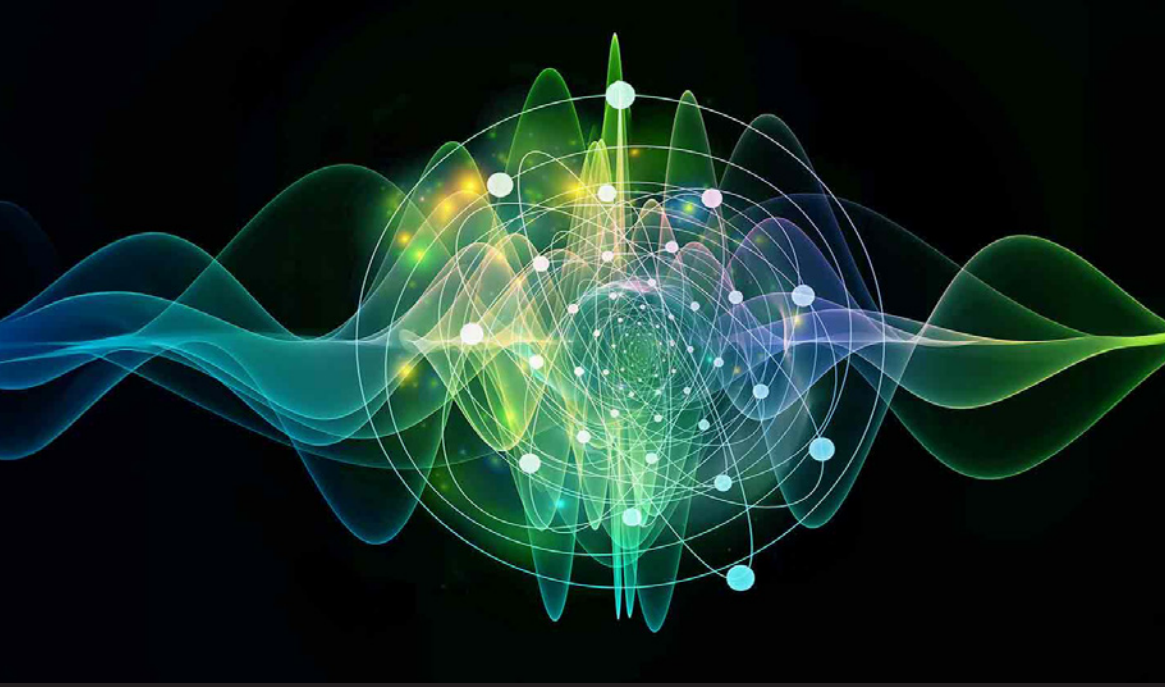


KBC DAYS 2025

"Bridging Scales: from Quantum to Cosmos"

11-12 November

Programme - Research Infrastructures -
Abstracts - Participants

KBC
CHEMICAL BIOLOGICAL CENTRE

A collaboration between

UMEÅ UNIVERSITY

SLU

DAY 1, Tuesday 11 November

SESSION 1: OPENING and KEYNOTE LECTURE I
Chairperson: Lars-Anders Carlson

9.00 **Welcome**
Stefan Björklund
Scientific Coordinator of KBC

9.05 **Opening of the KBC DAYS 2025**
Thomas Olofsson
Deputy Vice-Chancellor for Research, Umeå University

9.15 **Shaping the next generation of researchers in infection biology: NDPIA and NDP-VIP**
Annasara Lenman
National coordinator NDPIA and NDP-VIP, Department of Clinical Microbiology, Umeå University

9.25 **KEYNOTE LECTURE I: "Quantum Biology": How nature might be optimized to harness quantum mechanics**
Clarice D. Aiello
Founder of the Quantum Biology Ecosystem, CSO of the Quantum Biology Institute

10.10 *Coffee break*

SESSION 2: NEW FACULTY MEMBERS, AWARDS and GRANT RECIPIENTS from KBC
Chairperson: Ryo Morimoto

10.40 **Positive strand RNA virus replication – why the most interesting questions are still unanswered**
Lars-Anders Carlson
Department of Medical Biochemistry and Biophysics and Molecular Infection Medicine Sweden (MIMS), Umeå University

10.55 **Resolving microbial genomes in complex communities at the single-cell level**
Laura Carroll
Department of Clinical Microbiology and Molecular Infection Medicine Sweden (MIMS), Umeå University

11.10 **Integrated Multi-Trophic Farming: circularity and challenges**
Olivier Keech
Department of Plant Physiology, Umeå Plant Science Centre, Umeå University

