

## HOUSEWARMING FOR ALLEN AND HELLMICH LABS



The Microverse Cluster celebrated two of our Microverse professors on a beautiful Friday afternoon in May. Professors Ute Hellmich and Rosalind Allen, whose official welcome was delayed due to the pandemic, invited fellow scientists from around Jena to a festive lunch and tours of their laboratories in the BioInstrumentezentrum. Welcoming words by Microverse spokesperson Kirsten Küsel were followed by insights from Hellmich and Allen. It was a great possibility for local scientists to come together and get to know the new Microverse research groups.

## PAPER HIGHLIGHT: RECONSTITUTION OF STONE AGE MOLECULES

Cluster members Christina Warinner and Pierre Stallforth led an ambitious Microverse-facilitated collaboration between archeologists, bioinformaticians, molecular biologists, and chemists to overcome technological and disciplinary barriers and break new scientific ground, the results of which were published last month in [Science](#).

“By working collaboratively, we were able to develop the technologies needed to recreate molecules produced a hundred thousand years ago,” says Warinner.

The team reconstructed bacterial genomes encased within dental calculus, also known as tooth tartar, from 12 Neanderthals dating to ca. 100,000–40,000 years ago, 34 archaeological humans dating to ca. 30,000–150 years ago, and 18 present-day humans. Following, the tools of synthetic molecular biotechnology were employed to allow living bacteria to produce the chemicals encoded by the ancient genes. Looking to the future, the team hopes to use the technique to find new antibiotics.



Quelle: Werner Siemens-Stiftung, Felix Wey

## BOOK CLUB SCIENCE MEETS SOCIETY



Our „klein aber fein“ and family friendly Science Meets Society discussion in May tackled issues of nature conservancy in low-income nations, as discussed [in this article](#) in Die Zeit, and using land in North Africa to generate electricity for Europe, [as written about here](#). We thank the Haus auf der Mauer for hosting us this time! You can find information about past SMS events on our website, and all are invited to our next discussion on September 14<sup>th</sup> at the nucleus canteen.

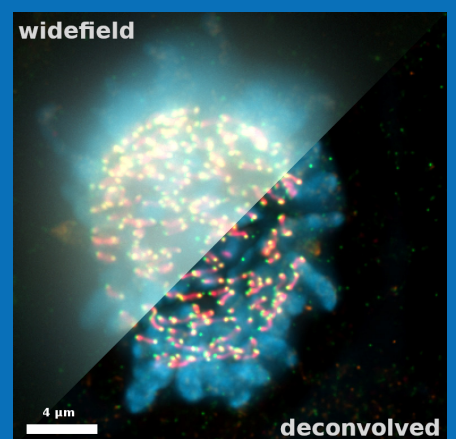
## NEWS FROM THE MICROVERSE IMAGING CENTER

The team of the MIC is happy to announce that they now have one of the leading deconvolution software suites available for our users!

With the Huygens microscope image processing package, you can use powerful and state-of-the-art deconvolution algorithms to further improve the quality of your microscopy images from different modalities (widefield, confocal, STED) by enhancing contrast and details and reducing background. Furthermore, Huygens offers easy-to-use wizards and batch processing, as well as various options for data analysis and display.

On June 2<sup>nd</sup> from 10 am -12:30 pm there will be an online workshop by SVI where you can learn more about Huygens and how it can help you in your research!

Questions? Contact us at our new address: [microscopy@microverse-cluster.de](mailto:microscopy@microverse-cluster.de)



Fluorescently labeled U2OS cells, before and after deconvolution with Huygens © SVI.nl

## UPCOMING EVENTS

### June 12<sup>th</sup>, 13:00-14:15 : Jena Excellence in Microbiology Seminar

“Diving into the deep: Elucidating mysteries of the groundwater microbiome“ by Kirsten Küsel  
Seminar Room Koch & Pasteur, Building A8 at Leibniz-HKI

### June 21<sup>st</sup>, 13:00-14:15: Microverse Guest Seminar

“Investigations into the mode of action of novel bacterial-elicited antifungal effectors“ by Janet Quinn  
Seminar Room Pasteur, Building A8 at Leibniz-HKI

### June 30, 15:30-19:00 : JSMC/ILRS Alumni Meeting

Online networking event for current and former members of the JSMC and ILRS. [More information](#)

### July 5, 17:00-18:00 : MiCoCo stars

“Natural products from interacting microorganisms and ancient microbiomes“ by Pierre Stallforth followed by a BBQ for JSMC members. [More information](#)

## NEW PUBLICATIONS

### Biofilm formation in Gram-positives as an answer to combined salt and metal stress

Erika Kothe and colleagues | Journal of Basic Microbiology | 15 May 2023

This study shows that biofilms in a structured environment such as soil will contribute to the water purification when water passes through the critical zone of soil, providing an ecosystem benefit that can hardly be overestimated. [Read more](#)

### Natural products from reconstructed bacterial genomes of the Middle and Upper Paleolithic

Pierre Stallforth, Christina Warinner, Christian Hertweck, Harikumar Suma and colleagues | Science | 12 May 2023

We identified a biosynthetic gene cluster shared by seven Middle and Upper Paleolithic individuals that allows for the heterologous production of a class of previously unknown metabolites that we named “paleofurans.” This paleobiotechnological approach demonstrates that viable biosynthetic machinery can be produced from the preserved genetic material of ancient organisms, allowing access to natural products from the Pleistocene and providing a promising area for natural product exploration. [Read more](#)

### Microbiome and immuno-metabolic dysregulation in patients with major depressive disorder with atypical clinical presentation

Anne Busch, Michael Bauer, Gianni Panagiotou, Ilse Jacobsen and colleagues | Neuropharmacology | 12 May 2023

This review discusses the interplay between the microbiome and immunometabolic imbalance in the context of atypical depressive symptoms. [Read more](#)

### Candida expansion in the gut of lung cancer patients associates with an ecological signature that supports growth under dysbiotic conditions

Michael Bauer, Bernhard Hube, Gianni Panagiotou and colleagues | Nature Communications | 09 May 2023

The gut microbiome from 75 cancer patients was analyzed with respect to the role of gut bacteria in promoting or inhibiting fungal colonization. Among other findings, the authors showed that Candida species tend to flourish alongside lactose producing bacteria, although they are not as pathogenic as Candida in the absence of lactose producers. [Read](#)

