
WDCM Training course for Microbial Data Analysis

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Teresa Lucena Reyes

CECT – UV

Universitat de València

Personal introduction

My name is Teresa Lucena; I am microbial taxonomist. Currently, I work in the Spanish Type Culture Collection CECT - UV which is located in Paterna, a city in Valencia on the east coast of Spain.

I received my B.S. of Biology in 2005 from University of Valencia, and my B.S. of Food Science and Technology from Polytechnic University of Valencia. In 2009, I received my M.D. Research in Molecular, Cellular and Genetics Biology and in 2012 the Ph.D. in Biotechnology, both from University of Valencia. The main research activity I am involved in the Spanish Type Culture Collection, is taxonomy of prokaryotes, phylogeny and preservation of marine bacteria, which includes the proposal of new species.

Mail: tlucena@cect.org or teresa.lucena@uv.es

*Culture Collection: CECT – Colección Española de Cultivos Tipo
(Spanish Type Culture Collection)*

ABSTRACT

The World Data Center for Microorganisms (WDCM) Training Course for Microbial Data Analysis, organized by World Federation for Culture Collection (WFCC) and Microbial Resource and Big Data Centre and Institute of Microbiology, Chinese Academy of Science (IMCAS), brings together researchers from ten different countries: France, Spain, Portugal, Thailand, Taiwan, New Zealand, Japan, United Kingdom, Hungary and Mongolia, with the objective of making known the Global Catalogue of Microorganisms (GCM) and the gcMeta platform. In addition, the course is a good frame to promote the collaboration between the biological resource centres and with the genome data centres.

Key words: WDCM, GCM, Genome sequencing, Type strain, Microbial Resource Centre, Culture collection of microorganisms, CECT.

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1. Brief introduction of your Culture Collection

The Spanish Type Culture Collection (CECT) is the only public Microbial Biological Resource Centre (mBRC) in Spain serving as a repository and provider of bacteria, archaea, yeast and filamentous fungi. The CECT provides microbial reference material and services related to preservation, identification and characterization of microorganisms. The CECT also makes an important task of training, consultancy and advice on aspects related to the handling and use of microbial resources.

The CECT is registered at the WDCM (number 412) and is a Member of the WFCC since 1977 and the European Culture Collections' Organization (ECCO) since 1983. The collection has grown progressively since the first edition of the Catalogue (1976), when it listed 436 strains, and currently registers over 10,000 strains (2018).

Since 1992, the CECT is the only International Depository Authority (IDA) for storing microorganisms for patent purposes in accordance with the Budapest Treaty existing in Spain.



The CECT holds the ISO 9001 certificate (2015) and complies with the Organization for Economic Co-operation and Development (OECD) Best

Practice Guidelines for BRCs; it is located in high-quality facilities at the

Scientific Park of the University of Valencia. The CECT actively participates in European and International initiatives working together with mBRCs to share good practices and experience in order to meet the demands of academic and industrial communities.

To comply with the biosafety regulations for Microbial Resource Centres the CECT has a restricted area where are located the Prokaryotes laboratory -bacteria and archaea- and Eukaryotes laboratory -filamentous fungi and yeast, the cleaning and sterilization room, culture media preparation laboratory, and freeze drying room. It is also located in this area the cold chambers: preservation of culture media, preservation of strains sensitive to freezing, preservation of users' samples (for deposit or identification) and long-term preservation of microorganisms freeze-dried or in liquid nitrogen.



At last, one room with several freezers at $-80\text{ }^{\circ}\text{C}$ as an alternative method for the preservation of microorganisms. The open access area has the offices for researchers and management / orders, the specialized laboratories: chemotaxonomy, molecular techniques and a microbiology laboratory for short stays of invited researchers.

The most effective method for microbial long term preservation is freeze drying. For this reason, most of the CECT strains are preserved by freeze drying in glass ampoules protected from light (in opaque plastic bags) at a constant temperature of 10 °C.



However, some microbial groups, like certain genera of filamentous fungi, do not resist this method. These strains are maintained active through periodical subculturing and storage at 4 °C. In addition, all the strains are kept at -80 °C as a second preservation method. Furthermore, a duplicate of the collection strains is allocated in a different facility (approximately 1 mile away of distance) in compliance with the Best Practice Guideline for Microbial Resources Centres.

The CECT shows all the information it has regarding the origin of the microorganisms, year of isolation, sampling permits, etc. on the tabs of each strain, accessible through its public catalogue. In addition, the origin and the year of isolation are indicated on the delivery note accompanying each strain.

As a Biological Resource Centre (BRC) the research lines include very broad aspects of taxonomy, preservation and identification or characterization methods of its microbial holdings. All these aspects are

present in the recent CECT research activity: Taxonomy, phylogeny and preservation of marine bacteria; Bacteria of food and agriculture interest; Application of identification methods of strains: MALDI-TOF MS and GC FAME; Study of halophilic microorganisms; Development of new presentations for the microbial genetic resources; Optimization of preservation protocols for delicate and recalcitrant strains and Exploring microbial diversity and its biotechnological potential.

Currently, the CECT has sequenced and analysed more than 100 genomes. The demand for genomic sequencing by researchers and other users is increasing progressively, both the sequencing and the analysis of the genomes. This is why the CECT offers external user service and not just as part of their routine research.