11.25 **Development and prospect of hollow-core optical fiber**
Max Yan
Department of Applied Physics and Electronics, Umeå University

11.40 **Cuticle and apical hook development in *Arabidopsis***
Stephanie Robert

Department of Forest Genetics and Plant Physiology, Umeå Plant Science Centre, Swedish University of Agricultural Sciences

12.00 *Lunch break*

SESSION 3: KEYNOTE LECTURE II and ELEVATED TALKS PRESENTATIONS by PhD STUDENTS
Chairperson: Benedicte Albrectsen

13.00 **Elevator talks presentations by PhD students** (2 min each), Part 1:

1. Burning Question: Where Does Chromium Hide in Bottom Ash?
Jeenu Jegy, *Department of Applied Physics and Electronics, Umeå University*

2. ELEVATE – Implementing new technologies into alpine vegetation monitoring programs
Arvid Sjöberg, *Department of Forest Resource Analysis, SLU Umeå*

3. Light-dependent modulation of sustained quenching during overwintering in *Pinus koraiensis* seedlings
Mingyu Liu, *Department of Plant Physiology, Umeå Plant Science Centre (UPSC), Umeå University*

4. Longitudinal Assessment of Tubular and Glomerular Kidney Function After COVID-19 – a prospective cohort study
Hanna Jerndal, *Department of Clinical Microbiology, Umeå University*

13.10 **KEYNOTE LECTURE II: "Integrating Environmental Ground Monitoring and Remote Sensing Using Machine Learning: Promising Advances and Key Challenges"**
Sven Adler

Department of Forest Resource Management; Division of Landscape Analysis, Swedish University of Agricultural Sciences (SLU)

13.55 **Elevator talks presentations by PhD students** (2 min each), Part 2:

5. Landscape Breeding: A new paradigm in forest tree management using remote sensing and AI
Annica Nordström, *Department of Forest Genetics and Plant Physiology, Umeå Plant Science Centre (UPSC), Swedish University of Agricultural Sciences (SLU)*

6. Characterizing the Genetic Landscape of Puumala virus in Sweden
Rebecca Lantto Reinman, *Department of Clinical Microbiology, Molecular Infection Medicine Sweden (MIMS), Umeå Centre for Microbial Research (UCMR)*

7. Genome-wide Characterization of Microbial Gene Functions
Florian Albrecht, *Department of Molecular Biology, Umeå Centre for Microbial Research (UCMR), Integrated Science Lab (IceLab), Umeå University*

DAY 1, Tuesday 11 November

INTERACTION / POSTER SESSION

14.05 **Poster presentations by PhD students and research infrastructures**

and

coffee

SESSION 4: NEW FACULTY MEMBERS, AWARD and GRANT RECIPIENTS from KBC

Chairperson: Anna Strandberg

15.00 **Using crystals to track the Earth's past climate extremes**

Morgan Jones

Department of Ecology, Environment and Geoscience, Umeå University

15.15 **Nanostructured carbon materials for removal of actinides from industrial waste solutions**

Alexandr Talyzin

Department of Physics, Umeå University

15.30 **Methane emissions from northern rivers: from microbial to planetary scales**

Gerard Rocher Ros

Department of Ecology, Environment and Geoscience, Umeå University

15.45 **Optical bio-manipulation of cells, vesicles and single molecules**

Pól Martin Bendix

Niels Bohr Institute, University of Copenhagen, Denmark

16.15 **Gut microbial modulation of intestinal mucus function**

Björn Schröder

Department of Molecular Biology and Molecular Infection Medicine Sweden (MIMS), Umeå University

16.30 *Poster viewing and mingle before the dinner starts*

16.45 *KBC Ping-Pong Tournament Semi-finals and the Final*

- Award ceremony for the KBC Ping-Pong Tournament winner

18.00 *Dinner*

- Announcement of the PhD student presentation prize winners
- Announcement of the KBC Employee of the Year

DAY 2, Wednesday 12 November

SESSION 5: UMEÅ POSTDOC SOCIETY (UPS)
Chairperson: Madhusree Mitra

9.00 **From research to benefit for society**
Johan Nordlund
IP- and innovation lawyer, The Innovation Office, Umeå University

Programme organised by UPS:

9.15 **The forest value chain – from seeds to trees where STEM sees**
Christian Kugge
Research specialist, Svenska Cellulosa Aktiebolaget (SCA) R&D