### Influence of amino acid size at the P3 position of N-Cbz-tripeptide Michael acceptors targeting falcipain-2 and rhodesain for the treatment of malaria and human african trypanosomiasis

Marta Bogacz and colleagues | Bioorganic Chemistry | 04 May 2023

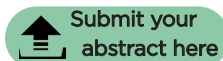
Cysteine proteases are promising targets for the development of antiparasitic agents. This study varied the amino acid composition of cysteine protease inhibitors and tested them for potency against the parasite causative agents of two major human infections, malaria and human african trypanosomiasis, also known as sleeping sickness. [Read more](#)

## MICROVERSE SYMPOSIUM: 4-5 SEPTEMBER 2023 | JENA, GERMANY



Credits: Balance of the Microverse

This 2-day symposium organized by the Microverse Cluster will bring together experts from Jena's academic community to address the orchestration of microbial balance on multiple levels, including by chemical signals, host factors, spatial demand, metabolic flux and genetic exchange.

 Submit your abstract here

We cordially invite all researchers interested in shaping the Microverse to submit abstracts for a short talk or poster by 20<sup>th</sup> July 2023.

With Keynotes by  
**Melanie Schirmer**, TU Munich &  
**Matthew Sullivan**, Ohio State University

## NEW OUTREACH AND MARKETING MANAGER: ANTJE NIEBER

Hi everybody, I am Antje Nieber (she/her) and the new Outreach and Marketing Manager in the Microverse Cluster Team. I will work closely with Alena Gold to realize further communication activities.

I studied German, French and English language and literature, later adding a Master's degree in environmental education. In my professional career so far, I have worked especially in the field of communication and was responsible for science communication in research projects, among other things.

Particularly, I am interested in how scientific findings can be communicated into society and how to develop a dialogue. Lets go for it :) I look forward to working with you and developing exciting outreach formats. You can reach me at: [antje.nieber@uni-jena.de](mailto:antje.nieber@uni-jena.de) and 03641 532 1448.



Credits: private

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Mario Krespach, Axel A. Brakhage, Christian Hertweck and colleagues | Nature Microbiology | 15 June 2023

Cross kingdom communication: *Streptomyces* species in the soil were shown to communicate with fungi via arginine derived polyketides (arginoketides) and trigger the production of fungal natural products. Genome analyses and a literature search indicate that arginoketide producers are found worldwide and these molecules may be part of a wide spread bacterial-fungal communication strategy. [Read more](#)

### **Growth rate is a dominant factor predicting the rhizosphere effect**

José Lopéz, Bas E. Dutilh and colleagues | ISME Journal | 15 June 2023

In an effort to better understand the construction of soil bacterial communities, in particular with application toward improving rhizosphere communities, the authors correlated predicted growth rate potential with protein encoded functional traits. [Read more](#)

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Ingrid Richter, Falk Hillmann, Christian Hertweck and colleagues | Current Biology | 09 Juni 2023

Evading host defenses: the toxin-producing bacterium *Mycetohabitans rhizoxinica* faces myriad challenges as a resident of the fungus *Rhizopus microspores*. Combining microfluidics with fluorescence microscopy, the authors showed that a transcription activator-like (TAL) effector released by the endobacteria is an essential symbiosis factor – an unprecedented function for the TAL effectors and an unusual survival strategy for the bacteria. [Read more](#)

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Howell Leung, Anne Busch, Michael Bauer, Gianni Panagiotou and colleagues | npj Biofilms and Microbiomes | 07 June 2023

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### **Towards therapeutic drug monitoring of antibiotic levels – analyzing the pharmacokinetics of levofloxacin using DUV-resonance Raman spectroscopy**

Christian Domes, Juergen Popp and colleagues | Analyst | 05 June 2023

Therapeutic drug monitoring is a solution to under- or overdosing of antibiotics, which regularly occurs due to complex interactions once the drug is administered into the body. Here, Raman spectroscopy, which is rapid and has low sample demand, was trialed as a method to monitor antibiotic pharmacokinetics in oral and intravenous drug delivery and provide rapid feedback about patient drug needs. [Read more](#)



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Julie Zedler, Georg Pohnert and colleagues | Environmental Microbiology | 01 June 2023

Fast-sedimenting algal strains would make cyanobacterial harvesting at scale more cost-effective and attractive. A domesticated algal strain that presents an unusually fast sedimenting rate was investigated to provide genetic targets toward this application. [Read more](#)

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Carlijn Bruggeling, Bas E. Dutilh and colleagues | Journal of Crohn's and Colitis | 27 May 2023

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Celia Jakob, Manja Marz and colleagues | Nucleic Acids Research | 24 May 2023

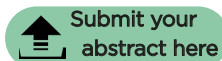
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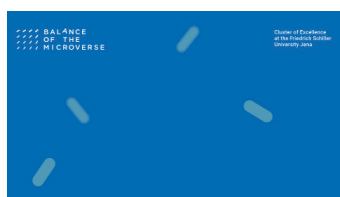
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## MICROVERSE SYMPOSIUM: ABSTRACT SUBMISSION & REGISTRATION

The registration for the Microverse Symposium on 4+5 September 2023 at the Rosensäle Jena is open until 15 August. Register [here](#). If you want to submit an abstract for a talk and/or poster, please do so until **31 July** via this [link](#). The indico tool requires login or registration before abstract submission. Members of the Friedrich Schiller University Jena can login with their URZ username and password and press „Login with LDAP“.

## NETWORKING EVENT WITH EXC CMFI AND RESIST



The board members of the Clusters of Excellence Balance of the Microverse (Jena), Controlling Microbes to Fight Infections (Tübingen) and Resolving Infection Susceptibility (Hannover) met at Kloster Eberbach on June 22 and 23 for collaboration and networking purposes. Despite many complementarities, the research programs of the three clusters also offer great potential for synergy. A joint scientific symposium in 2024 has therefore emerged as a key goal of the group. In addition, the participants discussed possibilities for cooperation in the area of promoting young scientists; for example, laboratory courses for learning new methods are to be opened up to doctoral researchers from the three EXC.

