***EU COST Blastocystis Action: Training School in Microbiome Data Analysis***

Keynote speakers: Graham Clark (online), Javier Del Campo, Mireia Valles-Coloomers, Rays Jiang

Lecturers/facilitators: Raul Tito-Tadeo, Yohannes Seyoum, Lee O’Brien Andersen, Javier Del Campo, Martin Kolisko, Mark van der Giezen

 Course organisers: Mark van der Giezen, Rune Stensvold, Javier Del Campo

Location: Institut de Biologia Evolutiva (CSIC - Universitat Pompeu Fabra)

CMIMA Building, Passeig Marítim de la Barceloneta 37 - 49, 08003, Barcelona, Spain

https://maps.app.goo.gl/i9RsodMJgQUUcssQ8

Next-generation sequencing methods have revolutionised our understanding of the role of microbial communities in many fields. A variety of methods have been developed to analyse and process the vast amounts of data generated by these methods. However, microbial eukaryotes have been largely ignored in these developments, despite data suggesting that these microorganisms may indeed play an important role in environments such as the human gut.

This training school aims to address this issue and provide the *Blastocystis* community with a comprehensive overview of microbiome data analysis in relation to *Blastocystis*. It is aimed at those with basic bioinformatics skills and hopes to unify our approaches so that our community can make greater strides in understanding the role of *Blastocystis* in health and disease.

Course objectives:

* Obtain insight into and knowledge of the differences between various sequencing technologies and their uses, including their advantages and disadvantages.
* Understand the difference between ASVs, OTUs, and other key terminology and concepts.
* Acquire tools to study associations between gut microbial eukaryotes and bacteria and host interactions (transdomain relationships), including R-script based analysis of diversity and taxonomic composition.

Required skills:

* Some experience with research into the role of *Blastocystis* and/or other microbial eukaryotes in health and disease.
* Basic experience using R is an advantage (participants will receive an appropriate R script in time for some practise before the course).

**Wednesday 24/04 – Meeting room: Sala d’Actes, CMIMA Building**

08:30-09.15: Arrivals and registration

09.15-09.45: Words of welcome, overview of workshop and agenda

9:45-10.45: Keynote lecture: Graham Clark

10.45-11.10: Coffee Break: Pati Besós, CMIMA Building

11.10-11.40: 1 slide – 1 min presentations by each participant (Mark van der Giezen)

*Session 1:* Introduction to amplicon sequencing analysis

11.40-12.20: Introduction to microbiome studies: Basic concepts and applications (Raul Tito-Tadeo)

12.20-13.40: Lunch (last minute software set-up check)

*Session 2:*  Data analysis basics

13.40-14.10: Fundamentals and overview of bioinformatics pipelines for amplicon sequencing data analysis (Raul Tito-Tadeo)

14.10-15.00: Hands-on session: Microbiome data analysis, tools and software (Raul Tito-Tadeo)

15.00-15.25: Coffee Break: Pati Besós, CMIMA Building

15.25-16.25: Hands-on session: Data preprocessing and quality control (Raul Tito-Tadeo)

16.25-17.00: Evaluation and wrap-up (Raul Tito-Tadeo)

**Thursday 25/04 - Meeting room: Sala d’Actes, CMIMA Building**

09.00-10.00: Keynote lecture: Mireia Valles-Coloomers

10.00-10.15: Coffee break: Pati Besós, CMIMA Building

*Session 3: Analysis and interpretation of data*

10.15-11.00 Taxonomic classifiers, principles and methods (Lee O’Brien Andersen)

11.00-12.00 Diversity analysis (alpha and beta) and statistical methods (Yohannes Seyoum)

12.00-13.00: Lunch

*Session 4: Application and case studies*

13.00-13.45: **Hands-on session**: Alpha and beta diversity analysis (Reanalysis of published data)

13.45-14.30: **Hands-on session**: Alpha and beta diversity analysis and differential abundance analysis (Reanalysis of published data)

14.30-14.45: Coffee Break: Pati Besós, CMIMA Building

14.45-15.15: (work in groups of 3) Association analysis: (Alpha and beta diversity - lefse - heatmaps – non-parametric tests – Proposal: 1,200 subject *Blastocystis* data set)

15.15-15.30: Coffee break

15.30-16.15: Outputs – figures – what are the best ways to present things – which figures are relevant – what to use? How to best display? (Javier del Campo)

16.15-17.00: Presentation by group – 10 min for each group – visualize, show and communicate your results

19:00: Keynote lecture: Javier del Campo

20:00: Dinner (ideally as a group but by EU COST rules we need to pay ourselves)

**Friday 26/04 – Meeting room: Sala d’Actes, CMIMA Building**

09.00-10:00: Keynote lecture: Diversity of anaerobic microbial eukaryotes (Martin Kolisko)

10.00-10:15: Coffee break: Pati Besós, CMIMA Building

10:15-11.00: Lecture (Javier del Campo):  introduction of PR2 and 18S using different packages

11.00-12.00: Lecture (Martin Kolisko (TBC)): Using transcriptomic and genomic approaches to study gut microbiomes and gut inhabiting eukaryotes. (Annotation: *Introduction to meta- transcriptomic and metagenomic data. Examples of use. Brief guide/overview of methods, approaches, and their known issues).*

12.00-13.00 Lunch

*Session 5: 18S rRNA amplicon sequencing and PR2 (or something like that: up to Javier)*

**Metatranscriptomics and microbial eukaryotic diversity:**

13.00-14.00: Lecture: Martin Kolisko – analysis of metatransciptomics

14.15-15.00: Experiments – Eukaryome analysis - hands-on (Javier)

15:00-15.15: Coffee break: Pati Besós, CMIMA Building

15:15-16.00: Evaluation and wrap-up

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**ADJUVANT INFORMATION**

**Places to eat close to the Institute of Evolutionary Biology**

There are many restaurants around, some of them a bit expensive. Here it is a list of some good and relatively affordable places, the more € symbols the more expensive.

**Ca La Nuri Restaurant - €€ - Mediterranean Food**

**https://maps.app.goo.gl/5oqSWBPBYjXMefCA7**

**The Room Barcelona - € - Daily Menú**

**https://maps.app.goo.gl/wEPGpM4pWWFHD5gr7**

**Marina Bay - Lounge Bar - €€ - Paella**

**https://maps.app.goo.gl/wywY2T51HhqZvHhz6**

**Forn Beltrán - € - Sandwiches (Only takeaway)**

**https://maps.app.goo.gl/itKpCPZRgTV9j3rz5**

**Bar Magatzem 03  - € - Sandwiches, Daily Menu and Tapas**

**https://maps.app.goo.gl/CXfwSmW6nPPpEVuB9**