9.35 **Panel discussion: From Postdoc to PI: Winning Grants and Finding Your Path**
Moderator: Madhusree Mitra, *Umeå Postdoc Society (UPS)*
Panel members:
Eric Capo, Department of Ecology, Environment and Geoscience
Laura Bacete, Department of Plant Physiology, Umeå Plant Science Centre (UPSC)
Max Renner, Department of Chemistry, Umeå Centre for Microbial Research (UCMR)
Paulina Wanrooji, Department of Medical Biochemistry and Biophysics
Ryo Morimoto, Department of Molecular Biology, Molecular Infection Medicine Sweden (MIMS)
Verena Kohler, Department of Molecular Biology

10.35 *Coffee Break*

SESSION 6: RESEARCH INFRASTRUCTURE INFORMATION - Attend the live "Guinness World Records" attempt in "bridging scales" from Å to our solar system
Chairperson: Linda Sandblad

10.55 **Start of a live experiment by electron microscopy – "Bridging scales"**

11.05 **Overview and news from KBC research infrastructures – Local and National facilites in one building**
Linda Sandblad
Director of Umeå Centre for Electron Microscopy and SciLifeLab Site Umeå, Umeå University

11.15 **Infrastructure at the Translational Research Centre**
Ola Billing
Department of Diagnostics and Intervention, Umeå University

11.25 **SITES – a national open resource for ecosystem science**
Marcus Wallin
Director of the national infrastructure SITES (The Swedish Infrastructure for Ecosystem Science)

DAY 2, Wednesday 12 November

11.35 **Combining lab-sources and synchrotron X-rays: Need, strategies and future**
Mahesh Ramakrishnan
TEC Lab, Department of Applied Physics and Electronics, Umeå University and Guest Researcher – MAX IV

11.45 **National unique research infrastructure to elevate your research**
Linda Sandblad
Director of Umeå Centre for Electron Microscopy and SciLifeLab Site Umeå, Umeå University

INTERACTION SESSION

12.00 **Posters by research infrastructures**

and standing lunch

13.00 **Posters by Research Infrastructures (continued)**

and

Guided tours to infrastructure facilities /drop-in discussions with infrastructure representatives

SESSION 7: KEYNOTE LECTURE III and NEW FACULTY MEMBERS, AWARD and GRANT RECIPIENTS from KBC

Chairperson: Morgan Jones

13.30 **KEYNOTE LECTURE III: Exoplanets, near and far, small and rare, large and plenty?**
Stephanie Werner
Department of Geosciences, Centre for Planetary Habitability, University of Oslo

14.15 **Precision spectroscopy using optical frequency combs**
Aleksandra Foltynowicz Matyba
Department of Physics, Umeå University

14.30 *Coffee break*

DAY 2, Wednesday 12 November

SESSION 8: NEW FACULTY MEMBERS, AWARD and GRANT RECIPIENTS from KBC

Chairperson: Stefan Björklund

14.45 **Why the Arctic Matters – Communicating Science to Make an Impact**
Keith Larsson
Director of the Arctic Centre at Umeå University and Coordinator of the Climate Impacts Research Centre, Department of Ecology, Environment and Geoscience, Umeå University

15.00 **Disarming *Fusobacterium nucleatum*: Development of FadA Inhibitors to Enhance Immunotherapy and Reduce Tumor Burden in Colorectal Cancer**
Fredrik Almqvist
Director of the Umeå Center for Microbial Research, UCMR, Department of Chemistry, Umeå University

15.15 **Efficient genome editing in worms**
Changchun Chen
Department of Molecular Biology, Umeå University

15.30 **Concluding remarks**
Stefan Björklund
Scientific coordinator of KBC

- Announcement of the KBC Photo Contest winner

Keynote Speaker

Dr. Clarice D. Aiello

Founder of the Quantum Biology Ecosystem, CSO of the Quantum Biology Institute

https://www.quantumbiology.org/

Bio: Clarice is a quantum engineer interested in how quantum physics informs biology at the nanoscale. Born and raised in Brazil, Clarice obtained a Diplome d'Ingenieur in Physics from the Ecole Polytechnique in France and an M.Phil. in Physics from the University of Cambridge, Trinity College, in England; she received her Ph.D. from MIT in Electrical Engineering. She further held postdoctoral appointments in Bioengineering at Stanford, and in Chemistry at Berkeley.

Clarice will give a keynote lecture, **"Quantum Biology": How nature might be optimized to harness quantum mechanics** on 11 November, 9:25-10:10.