## NEWS FROM THE MICROVERSE IMAGING CENTER

Our confocal microscope Zeiss LSM980 has recently been equipped with a brand new automated water immersion system. This new module can be used to automatically replenish the immersion medium during long-term and/or multi-position measurements with the 40x water immersion objective. It extends the possibility to do long and complex experiments (several hours and more) towards water-immersion objectives, which otherwise would be limited due to evaporation of the water droplet. The new module is easy and straightforward to use.

For more information about how to use the auto-immersion in your experiments contact Aurélie Jost and Patrick Then at: [microscopy@microverse-cluster.de](mailto:microscopy@microverse-cluster.de)



## MICROVERSE EARLY CAREER SCIENTIST AWARD

With the Microverse Early Career Scientist Award we aim to honor outstanding early career scientists for their achievements and significant contribution to the mission of the Microverse Cluster. Eligible are doctoral researchers, postdocs and junior research group leaders up to 6 years after their PhD who are members of the Microverse Cluster or have a strong thematic connection. All Microverse researchers are invited to nominate early career scientists for the award, self-nomination is possible. The prize is 5000 Euro or supplies. Please submit your nominations [here](#) until September 30. For any questions contact Dania Rose-Sperling at [contact@microverse-cluster.de](mailto:contact@microverse-cluster.de). We are looking forward to your nominations!

## NEW PUBLICATIONS

### Genome-scale metabolic modeling of *Aspergillus fumigatus* reveals growth dependencies on the lung microbiome

Mohammad H. Mirhakkak, Xiuqiang Chen, Yueqiong Ni, Amelia Barber, Axel A. Brakhage, Gianni Panagiotou and colleagues | *Nature Communications* | July 20, 2023

The authors constructed 252 strain-specific, genome-scale metabolic models of the fungal pathogen to study the metabolic component of its pathogenic versatility, showing that 23.1% of *A. fumigatus* metabolic reactions are not conserved across strains. Shotgun metagenomics analysis of sputum from cystic fibrosis patients suggests that the fungus shapes the lung microbiome towards a more beneficial fungal growth environment. [Read more](#)

### Visible-Light-Driven Hydrogen Evolution of PtNP/[Ru(bpy)<sub>3</sub>]<sup>2+</sup>/Polyampholyte Hybrid Hydrogels

Tolga Çeper, Felix H. Schacher and colleagues | *ACS Applied Polymer Materials* | July 21, 2023

This study presents a polyelectrolyte hydrogel platform as a flexible and reusable heterogeneous catalyst for hydrogen evolution reaction, combining polydehydroalanine hydrogels with Pt nanoparticles (PtNPs). [Read more](#)

## In-line synthesis of multi-octave phase-stable infrared light

Hadil Kassab, Ioachim Pupeza and colleagues | Optics Express | July 12, 2023

The authors employ intrapulse difference-frequency generation in a multi-crystal in-line geometry and demonstrate that optical-phase coherence is maintained, in theory and experiment, the latter employing ultra-broadband electro-optic sampling. [Read more](#)

## TAXPASTA: TAXonomic Profile Aggregation and STandardisation

Moritz Beber, Maxime Borry and colleagues | The Journal of Open Source Software | July 11, 2023

The Python package TAXPASTA was developed for standardizing and aggregating metagenomic profiles coming from a wide range of tools and databases. The tabular format outputs are readily consumed in downstream applications, thus facilitating cross-comparison between taxonomic profiling tools. [Read more](#)

## Guidelines for public database submission of uncultivated virus genome sequences for taxonomic classification

Evelien Adriaenssens, Matthew Sullivan, Bas E. Dutilh and colleagues | Nature Biotechnology | July 10, 2023

Incorporation of newly discovered viral sequences into high-quality reference databases adds a bottleneck to virology. In this paper, the authors present standards and recommendations for the submission of virus genome sequence data to public databases for the purpose of taxonomic classification. [Read more](#)

## Genetic basis and expression pattern indicate the biocontrol potential and soil adaption of *Lysobacter capsici* CK09

Pu Yang, Xiu Jia and colleagues | Microorganisms | July, 6 2023

This study analyzed the genomic and transcriptomic patterns of *Lysobacter capsici* CK09 and provides a comprehensive understanding of its biocontrol potential and soil adaption, showing the potential of this strain for future application. *Lysobacter* species have attracted increasing attention due to their capacities to produce diverse secondary metabolites against phytopathogens. [Read more](#)

## Bifurcate evolution of quinone synthetases in basidiomycetes

Paula Sophie Seibold, Stefanie Lawrinowitz, Hans-Dieter Arndt, Pierre Stallforth, Dirk Hoffmeister and colleagues | Fungal Biology and Biotechnology | July 3, 2023

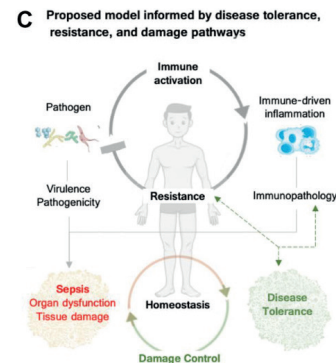
This study addressed the phylogenetic origin of the quinone synthetases that assemble terphenylquinones, a class of basidiomycete natural products that impact microbial consortia. They showed that quinone synthetases evolved twice independently in basidiomycetes. Key amino acid residues for substrate specificity were identified and changed, laying the groundwork for future targeted enzyme engineering. [Read more](#)

## What's new in intensive care: disease tolerance

Rachel E. Powell, Miguel Soares, Sebastian Weis | Intensive Care Medicine | June 23, 2023

The authors discuss evidence that severe disease after infection is perhaps best understood when incorporating a critical, regulated feature of host defense against infections known as disease tolerance. Understanding disease tolerance will lead to fundamental insights into recovery and open yet hidden paths to precision medicine. [Read more](#)

Figure taken from Powell et al. (2023): Conceptual model of infection and host response that includes both dysfunction/damage, imposed by pathogens and/or by immune-driven resistance mechanisms as well as disease tolerance as a key regulator of sepsis progression.



