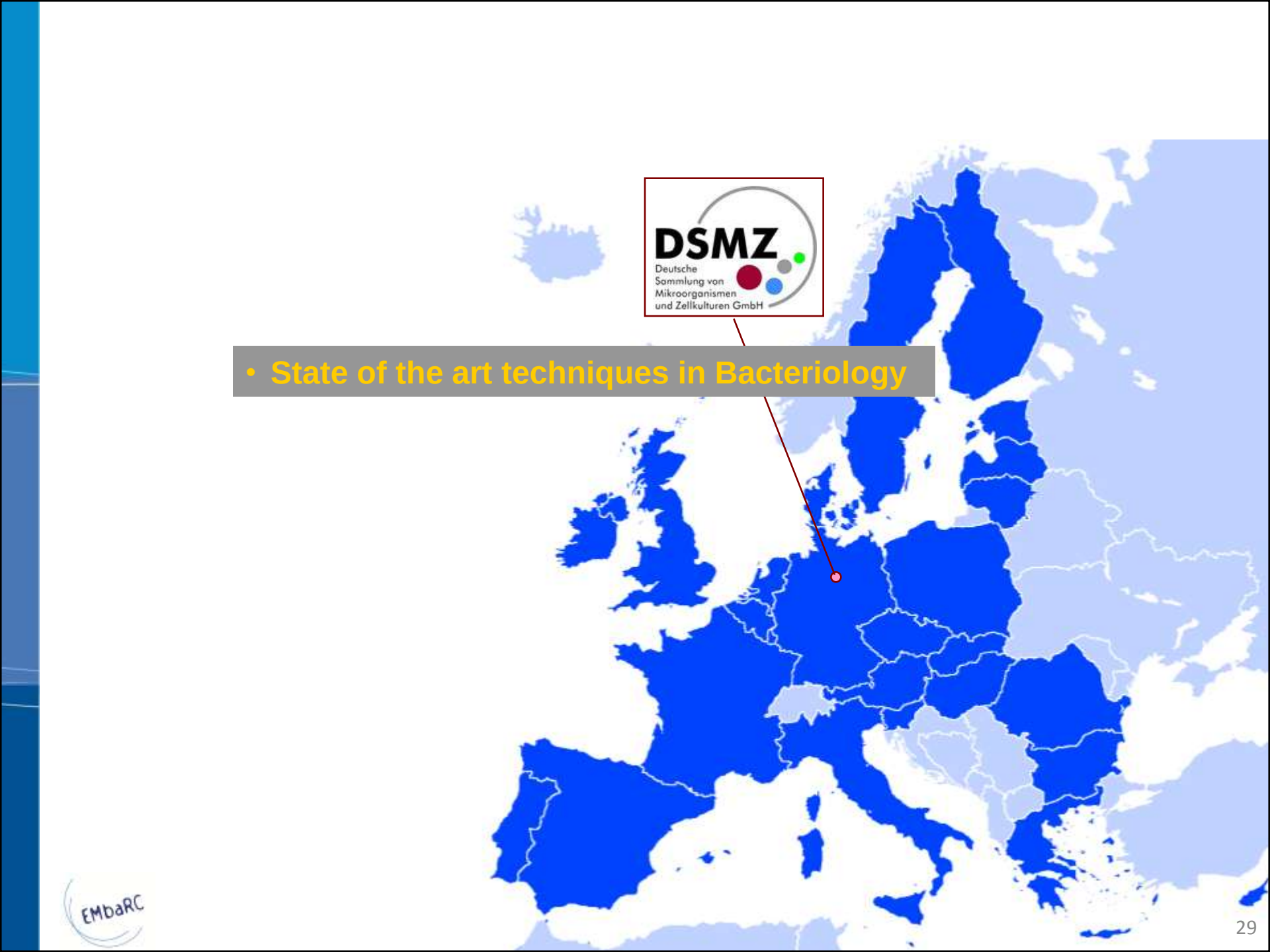
BCCM™

- Theoretical, practical and regulatory aspects of a plasmid collection management
- Operation of a bacterial collection & preservation of samples through freeze-drying
- Taxonomy, identification and typing of prokaryotes
- In vitro Culture of Arbuscular Mycorrhizal Fungi



EMbaRC

- **Preservation, collection management, databasing, identification**


DSMZ
Deutsche
Sammlung von
Mikroorganismen
und Zellkulturen GmbH
• State of the art techniques in Bacteriology
EMbaRC

Visit www.embarc.eu

All necessary information

www.embarc.eu

European Consortium of Microbial Resources Centres

- Home
- Project
- Structure
- Partners
- Events
- Information Resource
- Database access
- Access Grants

Access Grants

...for the future

EMbaRC brings together key microbial resource centres in Europe to improve, coordinate and validate microbial resource delivery to European and International researchers from both public and private sectors.