Abstract. Accumulating experimental evidence suggests that quantum mechanical effects underlie how organisms function. "Quantum Biology" includes phenomena as varied as: magnetic field detection for animal navigation; metabolic and enzymatic regulation in cells; and optimal energy harvesting in photosynthesis. Unveiling such phenomena at all length scales (i.e., from the nanoscale to whole organisms) has remained a challenge, but can lead to the development of: biomimetic electromagnetic probes; room-temperature quantum computing architectures; improved photovoltaics; and novel therapeutics, among other novelties.

In this talk, I will review some of the evidence in support of these phenomena, besides discussing proposed underlying biophysical mechanisms and potential implications on human, plant and environmental biology. Can quantum mechanics be established – or refuted! – to account for physiologically relevant phenomena, and be manipulated to technological and therapeutic advantage?

This is the exciting question that the field of "Quantum Biology" should aim to answer in the near future. I will argue that successful efforts in Quantum Biology will be contingent on interdisciplinarity, multi-scale approaches, and close theory-experiment collaboration.

Keynote Speaker

Associate Prof., Dr. Sven Adler

Department of Forest Resource Management; Division of Landscape Analysis, Swedish University of Agricultural Sciences (SLU)

https://publications.slu.se/?file=pers/show&cid=307326

Bio: Sven Adler – Associate Professor of Biology – studied mathematics and biology at the University of Rostock and then completed his PhD on the use of diatoms as bioindicators in paleoecology. After earning his doctorate, he joined the University of Kiel, where he supported PhD students in designing their studies and analysing their data, with a focus on marine birds and mammals in the North and Baltic Seas.

In the autumn of 2011, Adler began working at SLU in Umeå on the EU LIFE project MOTH – Monitoring of Terrestrial Habitats – working on a two-stage monitoring design to locate rare habitat types using remote-sensing data. In subsequent projects, he increasingly combined national monitoring datasets with remote-sensing products, applying different ecosystem-service frameworks and machine-learning methods. In collaboration with the Sámi Parliament and the Swedish Forest Agency, he produced in 2019 the first reindeer-lichen map for northern Sweden. Since 2021, Adler has led the National Alpine Vegetation Monitoring Project (NILSfjäll), where he is testing the integration of diverse remote-sensing platforms, novel field-work techniques (drones) and machine-learning methods to optimize filed data collection in the Swedish alpine environments.

Sven will give a keynote lecture, "**Integrating Environmental Ground Monitoring and Remote Sensing Using Machine Learning: Promising Advances and Key Challenges"**, on 11 November, 13:10-13:55.

Abstract: Monitoring ecosystems demands methods that connect fine-scale field observations to wall-to-wall landscape views. We present a two-stage workflow that bridges scales - from sub-meter quadrats to regional maps - by fusing remote sensing (RS) with statistically designed field sampling. First, we derive continuous vegetation indicators from satellite time series, lidar-based forest structure, and drone orthophotos/3D point clouds. Second, we deploy balanced field sampling to calibrate and validate models

and to translate mapped cover into operational metrics such as biomass and grazing capacity. Drones act as the meso-scale bridge, aligning ground measurements with satellite predictors and enabling standardized, photo-based quality control (optionally AI-assisted) to reduce observer bias.

We illustrate the approach with two cases. Case 1 (lichen resources for reindeer winter grazing): multisensor predictors feed generalized additive models that produce continuous lichen indicator maps, later grouped into management classes. Balanced 0.5 × 0.5 m plots provide lichen cover and height; a deep-learning pipeline classifies plot photos, and the field data support the conversion from cover to biomass and then to estimated grazing days - yielding reproducible, management-ready outputs for forestry–reindeer co-planning. Case 2 (alpine vegetation inventory): Sentinel time series, lidar, and legacy plots pre-classify dense candidate sites across alpine grids; a balanced sample (constrained by habitat class and spatial criteria) targets both common and rare habitats, enabling area estimates with known sampling errors and repeatable change tracking.

By coupling pixels with plots - and using drones to knit the scales together - the framework delivers decision-ready indicators across scales, turning spectral signals into defensible, on-the-ground ecosystem metrics suitable for national monitoring and local management alike.

Keynote Speaker

Prof. Stephanie Werner

Department of Geosciences, Centre for Planetary Habitability, University of Oslo

https://www.mn.uio.no/geo/english/people/aca/phab/stephaw/

Bio: Stephanie C. Werner is a planetary scientist and geophysicist with a PhD from Freie Universität Berlin (Germany). Her research interests is Comparative Planetology, and combines planetary dynamics, formation and evolution of (exo-)planetary systems, cratering chronology, cratering processes, remote sensing of earth and other planets and potential field data analyses. She is member of several mission consortia studying Mars, Venus and exoplanets. Currently Dr. Werner leads the Centre for Planetary Habitability, a centre of excellence at the University of Oslo, that is to investigate how have Earth's physical and chemical attributes, and thus our planet's proclivity for life, evolved, and how can we recognize distant worlds around other stars that have been or could be habitable?