## The effects of allosteric and competitive inhibitors on ZIKV protease conformational dynamics explored through smFRET, nanoDSF, DSF, and <sup>19</sup>F NMR

Hannah Maus, Ute Hellmich and colleagues | European Journal of Medicinal Chemistry | June 22, 2023

The authors investigated the conformational dynamics of the homologous Zika virus protease through an integrated methodological approach. They showed that allosteric inhibitors favor the open conformation and competitive inhibitors stabilize the closed conformation of the Zika virus protease. [Read more](#)

## NEW JSMC MANAGING DIRECTOR: WARM WELCOME TO JASMIN MERTENS

I'm Jasmin Mertens (she/her) and I just joined the Jena School for Microbial Communication (JSMC) as the new Scientific Manager. I'm passionate about scientific advancements and helping young scientists navigate the academic science jungle to reach their personal and professional goals. I studied Biology at the Georg-August University in Göttingen, focusing on bacterial and human molecular genetics in my diploma and doctoral thesis. Earlier this year I finished my postdoctoral studies in California and South Africa where I studied spine degeneration and plant-bacterial biotechnology. My visions for the JSMC include a new postdoc program that focuses on supporting our scientists and their individual development as well as promoting women and diversity in future leadership roles. Looking forward to helping you reach your goals! Please don't hesitate to reach out: [jsmc@uni-jena.de](mailto:jsmc@uni-jena.de) or 03641-9-49540.



## UPDATED CORPORATE DESIGN: PPT & POSTER TEMPLATES ON THE INTRANET

We decided to further develop our visual appearance, and thus, updated our Corporate Design (CD):

- For further information from new fonts to updated colors, please see our style guide
  - We also developed new communication templates for your PowerPoint presentations (PPT) and scientific posters for use at conferences
  - And that's not the end: We are currently planning our website relaunch for Q1 2024
- Stay tuned and help us make the Microverse even more visible by using the templates!

## YOUR NEWS FOR MORE COMMUNICATION AND OUTREACH ACTIVITIES

You may have seen that we have recently created an [outreach section](#) in addition to the news section on the website. By this, we intend to bring topics and working methods from the Microverse closer to different target groups. We need your support and participation for this!

- Please send us information about your research progress and results, papers etc. for our news section on the website or social media to Alena ([alena.gold@uni-jena.de](mailto:alena.gold@uni-jena.de)) or Antje ([antje.nieber@uni-jena.de](mailto:antje.nieber@uni-jena.de))
- We want to find out: How can we realize joint science communication and outreach activities more successfully? Please take part in our anonymous 5-10-minute [online survey on sci-comm and outreach!](#)



## CONTACT POINT FOR SCIENTISTS AGAINST HATE SPEECH

The initiative "Scicomm Support" has been introduced recently by the Bundesverband für Hochschulkommunikation and Wissenschaft im Dialog to provide improved support to researchers encountering attacks. It offers direct assistance through counseling, with the goal of ensuring that the scientific community's voice isn't silenced due to apprehension over hate speech and online backlash. Currently, the project is accessible in German. An English website as well as English support is in preparation. Please check out the website: [www.scicomm-support.de](http://www.scicomm-support.de)

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  - Sep 21-22, 2023: 7<sup>th</sup> International Symposium "Systems Biology of Microbial Infection". [More information](#)
  - Oct 18, 2023: "EC2U Battle". [More information](#)
  - Oct 19, 2023: Symposium "New Frontiers in Modelling Ecology and Evolution of Microbiomes". [More information](#)
- Save the date - Oct 1-2, 2023: Internal symposium with CMFI Tübingen and RESIST Hannover

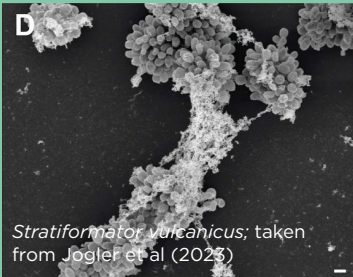
## NEW PUBLICATIONS (UNTIL AUGUST 18)

### Metabolic versatility enables sulfur-oxidizers to dominate primary production in groundwater

Beatrix M. Heinze, Kirsten Küsel, Martin Taubert and colleagues | *Water Research* | August 18, 2023

Chemosynthesis is the production of sugars and other organic compounds from CO<sub>2</sub>, using inorganic chemical compounds as a source of energy. Here the authors traced CO<sub>2</sub> fixation into a microbial groundwater food web, showing the significant and outsized contribution of chemosynthetic sulfur-fueled bacteria to the production of organic carbon.

[Read more](#)



*Stratiformator vulcanicus*; taken from Jogler et al (2023)

### *Stratiformator vulcanicus* gen. nov., sp. nov., a marine member of the family Planctomycetaceae isolated from a red biofilm in the Tyrrhenian Sea close to the volcanic island Panarea

Gaurav Kumar, Christian Jogler and colleagues | *Antonie van Leeuwenhoek* | August 16, 2023

A novel planctomycetal strain was isolated from biofilm material sampled off the coast of Italy in the Tyrrhenian Sea. The name *Stratiformator vulcanicus* was proposed for the novel taxon. [Read more](#)

### Thoracic adipose tissue contributes to severe virus infection of the lung

Franziska Hornung, Bettina Löffler, Stefanie Deinhardt-Emmer and colleagues | *International Journal of Obesity* | August 16, 2023

Obesity is an independent risk factor for severe influenza virus and COVID-19 infections. This potential connection was investigated with influenza A virus in mouse models, revealing that thoracic adipose tissue contributes to respiratory virus infection. Besides indirect induction of proinflammatory factors during infection, adipocytes and macrophages within the tissue can directly support viral replication. [Read more](#)

### Single-cell RNA sequencing and analysis of rodent blood stage *Plasmodium*

Elisa Jentho, Miguel Soares and colleagues | *STAR Protocols* | August 14, 2023

Bulk RNA sequencing of *Plasmodium* spp., the causative parasite of malaria, fails to discriminate developmental-stage-specific gene regulation. Here, a protocol that uses single-cell RNA sequencing of FACS-sorted *Plasmodium*-infected red blood cells to characterize developmental-stage-specific modulation of gene expression during malaria blood stage. [Read more](#)

### Asymmetric block extension of star-shaped [PEG-SH]<sub>4</sub> – Towards poly(dehydroalanine)-functionalized PEG hydrogels for catch and release of charged guest molecules