The conservation and utilisation of microorganisms aim to help deliver a knowledge-based bioeconomy

(c)CABI

Members Area

Login

Contact the Co-ordinator

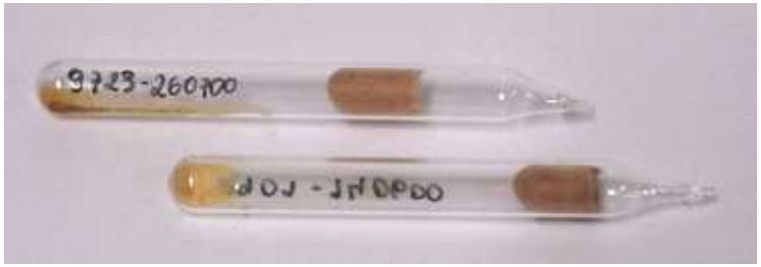
Improve and disseminate preservation techniques:

Subculture

Drying

Deep-Freeze -80 °C

Freeze-drying



Cryoperservation liquid N_2

- Why culture collections? – BRCs?
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- Example of a cc network: EMbaRC
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- **Difficulties of preservation and access**
- Future developments and plans

Freeze-drying protocol

- Culture strain to late exponential/early stationairy phase
- When enough biomass, collect cells from petri dish with cotton swab
- Create mother suspension:
  10 mg biomass/ml lyoprotectant
- Aliquote mother suspension in ampoules (200µl/ampoule, minimum 24 ampoules per test condition)
- Count amount of cfu/ml of mother suspension
- Freeze drying batches
- End controls
  - Spark coil leak test
  - Determination of residual moister conten (only at BCCM/LMG)

Freeze-drying protocol

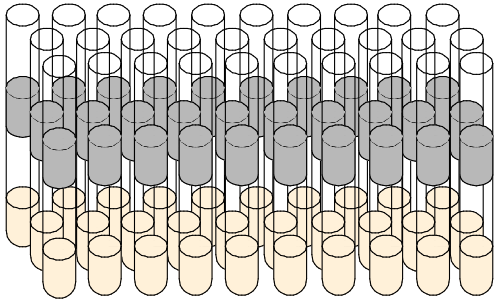
- **Storage**
  - Accelerated (14 days at 37°C) ≈ 20 years storage at 4°C
  - Protected from light and high temperature (dark, at 1<T<10°C)
- Count viable cells after storage
  - 1 week protected storage
  - 6 months protected storage
  - 12 months protected storage
  - Accelerated storage

Selected Strains

Strain	Number	Medium	T (°C)	Atmosphere	Phys. group
Aeromonas salmonicida	CECT 894^T	Nutrient Broth/AgarI (M1)	24	Aerobic	Freshwater bacteria
Vibrio agarivorans	CECT 5085^T	Marine Broth/Agar (M30)	26	Aerobic	Marine bacteria
Aliivibrio fisheri	LMG 4414^T	Marine Broth (M12)	20	Aerobic	Marine bacteria
Flavobacterium columnare	LMG 10406^T	Modified Shieh agar (M215)	25	Aerobic	Fish pathogen
Campylobacter fetus	CIP 53.96^T	Trypticase soja agar	37	Micro-aerophilic	Opp.human pathogen
Xanthomonas fragariae	DSM 3587^T	R2A Medium (M830)	28	Aerobic	Plant pathogen

Freeze drying process

Filling



Constriction

Heat sealing

Pressure:
<0,13 mbar

Prefreezing

Prefreezing: 2h at -80°C

Freeze drying

Freezing

Precooled shelf: -50°C

Primary drying

➡ Product temperature (Tp) -26°C

Secondary drying

➡ Product temperature (Tp) 20°C

36

Test conditions: example

Test condition	Incubation time		Growth medium		Cold shock	Lyoprotectans
	LMG 4414	LMG 10406	LMG 4414	LMG 10406		
batch1	3 days	4 days	M12	M215	no	Skimmed milk
batch2	3 days	4 days	**M12 + trehalose (10%)**	**M215 + trehalose (10%)**	no	Skimmed milk
batch3	3 days	4 days	M12	M215	**2h at 7°C, before filling**	Skimmed milk
batch4	**2 days**	**3 days**	M12	M215	no	Skimmed milk
batch5	**4 days**	**5 days**	M12	M215	no	Skimmed milk
batch6	3days	4 days	M12	M215	no	**Skimmed milk + trehalose (10%)**
batch7	3 days	4 days	M12	M215	no	**Skimmed milk + growth medium (1:1)**
batch8	3days	4 days	M12	M215	no	**Horse serum + trehalose (10%)**

$$\text{Survival factor (\%)} = \left[\frac{\text{LOG10 (cfu/ml) after freeze-drying}}{\text{LOG10(cfu/ml) before freeze-drying}} \right] x100$$

$$\text{Death factor (\%)} = 100 - \text{Survival factor}$$

$$\text{Death rate} = \text{LOG10(cfu/ml 1st week)} - \text{LOG10(cfu/ml accel. stor.)}$$