Stephanie will give a keynote lecture, "**Exoplanets, near and far, small and rare, large and plenty?"** on 12 November, 13:30-14:14

Abstract: Very few exoplanets have been seen directly. The majority is discovered by observing the host star, which gets wobbled (radial velocity method) or eclipsed (transit method) by the exoplanet, providing indirect mass or size measurements. The growing number of exoplanets, close to 8000 by now (exoplanet.eu), reveals the unexpected diversity of planet sizes and masses and planet types not known from the solar system before. Exoplanets can orbit one star, two stars or occasional freely-float orbiting no star. Cautioning for observational bias, the known planetary systems are more compact than the solar system, nevertheless, some can be found in the habitable zone of their host star provoking the question: Are we alone?

Planetary habitability encompasses the necessary conditions for the generation, survival, and continued evolution of life, but astronomically it has been simplified to the potential presence of liquid surface water. Earth's habitability may have resulted from a chain of singular events, but a major challenge is that habitability factors vary because they are time-dependent

due to changes in the Sun's energy and our planet's chemical, thermal, physical, and tectonic evolution. An in-depth knowledge of Earth-like habitability, and how our planet sustained conditions for life's evolution over geological time scales, is therefore critical for identifying habitable planets (exoplanets) around other stars. A key observable for Earth-like habitability today is a highly oxygenated atmosphere, an ozone layer, and low levels of CO2. But the Earth's atmosphere has changed dramatically over billions of years, and thus the age of a planetary system is critically important. Currently exoplanets are recognized in a wide range of planetary systems. The physical parameters of the central stars and planets are quite diverse, and of the nearly 8000 known planets, as few as 5% are potentially Earth-like in terms of mass and orbital distance. A real Earth-like planet is still to be found.

Optical bio-manipulation of cells, vesicles and single molecules

Associate Professor Poul Martin Bendix

Niels Bohr Institute, University of Copenhagen

The use of photothermal nanomaterials for biological applications are proving to be highly valuable tools in both medical and biophysical research. Recently, their use in conjunction with infrared light as nanoscale light-to-heat converters has gained clinical approval for effective treatment of prostate cancer, showcasing their potential in precision therapies. Additionally, these materials enable precise manipulation of living cells and biomimetic systems. In our work, we have conducted both theoretical and experimental studies to characterize the thermoplasmonic properties of a broad range of photothermal nanomaterials. These nanomaterials have been successfully applied to induce fusion and puncture in Giant Unilamellar Vesicles (GUVs), Giant Plasma Membrane Vesicles (GPMVs), and have been employed in the study of plasma membrane and nuclear repair in living cells.

Our findings offer novel insights into membrane protein dynamics following pore formation in biological and biomimetic membranes. Notably, applying thermoplasmonics to facilitate the fusion of cells and model systems allows the direct transfer of integral membrane proteins from living cells into phase-separated GUVs. This approach enables investigations into affinity of membrane proteins for lipid domain phases while maintaining the integrity and native orientation of the proteins. Photothermal nanomaterials offer unparalleled control over locally confined heat gradients, with temperature ranges spanning 20°C to 200°C within a confined volume (~100 nm), providing a powerful tool to study localized thermal ablation and phase transitions in biomaterials. Looking ahead, the integration of plasmonic nanomaterials with optical trapping and advanced imaging techniques holds promise for a versatile, multifunctional platform. This technology will not only enhance the study of living cells and biophysical model systems but will also enable the creation of hybrid systems involving lipid or polymeric membranes and living cells.

Finally, I will also showcase some applications of our C-trap infrastructure system (from LUMICKS). Applications involve the use of new ways of using optical bio-manipulation to control membrane vesicles, cells and single molecules. Optical forces delivered by the powerful traps allow applications in mechanobiology by studying molecular responses to significant deformation of membranes and cells. The four traps of the system open up new possibilities for studying DNA-DNA interactions by creating knots and study molecular process of DNA decatenation.