Kathrin Kowalczyk, Alexander Mosig, Felix Schacher and colleagues | *Macromolecular Bioscience* | August, 12 2023

Hydrogels find applications in catch and release of a large range of molecules, such as pharmaceuticals, toxins, or dyes. The authors here describe advances on a class of hydrogels that shows promise in the delivery of drugs and other bio-relevant molecules. [Read more](#)

### Identification of robust and generalizable biomarkers for microbiome-based stratification in lifestyle interventions

Jiarui Chen, Sara Leal Siliceo, Gianni Panagiotou and colleagues | *Microbiome* | August 08, 2023

Given our large diversity, it is no surprise that people respond differently to microbiome interventions. The authors used shotgun metagenomic sampling to identify three bacterial species that are biomarkers of a microbiota's resistance to structural changes, and showed that amino acid biosynthesis is also an important regulator of microbiome dynamics. Further research along these lines can help personalize interventions and improve care. [Read more](#)

### Microfluidic system for cell mixing and particle focusing using dean flow fractionation

Alexander Wiede, Ondrej Stranik, Astrid Tannert, Ute Neugebauer | *Micro* | July 31, 2023

Here presented is a new microfluidics system that can separate eukaryotic cells from bacteria without damaging either. The setup was constructed using standard microfluidics components and 3D printing, yielding it both low cost and easy to modify. [Read more](#)



## MICROVERSE INTERNAL SYMPOSIUM 2023: INSPIRATIONAL INSIGHTS AND ENCOUNTERS

The Microverse Internal Symposium was filled with discussions, presentations, and networking opportunities. It brought together various scientists from the Jena science landscape to exchange ideas on microorganisms with the following focal points:

- Microbial balance and dysbalance
- Microbial interactions with hosts and environment
- Microbial communication
- Methodological advances
- The challenges of Big Data

Highlights of the conference were – among others – the keynotes by our invited speakers Melanie Schirmer from Technical University Munich and Matthew Sullivan from Ohio State University, who both presented excerpts of their research, and offered numerous ideas for further discussions. In addition, the symposium offered different networking opportunities where the participants could make contacts, and exchange ideas.

Additionally, we celebrated the premiere of the film „Into the Microverse - Journey through an amazing world of microbes“ at the historic Planetarium Jena. The film was produced within the framework of our Cluster in cooperation with the University of Jena, and its graduate school ‘Jena School for Microbial Communication’ as well as many other research partners and sponsors.

We would like to thank all participants, speakers, and everyone who contributed to the success of this conference, and are already looking forward to the next edition next year.



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## DEADLINE 10 OCT 2023: EARLY CAREER SCIENTIST AWARD

The Microverse Cluster aims to honour outstanding early career scientists for their achievements and significant contribution to the mission of our Cluster. With the Microverse Early Career Scientist Award we want to recognize significant publications, excellent research achievements, major method advancements, transfer activities or other outstanding contributions. Please see the attachment for details on the prize, eligibility and nomination procedure. We look forward to receiving your nominations by 10 October 2023!



## NEW VIDEO SERIES: „THREE QUESTIONS FOR“ LAUNCHED

With the new video series “Three Questions For”, we provide crisp insights into the research of our Microverse researchers. Our Spokesperson Kirsten Küsel, our Microverse Professors and the Junior Research Group Leaders will reveal more about themselves, their research focus and current projects as well as impacts in around 2-3 minutes: <https://www.microverse-cluster.de/en/outreach.html>



## UPDATE: PROGRESS OF OUR MICROVERSE BUILDING

For those who are not on site to follow the construction with their own eyes, here are some recent photos. As you can see, the shell of our Microverse building has now begun. The whole building is slowly taking shape. Stay tuned, we will inform you here regularly about the progress of the construction work.



## FUNDS BY THE LIFE PROFILE: CONFERENCE – TALENT – CONNECT

The LIFE profile line awards various funds in order to support your research. Deadlines are still open for the LIFE “Talent” funds that are intended to support independent junior scientists on their career path. The LIFE “Conference” funds will support your planned conference.

Find more information and your contact person here: <https://www.uni-jena.de/en/life-advertisements>

## UPCOMING EVENTS

Oct 11-13, 2023: “Controlling Microbes to Fight Infection” Conference. Organized by the University of Tübingen. [More information](#)

**Dec 11, 2023: Save the Date: Microverse Christmas Party at Historisches Rathaus, Jena.**

Nov 27, 2023: 2nd LIFE Symposium – CONNECTING TALENTS of LIFE profile of the FSU Jena.

[More information soon](#)

## NEW PUBLICATIONS

### **A glimpse of the paleome in endolithic microbial communities**

Carl-Eric Wegner, Alex Hübner, Christina Warinner, Kai U. Totsche & Kirsten Küsel | *Microbiome* | September 25, 2023  
DNA in unexpected places: the study authors were able to extract ancient microbiome DNA from limestone bedrock and aquifers, giving shape to past microbial communities and even informing on their metabolic activities. The remarkably well preserved genetic material suggests that underground limestone formations could be good reservoirs of ancient microbiome information. [Read more](#)

### **Selection of cross-reactive T cells by commensal and food-derived yeasts drives cytotoxic TH1 cell responses in Crohn's disease**

Gabriela Rios Martini, Axel Brakhage, Bernhard Hube, Petra Bacher and colleagues | *Nature Medicine* | September 25, 2023  
Runaway activity of human T cells against intestinal microorganisms is considered to drive inflammation in inflammatory bowel diseases. This study investigated the role of intestinal yeasts in this inflammation, and found that both resident fungal commensals and daily dietary intake of yeasts can contribute to chronic activation of inflammatory T cell responses. [Read more](#)

### **The UV-A receptor CRY-DASH1 up- and downregulates proteins involved in different plastidial pathways**

Anxhela Rredhi, Trang Vuong, Maria Mittag, and colleagues | *Journal of Molecular Biology* | September 10, 2023  
Cryptochrome photoreceptors are known to play key roles in plant regulation and development. The function of the algal photoreceptor CRY-DASH1 was here shown to play an important role in photosynthesis, regulating plastidial metabolic pathways at the posttranscriptional level. [Read more](#)

### **A BODIPY-molecular rotor in giant unilamellar vesicles: A case study by polarization-resolved time-resolved emission and transient absorption spectroscopy**