Survival factor within 1 week storage after freeze-drying indicates how well the organism survives the freeze- drying process (= process survival)

Death rate indicates how well the organism survives during storage after freeze-drying (= shelf life)

Conclusions:

- Preservation is taxon related
- Preservation depends on the cryprotectans used
- Preservation depends on the matrix used

- Why culture collections? – BRCs?
- Why networks of culture collections are needed?
- Example of a cc network: EMbaRC
- Difficulties of preservation and access
- **Why should nations preserve the microbial biodiversity?**
- Future developments and plans

Biodiversity, biosecurity and access (1)

- The Convention on Biological Diversity
- Bonn Guidelines on Access to genetic resources and fair and equitable sharing of the benefits arising out of their utilization
- Budapest treaty (IDA)
- Cartagena Protocol to the Convention on Biological Diversity
- Convention on International Trade in Endangered Species (CITES)
- EC Regulation 3381/94/EEC on the Control of Exports of Dual-Use Goods
- EC Directive on Legal Protection of biotechnological inventions

Biodiversity, biosecurity and access (2)

- EC Directive 90/219/EEC on the Contained use of GEMs
- EC Directive 90/220/EEC on the Deliberate Release of GEMs
- FAO International Treaty on Plant Genetic Resources for Food and Agriculture
- International Plant Protection Convention (IPPC)
- OECD Initiative on biotechnology for sustainable growth and development
- Sanitary and phytosanitary (SPS) agreement of the WTO.

Order of events (research project)

1. Positive grant evaluation
2. Preparation for a sampling trip and Prior Informed Consent (PIC)

rainforest

seabed

desert

mountains

beach

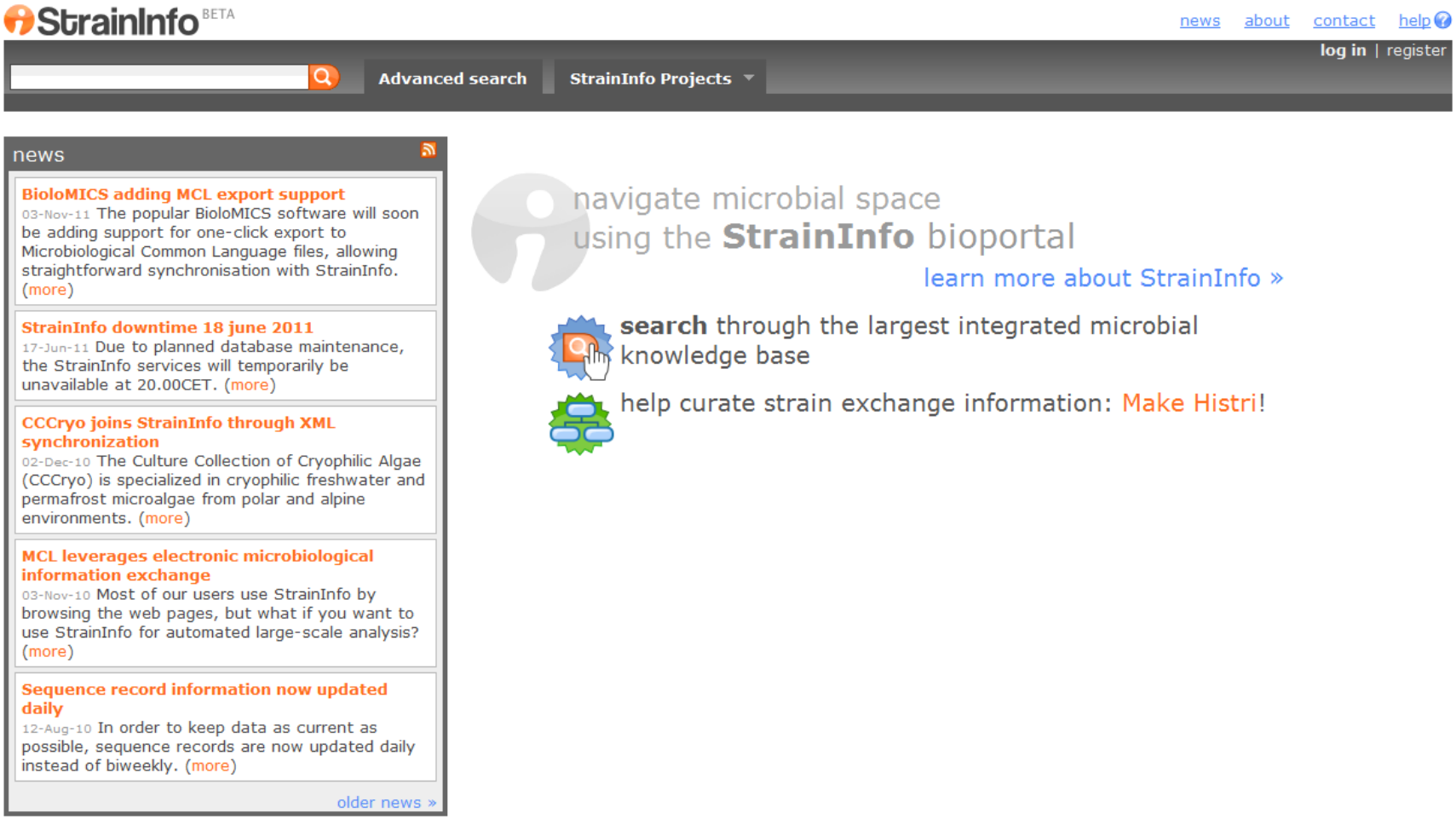
3. Return with x isolates (hundreds to thousands) or environmental samples
4. Characterization attempts (morphology, molecular)
5. Concentration on a few isolates
6. Publication(s) with rare deposition of references in CCs
7. Eventually lifelong occupation (but in most cases not)

