

MICROBIAL STRESS 2023

19-21 September | Vienna, Austria



The 6th meeting on Microbial Responses to Stress - Microbial Stress 2023 was held at TU Wien, Vienna, Austria on 18-21 September 2023. The event, organized by the Microbial Biotechnology Division of the European Federation of Biotechnology, attracted 100 biotechnologists from 26 countries.

The topics included:

- Molecular mechanisms of stress to low pH
- Understanding and exploiting the impacts of low pH on micro-organisms
- Microbial stress in bioproduction systems
- Plant microbe interactions and soil microorganisms
- Stresses associated with human microbe interaction
- Challenges to microbial life in the natural environment
- Molecular mechanisms of stress.

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Scientific Programme

Tuesday, 19 September 2023

12:30 – 13:30 *Registration*

Opening Session

Chairs: **Matthias Steiger** and **Stefan Plügl**, TU Wien, Austria

13:30 -13:40 Welcome announcements

13:40 – 14:00 Environmental conditions define the energetics of bacterial dormancy and its antibiotic susceptibility

Teuta Pilizota, University of Edinburgh, United Kingdom

Session 1: Molecular mechanisms of stress to low pH - from mechanisms to applications

Co-organiser:

Chairs:



Aricia Possas, University of Córdoba, Spain

Aleksandra Djukić-Vuković, University of Belgrade, Serbia

14:00 – 14:30 Transposon-directed insertion sequencing (TraDIS) can deepen our understanding of microbial stress responses

Peter Lund, University of Birmingham, United Kingdom

14:30 – 15:00 New insights into mechanisms of acid resistance in *Listeria monocytogenes* using comparative genomics

Conor O'Byrne, University of Galway, Ireland

15:00 – 15:15 Effect of low pH in the denitrification pathway and nitrous oxide reductase from *Marinobacter hydrocarbonoclasticus*

Sofia R. Pauleta, Microbial Stress Lab, NOVA University Lisbon, Portugal

15:15 – 15:30 Agri-food industry wastes as substrates for lactic acid production – an overview of different strategies

Aleksandra Djukić- Vuković, University of Belgrade, Serbia

15:30 – 16:30 *Coffee break and exhibition*

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Tuesday, 19 September 2023

Session 2: Understanding and exploiting the impacts of low pH on micro-organisms

Co-organiser:



EuroMicroPH

Chair:

Ricardo Santos, University of Lisboa, Portugal

- 16:30 – 17:00 Transporters involved in yeast pH and cation homeostases
Hana Sychrová, Institute of Physiology of the Czech Academy of Sciences, Czech Republic
- 17:00 – 17:15 The V-shaped structuring facilitates the biofilm developmental process during acid stress adaptation of *L. plantarum*
Athira Venugopal, The Hebrew University of Jerusalem, Israel
- 17:15 – 17:30 Landscape of expertise and collaborative opportunities from EuroMicroPH network dashboard
Immanuel Sanka, Tallinn University of Technology, Estonia
- 17:30 – 18:00 Low pH responses in micro-organisms: sharing knowledge and community building
Daniela De Biase, Sapienza University of Rome, Italy
- 18:00 End of EuroMicroPH Open Meeting
- 18:00 – 18:30 Poster flash talks (odd numbers, see list on page 9)
Chair: **Karen Trchounian**, Yerevan State University, Armenia
- 18:30 – 22:00 Poster session A (odd numbers)

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Wednesday, 20 September 2023

Session 3: Microbial stress in bioproduction systems (I)

Sponsor:



Chair:

Paola Branduardi, University of Milan - Bicocca, Italy

9:00 – 9:30

Understanding solvent-tolerance of *Pseudomonas taiwanensis* in the context of biotechnological production of aromatics

Nick Wierckx, Forschungszentrum Jülich, Germany

9:30 – 9:50

Combined sensor-based monitoring of oxidative stress and DNA-damage response in *Corynebacterium glutamicum*

Gerd Seibold, Technical University of Denmark, DTU Bioengineering, Denmark

9:50 – 10:10

The role of magnetosomes in the protection against accumulation of intracellular reactive oxygen species in magnetotactic bacteria

Marta Maso Martinez, Aston University, United Kingdom

10:10 – 10:30

Silver nanoparticle production as an adaptation mechanism in freshwater environment

Jana Sedláková, University of St. Cyril and Methodius, Slovakia

10:30 – 11:00

Coffee break and exhibition

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Wednesday, 20 September 2023

Session 4: Plant microbe interactions and soil microorganisms

Sponsor:



Federation of European
Microbiological Societies

Chair:

Diethard Mattanovich, BOKU, Austria

- 11:00 – 11:30 Networks elucidate microbiome instability under stress and identify keystone microbes driving biodiversity and community assembly
Michelle Afkhami, University of Miami, United States
- 11:30 – 11:50 A sustainable agricultural strategy to mitigate drought stress by utilizing exopolysaccharides-producing plant growth-promoting bacteria
Nur Ajjah, Institute of Microbiology, Faculty of biology, Uniwersytet Warszawski, Poland
- 11:50 – 12:10 High CO₂-stressed cyanobacteria accumulate acidic EPS, which can efficiently restore degraded soil
Nina Kamennaya, French Associates Institute for Agriculture and Biotechnology, The Jacob Blaustein Institutes for Desert Research, Ben-Gurion University of the Negev, Israel
- 12:10 – 12:30 The negative effect of soil micro-polyethylene accumulation on plant growth and root-associated microbial communities
Wout Yi Moe Oo, The Jacob Blaustein Institutes for Desert Research, Ben-Gurion University of the Negev, Sde Boker Campus, Israel
- 12:30 – 14:00 *Lunch break and exhibition*

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Wednesday, 20 September 2023

Session 5: Stresses associated with human microbe interaction

Sponsor:



Chair:

Sofia R. Pauleta, Microbial Stress Lab, NOVA University Lisbon, Portugal

14:00 – 14:30

Antimicrobial resistance and environmental stressors: the One-Health perspective

Julia Vierheilig, TU Wien, Austria

14:30 – 14:50

Manganese uptake mediated by the NRAMP-type transporter MntH is required for acid tolerance in *Listeria monocytogenes*

Jialun Wu, University of Galway, Ireland

14:50 – 15:10

The transmissible Locus of Stress Tolerance contributes to heat and oxidative stress tolerance while reducing desiccation tolerance by disaggregating proteins

David Simpson, University of Alberta, Canada

15:10 – 15:30

Control of fungal stress response networks: alternative splicing and prion proteins (*online presentation*)

João Neves-Da-Rocha, University of São Paulo, Brazil, Brazil

15:30 – 16:30

Coffee break and exhibition

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Wednesday, 20 September 2023

Session 6: Challenges to microbial life in the natural environment: adaptation and evolution

Chair: **Peter Lund**, University Birmingham, United Kingdom

- 16:30 – 17:00 Microbial life in extreme environments and interactions with the geosphere
Donato Giovannelli, University of Naples Federico II, Italy
- 17:00 – 17:20 CRISPR interference screens reveal trade-offs between growth rate and robustness
Michael Jahn, Max-Planck-Unit for the Science of Pathogens, Germany
- 17:20 – 17:40 Can TraDIS predict the evolution of adaptations to stress?
Mathew Milner, University of Birmingham, United Kingdom
- 17:40 - 18:00 Mitigating the trade-off between growth and stress resistance based on a cell-machine interface provide new insights into the role of phenotypic diversification
Mathéo Delvenne, Université de Liège - Gembloux Agro-Bio Tech, Belgium
- 18:00 – 18:30 Flash poster talks (even numbers, see list on page 10)
Chair: **Karen Trchounian**, Yerevan State University, Armenia
- 18:30 – 22:00 Poster session B (even numbers)

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Thursday, 21 September 2023

Session 7: Microbial stress in bioproduction systems (II)

Sponsor:

Jungbunzlauer

Chair:

John Morrissey, University College of Cork, Ireland

9:00 – 9:30

Limits of metabolism at the thermodynamic edge of life

Kaspar Valgepea, University of Tartu, Estonia

9:30 – 9:50

Adaptive laboratory evolution as a successful strategy to enhance the growth of *Clostridium carboxidivorans* on CO₂ and H₂

Valeria Agostino, Istituto Italiano di Tecnologia-CSFT@Torino, Italy

9:50 – 10:10

In vivo monitoring of reactive oxygen species in the yeast *Komagataella phaffii* using a genetically encoded fluorescent H₂O₂ biosensor

Victor Mendes Honorato, Universität für Bodenkultur, Austria

10:10 – 10:30

Unveiling *Pseudomonas*' enzymatic toolbox for 5-(hydroxymethyl)furfural (HMF) detoxification: towards accelerated 2,5-furandicarboxylic acid (FDCA) production

Thorsten Lechtenberg, Forschungszentrum Jülich, Germany

10:30 – 11:00

Coffee break and exhibition

Session 8: Molecular mechanisms of stress

Sponsor:



Chair:

Daniela De Biase, Sapienza University of Rome, Italy

11:00 – 11:30

Evolution targets two regulators of pH homeostasis, respiratory complex I and glutamate: GABA antiporter GadC, with alleles that lead to cytoplasmic acidification and hyper antibiotic tolerance

Bram Van den Bergh, KU Leuven, Belgium

11:30 – 11:50

Role of reducing power and nutrients in tuning a one-component system in *P. aeruginosa* biofilm maintenance

Serena Rinaldo, Dept. of Biochemical Sciences Sapienza University of Rome, Italy

11:50 – 12:10

Bacillus subtilis stress response mechanisms in response to nutrient limitation and competition with *Salmonella enterica* serovar Typhimurium