Keshav Kumar Jha, Christian Eggeling, Benjamin Dietzek-Ivansic and colleagues | *ChemPhotoChem* | September 10, 2023  
BODIPY systems are widely applied as fluorophores and as probes for viscosity detection in solvents and biological media. As a prerequisite to application of this particular BODIPY-derived fluorophore to biological systems, a variety of microscopic and spectroscopic methods were applied to provide detailed understanding of the fluorophore in solvent and its placement and orientation in a lipid bilayer. [Read more](#)

### **Resistant starch decreases intrahepatic triglycerides in patients with NAFLD via gut microbiome alterations**

Yueqiong Ni, Lingling Qian, Sara Leal Silice, Emmanouil Nychas, Gianni Panagiotou, and colleagues | *Cell Metabolism* | September 5, 2023  
A new intervention strategy for non-alcoholic fatty liver disease: The authors tested resistant starch as a dietary supplement in a placebo-controlled clinical trial, coupled with metagenomics and metabolomics analysis to determine the impact on patient microbiome. [Read more](#)

### **A "magic mushroom" multi-product sesquiterpene synthase**

Eike Schäfer, Paula S. Seibold, Christian Hertweck, Dirk Hoffmeister and colleagues | *ChemBioChem* | August 23, 2023  
To better understand the range of natural products produced by *Psilocybe* species – so called "Magic Mushrooms" – the terpene synthesis CubA from *P. cubensis* was investigated by in-vivo and heterologous expression methods. [Read more](#)

### **Gut ecological networks reveal associations between bacteria, exercise, and clinical profile in non-alcoholic fatty liver disease patients**

Susanne Csader, Xiuqiang Chen, Howell Leung, Gianni Panagiotou and colleagues | *mSystems* | August 22 2023  
The efficacy of exercise as treatment for gut microbial dysbiosis was investigated. Although exercise had no significant effect on the diversity of bacterial species present, there were changes in the bacterial interactome and improvements in many health markers, such as waist circumference; resting metabolic rate; and insulin resistance. [Read more](#)

## MICROVERSE SCIENCE COMMUNICATION AWARD 2023

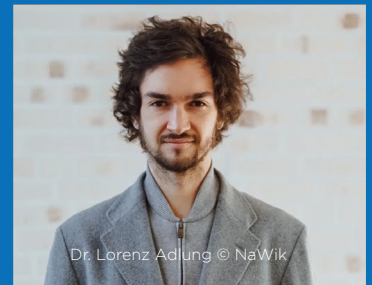
We are excited to announce the “Microverse Science Communication Award 2023”, recognizing our Microverse Cluster members for their exceptional ability to convey scientific knowledge effectively to a broader audience. Join us in celebrating those who have skillfully bridged the gap between complex research and public understanding, making science captivating and accessible.

**Application deadline: Dec 5, 2023 | 1.000 Euro Cash Prize**

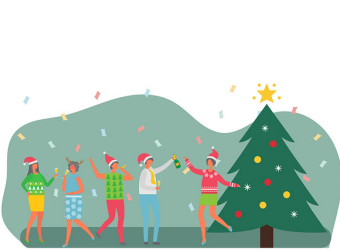
Find attached all details in the call for nominations and the nomination form. Please contact us ([antje.nieber@uni-jena.de](mailto:antje.nieber@uni-jena.de), [alena.gold@uni-jena.de](mailto:alena.gold@uni-jena.de)) for any further questions!

## MICROVERSE SPECIAL SEMINAR: MODERN SCIENCE COMMUNICATION

Would you like to learn more about science communication and outreach? Join our upcoming seminar, “Modern Science Communication” on Nov 6, 2023. This seminar presents a great opportunity to enhance your science communication skills, enabling you to effectively share your research and expertise with a wider audience. Our speaker and SciComm expert [Dr. Lorenz Adlung](#) from the NaWik (Das Nationale Institut für Wissenschaftskommunikation) has a PhD in systems biology and is a science slammer. He will share valuable insights and best practices to help you convey your messages clearly and persuasively. The talk will be in English. Zoom login: <https://uni-jena-de.zoom.us/j/64473096487>; Passcode: 115867



## MICROVERSE CHRISTMAS PARTY: DINNER REGISTRATION REQUESTED



Preparations for this year’s “Microverse End of the Year Event” on Dec 11, 2023 are in full swing. The Christmas committee is planning an event that will spread Christmas spirit and inspire party people at the same time. More details coming soon!

We need your **registrations for the Christmas Dinner Buffet by Nov 24, 2023**. Please register [here](#) for better planning of the catering.

**Please note:** Our program begins in the afternoon with christmas treats among other things. We have activities planned also after dinner, such as the SciComm Award ceremony. You’re welcome to join for the whole event or just part of it. No registration is required for the other activities.

## SUPPORT FOR PREGNANT SCIENTISTS

Expecting a baby? The Microverse Cluster has an info sheet for pregnant scientists and new parents. The document targets international scientists, who may not be familiar with the German system and the rights of pregnant people with respect to working conditions and state benefits. Also German locals will surely find a helpful tip or two. The information can be found on the Microverse Intranet, please share with your colleagues as appropriate.

## FURTHER SCICOMM PROJECTS BY THE NAWIK

**WissKon2024** on April 19 in Karlsruhe: The annual conference of the NaWik offers a platform to exchange ideas with researchers interested in science communication. It is primarily aimed at scientists from German-speaking countries who (would like to) communicate their research to the public. The call for contributions is open until Dec 3, 2023. More information on the conference [here](#).

**WissKon-Mentoring-Program 2024:** If you would like to take your SciComm skills to the next level you might apply as a mentee. You could also offer support for other scientists as a mentor if you have already gathered expertise in SciComm. More information on the program [here](#).