1. Nano Letters 24 (3), 777-789. Biological Applications of Thermoplasmonics V.T. Ruhoff, M.R. Arastoo, G. Moreno-Pescador, P.M. Bendix.
2. Chemical Reviews, 119 (13), 8087-8130 (2019). Plasmonic Heating of Nanostructures. L. Jauffred, A. Samadi, H. Klingberg, P.M. Bendix*, LB Oddershede*.
3. Nanoscale 14 (21), 7778-7787 (2022). Thermoplasmonic nano-rupture of cells reveals annexin V function in plasma membrane repair. G.S. Moreno-Pescador, D.S. Aswad, C.D. Florentsen, A. Bahadori, ...P.M. Bendix*.
4. Nano Letters, 23, 3377-3384 (2023). Thermoplasmonic Vesicle Fusion Reveals Membrane Phase Segregation of Influenza Spike Proteins. G. Moreno-Pescador, M.R. Arastoo, V.T. Ruhoff, S. Chiantia, R. Daniels, P.M. Bendix*.
5. J.Vis. Exp. 203, e65776 (2024). A Thermoplasmonic Approach for Investigating Plasma Membrane Repair in Living Cells and Model Membranes. H.M.D. Danielsen, M.R. Arastoo, G. Moreno-Pescador, P.M. Bendix.

Information from Research Infrastructures

The Biogeochemical Analytical Facility - BAF

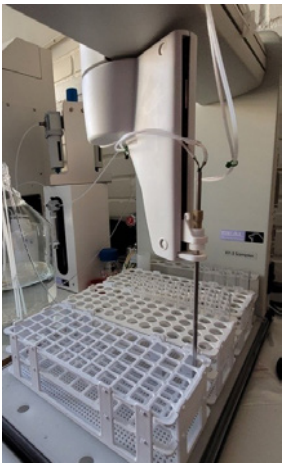
The infrastructure provides instruments for analysis of key chemical parameters in terrestrial and aquatic biogeochemical and ecological research and as such is of major interest for a large range of research groups.

BAF act as a core analytical facility for several major research projects run by researchers at EMG together with their collaborators and is also open for other users at Umeå and other universities.

INSTRUMENTS

The facility covers a scope of different instruments including:

- Gas chromatograph
- TOC/TN analyzer
  - Skalar, Formacs HTI
- Nutrient analyzer (NO_3+NO_2, NH_4, PO_4, TN, TP)
  - Seal Analytical, QuAAtro -39
- Elemental analyzer, for analyses of C/N/H/S on solids and glass fibers
  -Elementar, Unicube
- Fluorometer - Perkin Elmer, LS55
- Respicond facility (to measure respiration)
- Inverted microscope also with epifluorescence and cameras - Nikon, Eclipse TE 2000 and Eclipse T*i*



CONTACTS

For analyses contact: Anders Jonsson
Department of Ecology, Environment and Geoscience
Mobile: 070-2778659
E-mail: anders.jonsson@umu.se

MORE INFORMATION

https://www.umu.se/en/research/infrastructure/baf/

Poster I-1

Biopolymer Analytical Platform - BAP

The Biopolymer Analytical Platform (BAP) is dedicated to support research among KBC groups on cell walls of terrestrial and aquatic plants, biopolymer and environmental materials. Our competence lies in applying a large range of standard and advanced methods for the analysis of lignocellulose, as well as in fine detection of soluble sugars and starch. The instrumental backbone for many of those methods is gas chromatography/mass spectrometry (GC/MS). Pyrolysis-GC/ MS is one of the most important analytical devices that quickly yields highly reproducible and comprehensive chemical fingerprinting of carbohydrate and lignin types in samples in the lower microgram range. Pyrolysis-GC/MS can be also used for identification and quantification of microplastics and PFAS in environmental materials.

Postdocs, PhD students or project students with good lab work skills are required to do sample preparation in the BAP lab. We also provide an option to hire a professional staff hourly, in case your group has a lack of lab workers for sample preparation. It is possible to try a new method with us in the form of a project.

EXAMPLES FOR APPLICATIONS

- Pyrolysis-GC/MS for carbohydrate and lignin (G, S and H types) content estimation and for identification of organic compounds in soil/sediment and water
- TMS/Alditol acetate sugar-GC/MS for monosaccharide composition analysis
- Updegraff cellulose/anthrone assay for crystalline cellulose determination
- Klason and acetyl bromide lignin assay for lignin determination
- Enzymatic assays for soluble sugars and starch detection
- Size exclusion chromatography (SEC) for determination of MW, DP etc. of lignocellulose polymers
- Sample preparation and extraction using accelerated solvent extractor (ASE) 350

STEERING COMMITTEE

Totte Niittylä (Director), Dept. of Forest Genetics and Plant Physiology, SLU
Hannele Tuominen, Professor, Dept. of Forest Genetics and Plant Physiology, SLU
Leif Jönsson, Dept. of Chemistry, UMU
Ola Sundman, Dept. of Chemistry, UMU
Stéphane Verger, Dept. of Plant Physiology, UMU
Junko Takahashi-Schmidt, Dept. of Forest Genetics and Plant Physiology, SLU

CONTACT

First contact for the customer: Laboratory manager, Junko Takahashi-Schmidt (Junko.TS@slu.se). We are in KBC G5.

