

## THE COMPLEXITY OF LICHEN SYMBIOSIS

Lichens are complex symbiotic systems, in which coexistence occurs between several microalgal taxa and/or lineages with a single fungus -mycobiont-, displaying different tolerance patterns to multiple kinds of abiotic stress. Furthermore, certain communities of non-photosynthetic bacteria and yeasts are starting to be considered as an integral part of the lichen thalli.

Currently, interdisciplinary genomic approaches (NGS, culture isolations, multi-tool genetic analyses, etc.) have generated promising results to deal with lichen complexity and microalgae diversity. Therefore, under a new point of view lichen thalli are considered complex micro-ecosystems, which arise further questions on many of the biochemical and cellular mechanisms of the microalgae involved in the functional equilibrium of lichen symbioses.

This meeting is dedicated to discussing and clarifying to the better of our knowledge the complex interactions that uphold lichen symbiosis, through the characterization of different aspects of biology and phylogenetic relationships within the symbionts.

International outstanding attendees experienced in different research field of lichen symbiosis will present and discuss their novel results. A DEMO training session will be dedicated to explain / teach some biogeographical and phylogenetic tools in an informatics room. At the same time, this unique meeting will give the opportunity to both strengthen present cooperation and establish new ones for the compilation of future research proposals.

This interdisciplinary meeting is open to master and doctoral students, post doctoral fellows, lecturers, etc., both directly related and not to researches in lichen symbiosis.

**There will be no meeting fees.**

The Faculties of Biological Sciences and Mathematics will provide the venue and informatics facilities. The Institute Cavanilles of Biodiversity and Evolutionary Biology (ICBIBE) and the Department of Botany and Geology will provide lab facilities and other seminar rooms for any additional needs during the workshop.

## SPONSORS



ICBIBE  
Institut Universitari Cavanilles  
de Biodiversitat i Biologia Evolutiva



## THE COMPLEXITY OF LICHEN SYMBIOSIS: Novel interdisciplinary approaches from genomic to functional perspectives



Antoni Pitxot  
Autoretrat amb licorelles, 1974

**3-4**  
DECEMBER  
**2018**

**OPEN TO ALL:  
REGISTRATION FREE**

FOR MORE INFORMATION  
<http://symbiolichen.blogs.uv.es/december-2018/>

REGISTRATION  
[liquenologiauv@gmail.com](mailto:liquenologiauv@gmail.com)

## VENUE

Lectures at the Degree Seminar room in the Mathematics Faculty. The Informatics room 4B at the Faculty of Biological Sciences, 46100- Burjassot, C/ Dr. Moliner 50 (see maps below).

Website: <http://symbiolichen.blogs.uv.es/>

The venue can be easily reached by 15-20 min from the city centre (Bus line n.63), or from the underground/tram stations.

## HOTSPOTS AT THE UNIVERSITY



DISEÑO [www.calido.es](http://www.calido.es)

## SPEAKERS

**Pavel Škaloud & Jana Steinová**  
Charles University in Prague,  
Czech Republic

**Francesco Dal Grande**  
Senckenberg Biodiversität und  
Klima - Forschungszentrum |  
BIK-F, Goethe-Universität,  
Germany

**Tomislav Cernava**  
Graz University of Technology,  
Institute of Environmental  
Biotechnology, Austria

**Lucia Muggia**  
Università di Trieste,  
Department of Life Sciences,  
Italy

**Florian Mundt**  
University of Hamburg,  
Scientific Computing,  
Bremerhaven, Germany

**Pradeep Divakar**  
Universidad Complutense  
de Madrid, Biología Vegetal II,  
Spain

**Sergio Pérez-Ortega & Isaac Garrido-Benavent**  
Real Jardín Botánico de  
Madrid, CSIC, Spain

**Eva Barreno & Pedro Carrasco & Francisco Marco & Patricia Moya**  
Universitat de València,  
ICBIBE & BIOTECMED, Spain

**Alfonso Garmendia**  
Universidad Politécnica de  
Valencia, Ecosistemas  
agroforestales, Spain

**Myriam Catalá**  
Universidad Rey Juan Carlos,  
Biodiversidad y Conservación,  
Spain

## ORGANIZERS

**Eva Barreno**  
**Pedro Carrasco**  
**Francisco García-Breijo**  
**Francisco Marco**  
**Patricia Moya**  
**Salvador Chiva**

“Symbiosis diversity and evolution of lichens and plants: biotechnology and innovation”  
UVEG/team  
“Plant Biodiversity - Ecophysiology team”