## NEW PUBLICATIONS

### **Immunosuppressive effects of circulating bile acids in human endotoxemia and septic shock: patients with liver failure are at risk**

Julia Leonhardt, Ignacio Rubio, Michael Bauer and colleagues | Critical Care | Sept 27, 2023

Sepsis-induced immunosuppression is a frequent cause of opportunistic infections and death in critically ill patients. This study explored the role of bile acids and bile acid metabolism in sepsis patients. Bile acids were here shown to be present in a potential immunosuppressive function in sepsis patients, especially those with severe liver failure. [Read more](#)

### ***Candida albicans* induces neutrophil extracellular traps and leucotoxic hypercitrullination via candidalysin**

Lucas Unger, Bernhard Hube, Constantin F. Urban and colleagues | EMBO Reports | Oct 5, 2023

The authors show that the peptide toxin candidalysin, secreted by the pathogenic fungus *Candida albicans*, plays an important role in stimulating the host immune system. Candidalysin alone promotes a weaker immune response in comparison to wild type *C. albicans*, indicating that the toxin is just one factor – albeit an important factor – in host antifungal responses. [Read more](#)

### **“We’ve got to get out” – Strategies of human pathogenic fungi to escape from phagocytes (Review)**

Johannes Sonnberger, Bernhard Hube and colleagues | Molecular Microbiology | Oct 6, 2023

A virulence attribute shared by some of the most clinically relevant fungal species is their ability to survive inside macrophages and escape from these immune cells. This review discusses the mechanisms behind intracellular survival and strategies to induce programmed host cell death, and provides future perspectives for research and development of targeted therapies. [Read more](#)

### **Facilitating accessible, rapid, and appropriate processing of ancient metagenomic data with AMDirT**

Maxime Borry, Alexander Hübner, Anan Ibrahim, Irina M. Velsko, Jasmin Frangenberg, Christina Warinner, James A. Fellows Yates and colleagues | F1000research | Oct 9, 2023

This work provides an extension and update of the AncientMetagenomeDir, a collection of curated and standardised sample metadata tables for metagenomic and microbial genome datasets generated from ancient samples. Also provided is a report on commonly occurring errors with metadata with suggestions on how to improve the quality of data sharing by the community. [Read more](#)

### **How might bacteriophages shape biological invasions? (Review)**

Jannick Van Cauwenberghe and Ellen L. Simms | Microbial Ecology | Oct 9, 2023

Using the model of legume-rhizobium mutualism, this review synthesizes research from invasion biology, as well as bacterial, viral, and community ecology, to create a conceptual framework for understanding and predicting how phages can affect biological invasions through their effects on bacterial mutualists. [Read more](#)

### **Toll-like receptor 4 and CD11b expressed on microglia coordinate eradication of *Candida albicans* cerebral mycosis**

Yifan Wu, Bernhard Hube, David B. Corry and colleagues | Cell Reports | Oct 10, 2023

The fungal pathogen *Candida albicans* is linked to chronic brain diseases such as Alzheimer’s disease (AD), but the molecular basis of brain anti-*Candida* immunity remains unknown. Using a mouse model, the authors followed the effects on and clearance from the brain induced when *C. albicans* enters *via* the circulatory system. [Read more](#)

### **Differential transcriptional responses of human granulocytes to fungal infection with *Candida albicans* and *Aspergillus fumigatus***

Tilman E. Klassert, Manja Marz, Hortense Slevogt and colleagues | Journal of Fungi | Oct 14, 2023

Neutrophils are a component of innate immunity, playing a significant role in defending against invasive fungal pathogens. This study aimed to explore the transcriptional activation of human neutrophils in response to different fungal pathogens and to offer new avenues for diagnostic and therapeutic strategies, particularly in the management of invasive fungal diseases. [Read more](#)

### **Die Bedeutung des humanen Mikrobioms für die psychische Gesundheit (Review, in German)**

Alexander Refisch and Martin Walter | Der Nervenarzt | Oct 17, 2023

Many common diseases, including psychiatric disorders, show characteristic alterations in the microbiome. Dysregulation of the complex interplay between the microbiome, immune system, stress response, and energy homeostasis, particularly in the early stages of life, can predispose to the development of psychiatric symptoms later in life. [Read more](#)



## LAST CALL: MICROVERSE SCIENCE COMMUNICATION AWARD 2023

We look forward to receiving your nominations for our “Microverse Science Communication Award 2023”, recognizing our Microverse Cluster members for their exceptional ability to convey scientific knowledge effectively to a broader audience. Please ensure your nominations and applications reach us by Dec 5, 2023.

## REGISTER FOR OUR MICROVERSE MEDIA CONTACT DATABASE

Experts in their field are essential for serious media coverage. To enhance the visibility of the Microverse and communicate our key messages more effectively, we are looking for experts who are interested in making their expertise available to journalists. We are currently setting up a database for this purpose and ask interested scientists to register [here](#) to be a contact for journalists. For questions please contact [antje.nieber@uni-jena.de](mailto:antje.nieber@uni-jena.de) or [alena.gold@uni-jena.de](mailto:alena.gold@uni-jena.de)

## 5<sup>TH</sup> CENTRAL GERMAN MEETING ON BIOINFORMATICS

The “Mittelerde Meeting” will take place in Jena from Feb 29 to Mar 1, 2024 in Jena. The deadlines for submissions were shifted as follows:

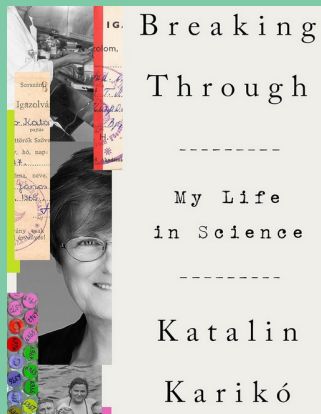
- abstracts: Dec 3, 2023
- talks and posters: Jan 20, 2024

Learn more about the meeting [here](#).

## POSTDOC PROGRAM WELCOME MEETING

The new JSMC Postdoc program is about to start. Therefore the JSMC manager Jasmin Mertens is inviting PhDs who will defend soon as well as postdocs from the Microverse Cluster to the Welcome meeting on Dec 5 at 9 am in the seminar room Neugasse 23 where she will present further details on the program. Spread the word - all interested postdocs in Jena are welcome to register. For questions contact [jasmin.mertens@uni-jena.de](mailto:jasmin.mertens@uni-jena.de).

## SCIENCE MEETS SOCIETY: BREAKING THROUGH BY KATALIN KARIKÓ



This time around, we will read the autobiography *Breaking Through: My Life in Science* by Katalin Karikó. Karikó is a Hungarian-American biochemist who was one of the winners of 2023 Nobel Prize in Physiology or Medicine and whose research played a major role in the development of the Covid vaccine.