And what happens to the rest of the isolates?
irrecoverable, high value added, high economic potential

How dramatic is the situation?

- Less than 1% of microbial biodiversity is known
- Mostly only a fraction of the overall studied isolates is available via public collections for further research.
- Less than 50% of the bacteria of which a whole genome has been reported is deposited in a public culture collection.
- Quality control (authenticity and viability) is poor for non-culture collection strains
- The cultures that are available are not easily accessed – data of public culture collections not integrated (example of the way forward is StrainInfo)

StrainInfo.net : about 60 public collections are integrated (bacteria, yeasts, fungi, micro algae)



- Searches are possible on taxon basis, on strain basis
- Taxonomy is updated (via links)
- Phylogeny (sequences) linked through EMBL
- History of strains is visualised (exchange between culture collections, or multiple deposits)
- Equivalent strainnumbers are visualised
- Direct links to the respective catalogue of culture collections
- Links to EPPO for quarantine bacteria

- **Further development is needed (MIRRI)**

StrainInfo.net : strain passport, taxon pasport, sequence passport- histry tool = history of exchange

StrainInfo BETA

news about contact help

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lmg 1794 Advanced search StrainInfo Projects

Strain Passport

LMG 1794 *Pseudomonas fluorescens*

overview

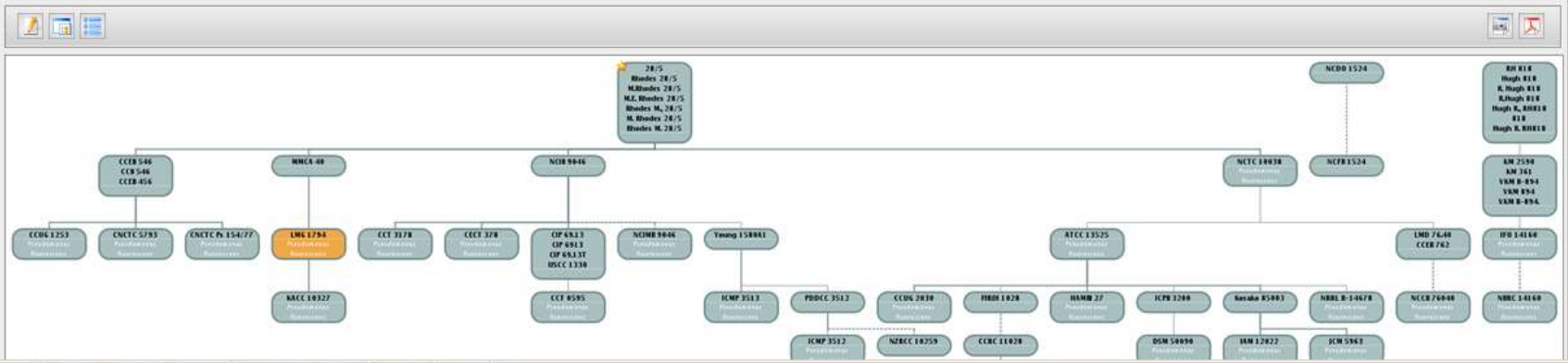
species name *Pseudomonas fluorescens*