BAP Biopolymer Analytical Platform

MORE INFORMATION

https://www.upsc.se/platforms/cell-wall-analysis/4845-biopolymer-analytical-platform.html

Posters I-2a,b,c

The Biochemical Imaging Centre Umeå - BICU

The Biochemical Imaging Centre Umeå (BICU) provides state-of-the-art imaging technology including advanced light microscopy and atomic force microscopy. BICU is an open-access imaging centre that offers cutting-edge technologies to researchers all over Sweden. Detailed information regarding our imaging centre organization and user fees can be found on our webpage.

We provide access and training to wide range of instruments including widefield, confocal and Tirf microscopy, FLIM, FLIM-FRET, FRAP, super-resolution (SIM and SMLM) and live cell imaging for an optimal spatial and temporal resolution. Furthermore, the centre provides access to Atomic Force Microscopy (AFM) to generate high resolution 3D topographical images and measure mechanical properties such as adhesion, stiffness and deformation of samples ranging from metal, glass, and surfaces coated with biomolecules to live cell under their physiological environment.

Apart from providing microscopy services we also actively take part in programs aimed at training young researchers in the use of the basic as well as advanced microscopy techniques and basic image analysis.

BICU is part of a National Microscopy Infrastructure (NMI): a Swedish infrastructure for the use and support of advanced microscopy in life science. The mission of NMI is to provide faster access to innovative technology and competence in microscopy for the life science research community. NMI also coordinates national and international knowledge exchange programs in microscopy. NMI in Umeå is the node specialized for advanced correlative imaging techniques. Hereby, BICU closely collaborates with Umeå Centre for Electron Microscopy (UCEM) to provide accessibility to various correlative light and electron microscopy (CLEM) techniques both in room temperature and cryo.

CONTACT

Facility Director: Richard Lundmark, richard.lundmark@umu.se
Facility Manager: Irene Martinez Carrasco, irene.martinez@umu.se
Staff Scientist for CLEM: Sebastian Rönfeldt, sebastian.ronfeldt@umu.se
Staff Scientist for AFM: Fouzia Bano, fouzia.bano@umu.se

MORE INFORMATION

https://www.umu.se/en/research/infrastructure/biochemical-imaging-centre-umea-bicu/

Poster I-3

BioMolecular Characterization Unit - BMCU

Research Infrastructure BMCU is an interdisciplinary facility that provides state-of-the-art technology to characterize biomolecules. The facility allows measurement of affinity using different technologies, together with molecular weight analysis, folding and overall structure.

At the facility we offer access, training and consultation for the following instruments:

Isothermal Titration Calorimetry (ITC), Surface Plasmon Resonance (Biacore3000/ ProteOn), Quartz Crystal Microbalance with Dissipation (QCM-D), Mass Photometer, NanoSight and CD spectrophotometer.

CONTACT

For questions about access and training:

Johan Olofsson Edlund

johan.olofsson.edlund@umu.se

Department of Medical Biochemistry and Biophysics

For questions about organization:

Marta Bally and Anna Arnqvist Björklund

marta.bally@umu.se

anna.arnqvist@umu.se

BMCU

MORE INFORMATION

https://www.umu.se/en/research/infrastructure/biomolecular-characterization-umea-/

Posters I-4a,b

Computational Analytics Support Platform - CASP

The Computational Analytics Support Platform (CASP) is a data analytics service at Umeå University (UmU), launched during 2021, within the framework of the Computational Life Science Cluster. CASP is a local co-funded KBC infrastructure that primarily supports, but also trains life scientists in the analysis of experimental data using data-driven tools and strategies. We focus on the analysis of data from a wide range of technologies, with a particular focus on downstream omics (metabolomics/ proteomics).