**Universitat de València,  
Campus de Burjassot  
VALENCIA  
SPAIN**

## THE PROGRAM

3-12-2018

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|---------------|---|
| 9:15 - 9:30   | <b>REGISTRATION</b>   |
| 9:30 - 10:00  | <b>WELCOME ADDRESS</b>  |
| 10:00 - 10:30 | <b>Pavel Škaloud, Zuzana Vaiglová, Jana Steinová, Ivana Ernajová, Patricia Moya, Helena Bestová &amp; Ondrej Peksa</b><br>“The <i>Primus</i> project - towards understanding the nature of lichen symbiosis”  |
| 10:30 - 11:00 | <b>Francesco Dal Grande, Anjuli Calchera &amp; Imke Schmitt</b><br>“High-throughput sequencing of lichen photobionts: from species to communities”  |
| 11:00 - 11:30 | <b>Tomislav Cernava, Martin Grube &amp; Gabriele Berg</b><br>“Recent insights into the functioning of lichen-associated bacterial communities”  |
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| 11:30 - 12:00 | <b>COFFEE-BREAK</b>   |
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| 12:00 - 12:30 | <b>Sergio Pérez-Ortega, Alejandro Berlinches &amp; Asunción de los Ríos</b><br>“Invariant network properties shape the relationships between lichen-forming fungi and their photobionts”  |
| 12:30 - 13:00 | <b>Patricia Moya, Arantzazu Molins, Lucia Muggia &amp; Eva Barreno</b><br>“Illumina assay reveals habitat/ location as the main factor influencing microalgal diversity in <i>Ramalina farinacea</i> ”  |
| 13:00 - 13:30 | <b>Lucia Muggia</b><br>“Culture approaches in the study of lichen symbiosis”  |
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| 13:30 - 15:00 | <b>LUNCH TIME</b>   |
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| 15:00 - 15:30 | <b>Florian Mundt, Dieter Hanelt, Lars Harms &amp; Sandra Heinrich</b><br>“Shedding light on the dark - Linking physiology and gene expression in <i>Cosmarium crenatum</i> under the influence of polar night”  |
| 15:30 - 16:00 | <b>Ernesto Hinojosa- Vidal, Francisco Marco, Fernando Martínez-Alberola, Francisco J. Escaray, Francisco J. García-Breijo, José Reig-Armiñana, Pedro Carrasco &amp; Eva Barreno</b><br>“Characterization of the responses to saline stress in symbiotic green microalga <i>Trebouxia</i> sp. TR9” |

3-12-2018

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| 16:00 - 16:30    | <b>Myriam Catalá, Joana Remedios Expósito, María Rosa de las Heras González, Alba Casillas, Lina Ben Oukhiye, Paula Herrero &amp; Eva Barreno</b><br>“Advances in the study of the role of NO in lichen phycobionts adaptation to anhydrobiosis and other interesting topics” |
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| 16:30 - 17:00    | <b>COFFEE-BREAK</b>   |
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| 17:00 - 17:30    | <b>Salvador Chiva, Patricia Moya, Arantzazu Molins &amp; Eva Barreno</b><br>“Biological Soil Crusts: myco/phycobiont relationships in terricolous lichen communities”   |
| 17:30 - 18:00    | <b>Tomislav Cervana, Martin Grube &amp; Gabriele Berg</b><br>“Persistence of the lichen microbiome under unfavorable environmental conditions”  |
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| 18:00 - 19:00    | <b>RESEARCH PROJECTS DISCUSSION</b>   |
| 20:00            | <b>DINNER IN VALENCIA CITY</b>  |
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| <p>4-12-2018</p> |   |
| <hr/>            |   |
| 9:30 - 10:00     | <b>Ernesto Hinojosa- Vidal, Francisco Marco, Fernando Martínez-Alberola, Pedro Carrasco &amp; Eva Barreno</b><br>“The genome of <i>Trebouxia</i> sp. TR9. How we have improved its assembly and which new insights have emerged from its annotation”                          |
| 10:00 - 10:30    | <b>Pradeep Divakar</b><br>“Larger genome size of mitochondria in mutualistic fungi and its role to maintain obligate mutualistic relations”   |
| 10:30 - 11:00    | <b>Jana Steinová</b><br>“Do reproductive and dispersal strategies shape the diversity of mycobiont-photobiont association in lichens?”  |
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| 11:00 - 12:00    | <b>DISCUSSION &amp; COFFEE-BREAK</b>  |
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4-12-2018

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| 12:00 - 12:30 | <b>Francisco J. García-Breijo, Alfonso Garmendia, José Reig-Armiñana, Patricia Moya, Arantzazu Molins, Salvador Chiva &amp; Eva Barreno</b><br>“Towards a new proposal on the ultrastructural taxonomy of <i>Trebouxia</i> microalgae”  |
| 12:30 - 13:00 | <b>Pavel Škaloud, Veronica Malavasi, Fabio Rindi, Sabrina Tempesta, Michela Paoletti &amp; Marcella Pasqualetti</b><br>“DNA-based taxonomy in ecologically versatile microalgae: a re-evaluation of the species concept within the coccoid green algal genus <i>Coccomyxa</i> ”   |
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| 13:00 - 15:00 | <b>LUNCH TIME</b>   |
| <hr/>         |   |
| 15:00 - 19:00 | <b>PRACTICAL ANALYSIS TOOLS</b><br><b>Francesco Dal Grande</b><br>“Introduction to the assembly, taxonomic binning of mycobiont-photobiont-bacteria components and functional characterisation of metagenomic reads from whole lichen thalli”<br><b>Pavel Škaloud</b><br>“Species delimitation and speciation analyses in R”<br><b>Isaac Garrido-Benavent</b><br>“An integrative analytical approach for phylogeographic studies” |