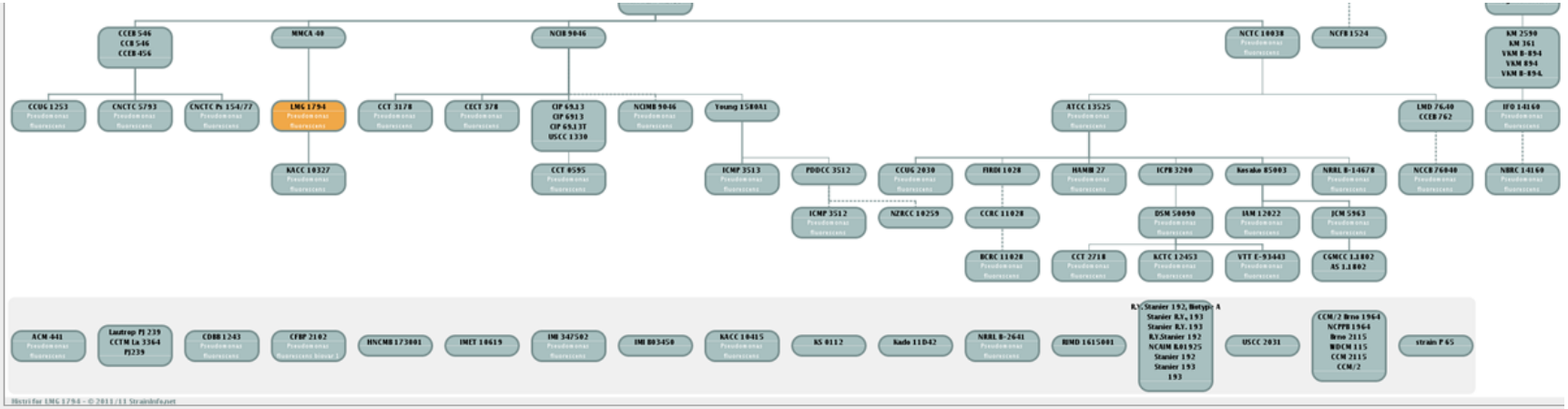
type strain of *Pseudomonas fluorescens*

strain numbers 193 T , 28/5 T , 818 T , ACM 441 T , AS 1.1802 T , ATCC 13525 T , BCRC 11028 T , Brno 2115 T , CCB 546 T , CCEB 456 T , CCEB 546 T , CCEB 762 T , CCM 2115 T , CCM/2 T , CCM/2 Brno 1964 T , CCRC 11028 T , CCT 0595 T , CCT 2718 T , CCT 3178 T , CCTM La 3364 T , CCUG 1253 T , CCUG 2030 T , CDBB 1243 T , CECT 378 T , CFBP 2102 T , CGMCC 1.1802 T , CIP 69.13 T , CIP 69.13T T , CIP 6913 T , CNCTC 5793 T , CNCTC Ps 154/77 T , DSM 50090 T , FIRDI 1028 T , HAMBI 27 T , HNCMB 173001 T , Hugh 818 T , Hugh R. RH818 T , Hugh R., RH818 T , IAM 12022 T , ICMP 3512 T , ICMP 3513 T , ICPB 3200 T , IFO (now NBRC) 14160T , IFO 14160 T , IMET 10619 T , IMI 347502 T , IMI B03450 T , JCM 5963 T , KACC 10327 T , KACC 10415 T , Kado 11D42 T , KCTC 12453 T , KM 2590 T , KM 361 T , Kosako 85003 T , KS 0112 T , Lautrop PJ 239 T , LMD 76.40 T , **LMG 1794** T , M. Rhodes 28/5 T , M.E. Rhodes 28/5 T , M.Rhodes 28/5 T , MMCA 40 T , NBRC 14160 T , NCAIM B.01925 T , NCCB 76040 T , NCDO 1524 T , NCFB 1524 T , NCIB 9046 T , NCIMB 9046 T , NCPPB 1964 T , NCTC 10038 T , NRRL B-14678 T , NRRL B-2641 T , NZRCC 10259 T , PDDCC 3512 T , PJ239 T , R. Hugh 818 T , R.Hugh 818 T , R.Y. Stanier 192, Biotype A T , R.Y.Stanier 192 T , RH 818 T , Rhodes 28/5 T , Rhodes M. 28/5 T , Rhodes M., 28/5 T , RIMD 1615001 T , Stanier 192 T , Stanier 193 T , Stanier R.Y. 193 T , Stanier R.Y., 193 T , strain P 65 T , USCC 1330 T , USCC 2031 T , VKM 894 T , VKM B-894 T , VKM B-894. T , VTT E-93443 T , WDCM 115 T , Young 1580A1 T