Time & place: Feb 8, 2024, 15:30 - 17:30 at Leibniz-HKI Nucleus Cafe with coffee & cake

Please help us plan for the catering and register [here](#).

If you are member of the Microverse Cluster, JSMC or Leibniz-HKI, you may request a copy of the book by contacting [anna.komor@uni-jena.de](mailto:anna.komor@uni-jena.de). We have limited books so please only request if you intend to attend on Feb 8. Deadline for requests is Nov 30, as we will try to get the books ordered and distributed before the Christmas holidays.

## JOIN OUR CHRISTMAS PARTY!

Christmas season is approaching fast and so is the Microverse End of the Year Event. The program starts with coffee, biscuits and punch followed by a review of the year 2023 and award ceremonies. It will conclude with dinner (only those who registered) and some games culminating in celebration. We are looking forward to seeing you on Dec 11 from 4 pm on at the Kulturbahnhof!



## NEW PUBLICATIONS

### Transcription activator-like effectors from endosymbiotic bacteria control the reproduction of their fungal host

Ingrid Richter, Christian Hertweck, and colleagues | mBio | Nov 16, 2023

The phytopathogenic fungus *Rhizopus microsporus* harbors a bacterial endosymbiont that produces a crucial virulence factor responsible for rice seedling blight. Investigation of role of the bacterial T3SS secretion system in this unique microbial alliance revealed a new function to members of the MTAL family of T3SS-associated effectors, and provide deeper insights into host control by prokaryotic symbionts. [Read more](#)

### Host extracellular vesicles confer cytosolic access to systemic LPS licensing non-canonical inflammasome sensing and pyroptosis

Puja Kumari, Vijay A. Rathinam and colleagues | Nature Cell Biology | Nov 16, 2023

Intracellular surveillance for systemic microbial components during homeostasis and infections governs host physiology and immunity. Here, the authors show a new role for host-derived extracellular vesicles, in the accessibility of microbial ligands to intracellular receptors. [Read more](#)

### Photoluminescence enhancement of monolayer WS<sub>2</sub> by n-doping with an optically excited Gold disk

Bayarjargal N. Tugchin, Thomas Pertsch and colleagues | ACS Nano Letters | Nov 15, 2023

This study explores the optical and electronic properties of a gold disc covered with a n-doped monolayer WS<sub>2</sub>, the results of which are relevant to the further development of nanotransistors in photonic circuits and optoelectronic applications. [Read more](#)

### Quantitative analysis of peroxisome tracks using a Hidden Markov Model

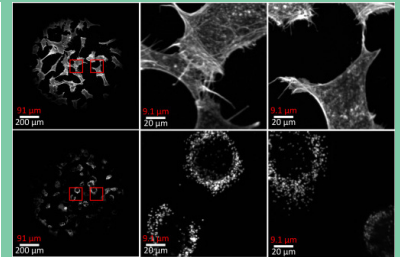
Carl-Magnus Svensson, Christian Eggeling, Marc Thilo Figge and colleagues | Scientific Reports | Nov 11, 2023

Imaging of 130 live cells allowed the authors to develop a model for peroxisome movement, with applications to deconvoluting and understanding microscopic images of live cells. [Read more](#)

### Field curvature reduction in miniaturized high numerical aperture and large field-of-view objective lenses with sub 1 μm lateral resolution

Sophia Laura Stark, Christian Eggeling and colleagues | Biomedical Optics Express | Oct 9, 2023

Endomicroscopy, also known as optical biopsy, is used for example to obtain images from within the human body. In this paper the development of a miniaturized endoscopic objective lens for various biophotonics applications is presented. [Read more](#)



Taken from Stark et al. (2023)

## REVIEW OF THE YEAR 2023

**Jan**  
Microverse Professorship Microbiome Dynamics

**Feb**  
ERC Consolidator Grants

**Mar**  
Interim Building House Warming Party

**May**  
BIZ House Warming Party

**Jun**  
• 3 EXC board meeting  
• JSMC Alumni Meeting  
• MiCoCo Stars with BBQ  
• New Outreach & Marketing Manager

**Aug**  
New JSMC Scientific Manager

**Sep**  
• Microverse Symposium  
• Planetarium Premiere  
• 3 Questions For..  
• Mongolian Exhibition

**Nov**  
Visit of the Thuringian Parliament

**Dec**  
• Launch: Into the Microverse  
• Christmas Party  
• Early Career Microverse Award



## MAGICAL MOMENTS: THE MICROVERSE CHRISTMAS PARTY

Last week, we had a delightful Microverse Christmas party at the Kulturbahnhof. It started with the review of the year that reminded us of our joint successes and made us look forward to the upcoming year with curiosity. The first Microverse Early Career Scientist Award ceremony was a special highlight, where we honoured outstanding achievements: Congratulations to Raquel Alonso Roman and Alexander Hübner! During the pub quiz participants put their knowledge to the test in various categories. Laughter, team spirit and perhaps even the odd aha moment made the evening an unforgettable experience. From the atmospheric decorations to the delicious food and the lovingly designed programme - every single hand contributed to making our celebration a complete success. We would like to thank you for your active support at our Christmas party!



## NEW PUBLICATIONS

### Biallelic variants in SLC4A10 encoding the sodium-dependent chloride-bicarbonate exchanger NCBE lead to a neurodevelopmental disorder

Reza Maroofian, Ute Hellmich, Christian Hübner and colleagues | *Genetics in Medicine* | Nov 24, 2023

Bicarbonate transport proteins play an essential role in maintaining pH balance in the body. Here, the authors showed a causal relationship between genetic abnormalities in one of these transport proteins and the development of certain neurological disorders. [Read more](#)

### The influenza A virus promotes fungal growth of *Aspergillus fumigatus* via direct interaction *in vitro*

Sarah König, Axel Brakhage, Bettina Löffler, Christina Ehrhardt and colleagues | *Microbes and Infection* | Nov 24, 2023

A new *in-vitro* co-infection model was developed to unravel the complex interplay of pathogen-host as well as pathogen-pathogen interactions during influenza and *A. fumigatus* superinfections on a molecular level. [Read more](#)