Eli Podnar, University of Ljubljana, Biotechnical Faculty, Slovenia

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12:10 – 12:30

Multimics approach to study cold stress response of postharvest
phytopathogenic fungi

Carmit Ziv, Agricultural Research Organization Volcani Center, Israel

Thursday, 21 September 2023

Closing Session

Chairs: **Matthias Steiger** and **Stefan Pflügl**, TU Wien, Austria

12:30 – 13:30

Closing the meeting

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List of flash poster presentations

Poster flash talks I (odd numbers), Tuesday, 19 September 2023, 18:00-18:30	
1	Crosstalk between stress sensing and nutrients availability signalling pathways in <i>Saccharomyces cerevisiae</i> , Riccardo Milanesi , University of Milano-Bicocca, Italy
3	Population heterogeneities in induced microbial continuous cultivation, Julian Kopp , TU Wien/Institute of Chemical, Environmental and Bioscience Engineering, Austria
5	Adaptative laboratory evolution of <i>Yarrowia lipolytica</i> revealed key genes and pathways involved in long SCFAs assimilation and lipid production, Sergio Morales Palomo , IMDEA Energy, Spain
7	Antimicrobial activity of <i>Catha edulis</i> leaves extracts and its endophytes against soil bacteria, Yoram Shotland , Shamoon College of Engineering, Israel
9	Physiological response to osmotic stress in <i>H. litoralis</i> as a blueprint for exploring the novel genus of <i>Halopseudomonas</i> , Luzie Kruse , Heinrich Heine University Duesseldorf, Germany
11	Stimulation by stress - a closer look into nanomaterial-bacteria interactions, Adrian Augustyniak , University of Szczecin, Poland
13	Unravelling plant-bacteria interactions in MCPA-contaminated soils, Elzbieta Mierzejewska-Sinner , University of Lodz, Poland
15	Lactic acid modulates oxidative stress response to VBNC state in <i>Listeria innocua</i> challenged by nature-based antimicrobial formulation, Esther Mwangi , Hebrew University of Jerusalem, Israel
17	Proteomic and morphological insights into the exposure of soil bacteria to aluminium, Nissem Abdeljelil , Faculty of Science, Mons University, Belgium
19	Styrene production in <i>Pseudomonas taiwanensis</i> by <i>de novo</i> synthesis from glucose and biotransformation from trans-cinnamic acid, Jakob Rönitz , Forschungszentrum Jülich GmbH, Germany
21	Recovering the robustness of an impaired yeast strain through laboratory evolution, Nathália Vilela , Chalmers University, Sweden
23	<i>Presentation cancelled</i>

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Poster flash talks II (even numbers), Wednesday, 20 September 2023, 18:00-18:30

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| 2 | Exploring strategies for pushing methanogenic consortia from underground reservoirs, Arianna Vizzarro , Politecnico di Torino, Italy |
| 4 | Wood-decay fungal interactions include responses to oxidative, metabolite and acidic stress, Taina Lundell , University of Helsinki, Finland |
| 6 | Genetic heterogeneity of <i>Escherichia coli</i> Nissle 1917 strains during simulated long-term fermentations, Lara Pauline Munkler , DTU: Novo Nordisk Foundation Center for Biosustainability, Denmark |
| 8 | Physiological responses of cyanobacteria to excess CO ₂ , May Barani Maung , Bengurion University of the Negev, Israel |
| 10 | Grafting the ribulose monophosphate pathway into <i>Komagataella phaffii</i> for Increasing energy efficiency on methanol, Miriam Kuzman , acib - Austrian Centre of Industrial Biotechnology, Austria |
| 12 | Harnessing <i>E. coli</i> for microbial casein production, Anna Maria Erian , Fermify, Austria |
| 14 | Impact of low-frequency electromagnetic stress on yeast <i>Saccharomyces cerevisiae</i> growth, Miroslava Sincak , University of Ss. Cyril and Methodius in Trnava, Slovakia |
| 16 | The effect of pH on <i>Metschnikowia pulcherrima</i> antagonistic properties, João Sousa , University of Trás-os-Montes and Alto Douro, Portugal |
| 18 | Ectomycorrhizal fungi as a reservoir of peroxidase genes, Bohuš Kubala , Institute of Molecular Biology SAS, Slovakia |
| 20 | Evaluation of dihydroxyacetone as an alternative carbon source for citric acid production by <i>Aspergillus niger</i> , Elena Ortiz Perez , ACIB Vienna, Austria |
| 22 | Flow cytometry as a technique for testing stress in bacteria induced by nanomaterials, Kamila Dubrowska , West Pomeranian University of Technology in Szczecin, Poland |
| 24 | Gotta catch'em all - wide stress response elicited in budding yeast by purine starvation, Zane Ozoliņa , University of Latvia, Institute of Microbiology and Biotechnology, Latvia |