availability map BRC strain browser

history





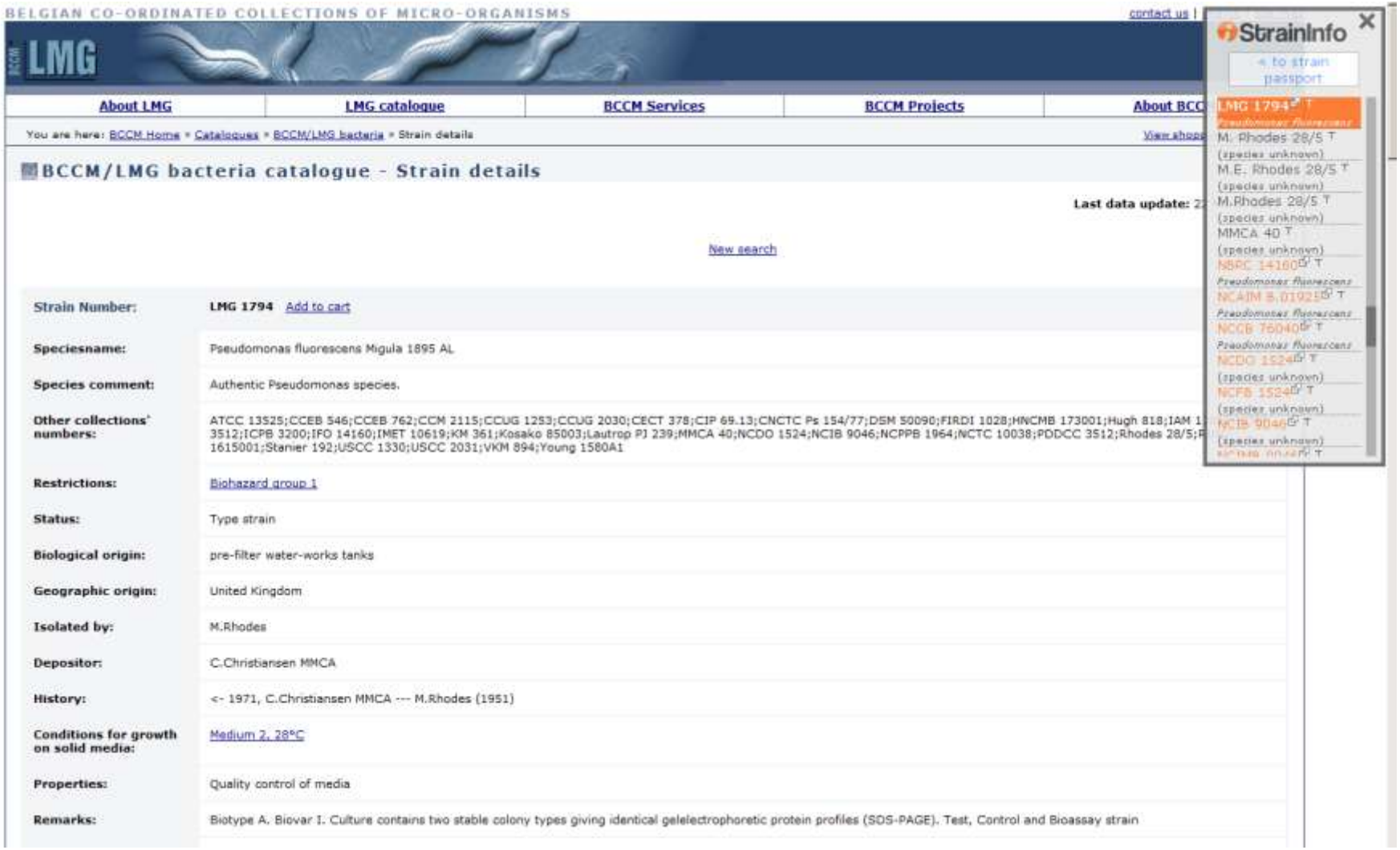
This Histri was manually curated (last saved on 2008-08-29).

sequences

73 items found, displaying 1 to 25.[First/Prev] **1**, 2, 3 [Next/Last]

accession#	description	strainnumber	date	length
JN397566	Pseudomonas fluorescens strain LMG1794 RNA polymerase subunit D (rpoD) gene, partial cds	LMG 1794 T	2011/09/22	585
JN397520	Pseudomonas fluorescens strain LMG1794 pyrroloquinoline quinone synthase (pqqC) gene, partial cds	LMG 1794 T	2011/09/06	505
JF810206	Pseudomonas fluorescens strain DSM 50090 rod shape-determining protein (mreB) gene, complete cds	DSM 50090 T	2011/08/02	1038
AB560245	Pseudomonas fluorescens gene for 30S ribosomal protein S11, complete cds, strain: NBRC 14160	NBRC 14160 T	2010/11/04	390
AB560244	Pseudomonas fluorescens gene for 30S ribosomal protein S13, complete cds, strain: NBRC 14160	NBRC 14160 T	2010/11/04	357
AB560243	Pseudomonas fluorescens gene for 50S ribosomal protein L36, complete cds, strain: NBRC 14160	NBRC 14160 T	2010/11/04	117
AB560242	Pseudomonas fluorescens gene for 50S ribosomal protein L30, complete cds, strain: NBRC 14160	NBRC 14160 T	2010/11/04	177
AB560241	Pseudomonas fluorescens gene for 50S ribosomal protein L18, complete cds, strain: NBRC 14160	NBRC 14160 T	2010/11/04	351
AB560240	Pseudomonas fluorescens gene for 30S ribosomal protein S8, complete cds, strain: NBRC 14160	NBRC 14160 T	2010/11/04	393
AB560239	Pseudomonas fluorescens gene for 30S ribosomal protein S14, complete cds, strain: NBRC 14160	NBRC 14160 T	2010/11/04	306
AB560238	Pseudomonas fluorescens gene for 50S ribosomal protein L24, complete cds, strain: NBRC 14160	NBRC 14160 T	2010/11/04	315
AB560237	Pseudomonas fluorescens gene for 50S ribosomal protein L14, complete cds, strain: NBRC 14160	NBRC 14160 T	2010/11/04	369
AB560236	Pseudomonas fluorescens gene for 30S ribosomal protein S17, complete cds, strain: NBRC 14160	NBRC 14160 T	2010/11/04	267
AB560235	Pseudomonas fluorescens gene for 50S ribosomal protein L29, complete cds, strain: NBRC 14160	NBRC 14160 T	2010/11/04	192
AB560234	Pseudomonas fluorescens gene for 50S ribosomal protein L22, complete cds, strain: NBRC 14160	NBRC 14160 T	2010/11/04	333
AB560233	Pseudomonas fluorescens gene for 30S ribosomal protein S19, complete cds, strain: NBRC 14160	NBRC 14160 T	2010/11/04	276
AB560232	Pseudomonas fluorescens gene for 50S ribosomal protein L23, complete cds, strain: NBRC 14160	NBRC 14160 T	2010/11/04	300
AB560231	Pseudomonas fluorescens gene for 30S ribosomal protein S10, complete cds, strain: NBRC 14160	NBRC 14160 T	2010/11/04	312