2. Benefit from the training courses

2.1. Programme

Date	Time	Lecture	Lecturer
Nov. 23	9:00-9:10	Opening remarks	Prof. Juncai Ma
	9:10-10:00	Combination of Lab & Paper work : Culture Collections' management	Prof. Philippe Desmeth
	10:00-10:20	Coffe Break	
	10:20-11:20	Genome sequencing and data analysis in Ustilaginomycotina	Prof. Qinming Wang
	14:00-15:00	Genome sequencing and genome analysis report	Prof. Bangzhuo Tong
	15:00-15:20	Coffe Break	
	15:20-16:20	Q&A	Prof. Bangzhuo Tong

Nov. 26	9:00-10:00	Introduction of INSDC, data submission and genome annotation	Prof. Yasukazu Nakamura/ Dr. Yasuhiro Tanizawa
	10:00-10:20	Coffe Break	
	10:20-11:20	Practice	Prof. Yasukazu Nakamura/ Dr. Yasuhiro Tanizawa
	14:00-15:00	The BIG Data Center: from deposition to integration to translation	Prof. Lina Ma
	15:00-15:20	Coffe Break	
	15:20-16:20	Lab visit of Beijing Institute of Genomics, Chinese Academy of Sciences	Prof. Lina Ma
Nov. 27	9:00-10:00	Genomic data analysis: Assembly and Annotation	Dr. Wenyu Shi
	10:00-10:20	Coffee Break	
	10:20-11:20	Practice	Dr. Wenyu Shi
	14:00-15:00	Microbiome statistical analysis based on Next Generation Sequencing techniques	Prof. Jun Wang
	15:00-15:20	Coffee Break	
	15:20-16:20	Practice	Prof. Jun Wang
Nov. 28	9:00-10:00	Applying advanced bioinformatics tools and machine learning to big data problems in microbiome research	Prof. Zhenjiang Xu
	10:00-10:20	Coffee Break	
	10:20-11:20	Practice	Prof. Zhenjiang Xu
	14:00-14:30	Characterization of bacterial strains for taxonomic purposes	Prof. Man Cai
	14:30-15:00	Practice	Prof. Man Cai
	15:00-15:20	Coffee Break	
	15:20-16:20	Diversity of yeast community isolated from crater lakes, plant leaves and soil, and proposal of novel species and genera	Prof. Aihua Li
Nov. 29	9:00-10:00	Bioinformatics: genome comparative analysis and genome distance calculation	Dr. Wenyu Shi
	10:00-10:20	Coffee Break	
	10:20-11:20	Practice	Dr. Wenyu Shi
	14:00-15:00	The Origin, Domestication and Genome Evolution of Saccharomyces Yeasts	Prof. Fengyan Bai
	15:00-15:20	Coffee Break	
	15:20-16:20	Droplet microfluidics for high throughput cultivation, screening and sequencing of environmental microorganisms	Prof. Wenbin Du

Nov. 30	9:00-10:00	What have we learned from Clostridium difficile? -Bioinformatics in clinical detection	Prof. Chen Chen
	10:00-10:20	Coffee Break	
	10:20-10:50	Computational design of industrial enzymes	Prof. Bian Wu
	10:50-11:30	Microbial Defence Systems: from CRISPR to More	Dr. Min Li
	14:00-15:00	WDCM data resources: Global catalogue of Microorganisms and ABC database	Prof. Linhuan Wu
	15:00-15:20	Coffee Break	
	15:20-16:20	Discussion of future cooperation	Prof. Linhuan Wu

2.2. Benefit from the training

The participation in the WDCM training course has provided me the opportunity to meet international experts related with the genome sequencing, genome analyses, microbiome analyses and with microorganism taxonomy. It has been also a great opportunity to learn some specific program platform as gcMetada which includes several tools for checking the quality of the genomes and genome analyses. It would very nice to have the same tools for fungi. I have also discovered the Global Catalogue for Microorganism and the Big Data centre of the CAS.

3.2. Suggestion on WDCM work

The CECT joined the WDCM in 1977, thus we just knew about his database and the CECT staff works with it usually. CECT holds most of the reference strains listed in the [WDCM catalogue](#). This catalogue facilitates the access to the reference strains listed by the ISO TC 34 SC 9

working groups and the Working Party on Culture Media of the International Committee on Food Microbiology and Hygiene. It would be interesting to explain to researchers, not from culture collections, that the available equivalent strains in different Culture Collections or supplied by different suppliers are uniquely identified by its WDCM code.

WDCM could establishing scientific collaborations with not only the public culture collections but with other research groups of universities that keeps their own private collections of microorganisms to increase the catalogue data and share all the information with the scientific community.

4. Comments or suggestion on the training courses

My suggestions for next courses:

- To shorten the lunch time. Two hours is too much time, normally we take one hour and it is enough.
- To program more time for practical sessions. I would like to have more interactive practice sessions with the assistance of the professors. Practical sessions for bioinformatics, metagenomics and whole genome sequence analysis.
- To include Fungi in the program. There was no information about how to assembly an annotate a fungi genome.

Finally, I would suggest to organizers to include some visits to the molecular laboratories. It would very interesting to see the sequencers

underway and learn how the results are analysed. It would be interesting to visit the China General Microbiological Culture Collection (CGMCC) too and other facilities of the Institution for Microbiology CAS.

5. Suggestion on further cooperation between WDCM and your collections

The CECT has already established a cooperation with the WDCM. This cooperation will consist in sending the DNA of several CECT type strains to the WDCM for sequencing and analysing the genomes. From this cooperation we expect from the WDCM help with the publication of the genomes in the public databases and advice with the management of the results. We hope there is a continuous flow of information and that we can publish the results in international journals.

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