StrainInfo.net : simple access tool-> culture collection catalogue



BELGIAN CO-ORDINATED COLLECTIONS OF MICRO-ORGANISMS

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LMG

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You are here: BCCM Home » Catalogues » BCCM/LMG bacteria » Strain details

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BCCM/LMG bacteria catalogue - Strain details

Last data update: 2

New search

Strain Number:	**LMG 1794** Add to cart
Speciesname:	Pseudomonas fluorescens Migula 1895 AL
Species comment:	Authentic Pseudomonas species.
Other collections' numbers:	ATCC 13525;CCEB 546;CCEB 762;CCM 2115;CCUG 1253;CCUG 2030;CECT 378;CIP 69.13;CNCTC Ps 154/77;DSM 50090;FIRDI 1028;HNCMB 173001;Hugh 818;IAM 1 3512;ICPB 3200;IFO 14160;IMET 10619;KM 361;Kosako 85003;Lautrop PJ 239;MMCA 40;NCDO 1524;NCIB 9046;NCPPB 1964;NCTC 10038;PDDCC 3512;Rhodes 28/5;F 1615001;Stanier 192;USCC 1330;USCC 2031;VKM 894;Young 1580A1
Restrictions:	Biohazard group 1
Status:	Type strain
Biological origin:	pre-filter water-works tanks
Geographic origin:	United Kingdom
Isolated by:	M.Rhodes
Depositor:	C.Christiansen MMCA
History:	<- 1971, C.Christiansen MMCA --- M.Rhodes (1951)
Conditions for growth on solid media:	Medium 2, 28°C
Properties:	Quality control of media
Remarks:	Biotype A. Biovar I. Culture contains two stable colony types giving identical gelelectrophoretic protein profiles (SDS-PAGE). Test, Control and Bioassay strain

StrainInfo

« to strain passport

LMG 1794 T
Pseudomonas fluorescens
M. Rhodes 28/5 T
(species unknown)
M.E. Rhodes 28/5 T
(species unknown)
M.Rhodes 28/5 T
(species unknown)
MMCA 40 T
(species unknown)
NBRC 14160 T
Pseudomonas fluorescens
NCAIM B.01925 T
Pseudomonas fluorescens
NCCB 76040 T
Pseudomonas fluorescens
NCDO 1524 T
(species unknown)
NCFB 1524 T
(species unknown)
NCIB 9046 T
(species unknown)

Summary: evaluation by EMbaRC (1)

Collections are willing to accept more strains:

- The public European Collections investigated cover prokaryotic biodiversity from phyla to species level and individual collections offer in-depth diversity at the strain level (unparalleled in the world).
- They are experts in maintenance and taxonomy.

Authors feel no obligation to deposit non-type strains:

- A survey of 835 articles of 8 European journals included 20.200 non-type strains.
  Of these 0.9% were deposited in public collections.
- In a anonymous request to obtain strains from 100 randomly selected authors of the journals screened above, only 19% indicated their willingness to provide strains.

Summary: evaluation by EMbaRC (2)

Journals have a dissemination policy (see Instructions to Authors):

- 400 authors were asked whether they are aware of journal's policy to make strain public:

  -70% of those who responded agreed.

  -15% were actually asked to deposit strains (0.6% of strains covered).

- Why culture collections? – BRCs?
- Why networks of culture collections are needed?
- Example of a cc network: EMbaRC
- Difficulties of preservation and access
- Why should nations preserve the microbial biodiversity?
- **Future developments and plans**

Partners in a future strategy:

- **Funding bodies of researchers and authors**
  support for maintenance, taxonomy and shipping

- **Funding bodies of collections**

support for maintenance, expansion and expertise

- **Authors**

deposition of selected strains included in publications

- **Researchers**

deposition of selected authentified isolates

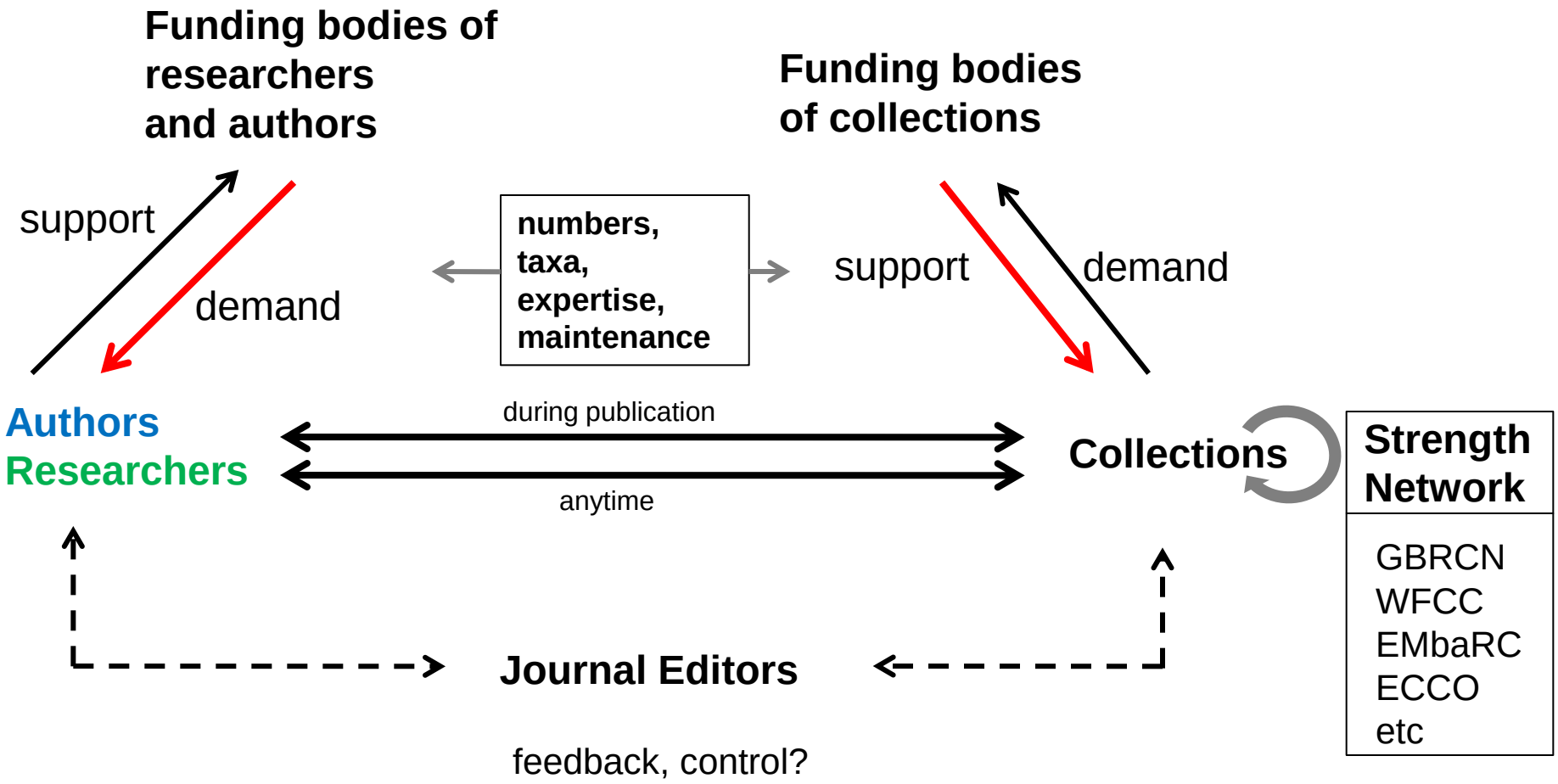
- **Collections**

national, international

- **Journal editors**

harmonized journal policy, and surveillance of deposit

Network of activities:



Future plans

1. AMBER: EU proposal submitted
= continuation of EMbaRC
inclusive viruses

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2. MIRRI: EU proposal submitted (ESFRI)

= Research infrastructure (3 phases):

- preparatory phase (2012-2015)

-construction phase (2015-2017)

- operational phase 2017- open ended)

EMbaRC@rennes.inra.fr

www.embarc.eu > Access Grants