Our aim is to help bridge the existing gap in data-driven life science, allowing researchers to convert complex data into meaningful biological and chemical interpretations via the use of advanced data-driven tools and strategies. Combined, the group have strong expertise in data-driven life science, in addition to wide domain expert knowledge arising from active engagement with multiple projects in the 'omics' area and beyond. This allows a full understanding of the researcher's needs, not only in terms of the data analysis, but also in how the data was generated and equally important, the interpretation of the biology behind the project.

Support packages we provide

- Packaged and customer-specific data analytics projects
- One-to-one consultations for data analysis support
- Personalised tutorials including theoretical knowledge and hands-on experience using data analysis and processing software
- Extended data analytics support for high-throughput experimental platforms including the Swedish Metabolomics Centre

Services we provide

- Statistical experimental design
- Multivariate data analysis
- Machine learning
- Pathway analysis and interpretation
- Publishing

CONTACT

Please contact the Platform Manager Kate Bennett (katie.bennett@umu.se). We can help with the analysis of many different data types so please feel free to contact us and we will be happy to answer your questions.
We look forward to supporting you in your projects!

MORE INFORMATION

https://www.umu.se/en/research/infrastructure/computational-analytics-support-platform-casp/

Poster I-5

Chemical Biology Consortium Sweden - CBCS

CBCS is a national VR-funded SciLifeLab research infrastructure that enables the identification and development of small molecules for investigating biological systems. These chemical tools provide powerful means to decipher biological pathway functions and generate leads for drug discovery.

CBCS Umeå Capabilities

Expertise & Services

- Development and optimization of biological assays for screening and structure-activity relationship (SAR) analyses
- Target- and cell-based screening for identification of novel chemical tools
- High-content screening (HCS) microscopy for multiparameter analyses at high resolution and throughput
- High-throughput flow cytometry analyses (96- and 384-well plate formats)
- Organic synthesis and medicinal chemistry optimization
- Compound quality profiling and characterization
- Computational chemistry and molecular modeling
- Preparative and analytical chemistry support

Compound Collections

- >350,000 compounds available for small molecule screening at Compound Center, KI
- AstraZeneca collaboration providing access to 14,000 annotated compounds targeting 1,700+ human proteins

Access to CBCS Services

- *Quick access:* Consultations and small service projects (first-come, first-served)
- *Project-based:* Extensive screening and chemistry projects (peer-reviewed, prioritized by scientific merit, impact, and feasibility)
- *Equipment access:* Collaborative agreements or user arrangements

Core Equipment

Screening & Detection

- Plate readers: Biotek Synergy H4, BMG ClarioStar
- High-content screening: Molecular Devices ImageXpress
- High-throughput flow cytometry: Sartorius iQUE3

Automation & Chemistry

- Liquid handling robotics: BC NxP (96/384-well), Wellmate
- HPLC systems: Gilson & Shimadzu
- Fully equipped organic chemistry laboratories

Training

Online course (January 2026): Exploring biology with small molecules: screening tools and strategies

Additional Services

CBCS has nodes at all six partner universities, offering a range of services including fragment-based screening with NMR, screening in BSL-3 environments, cell painting, functional precision medicine, and assessment of compound cardiotoxicity – all accessible to researchers nationwide.

CONTACT

Department of Chemistry, KBC-building, Floor 4C
Erik Chorell: erik.chorell@umu.se
Stina Berglund Fick: stina.berglund.fick@umu.se

MORE INFORMATION

www.cbcs.se ; www.scilifelab.se/units/cbcs;
www.umu.se/en/research/infrastructure/cbcs

CBCS UMU Web

Poster I-6

C-Trap Facility

The C-Trap facility provides access to a dual-trap C-Trap dymo 300 instrument, which combines optical tweezers, multichannel microfluidics, and confocal fluorescence microscopy into a single, fully synchronized system.

This state-of-the-art setup enables real-time visualization of biomolecular interactions and dynamic processes at single-molecule resolution, while simultaneously allowing correlated force measurements.

Facility users receive support and guidance in experimental design, sample preparation, data collection, and analysis. Applications include studies of DNA/RNA–protein interactions, biomolecular conformational changes, and the biomechanical properties of molecules, membranes, and cell walls.

Running costs are covered by user fees.

The C-Trap was funded by Kempestiftelserna, the Faculty of Science and Technology, the Faculty of Medicine, and the Department of Plant Physiology at Umeå Plant Science Centre (UPSC). The facility is hosted by UPSC and is also part of the Chemical Biological Centre (KBC).

Examples of research at the C-Trap

- **DNA/RNA-protein interactions**
  - Direct visualization and kinetics of single-protein binding events
  - Force spectroscopy of protein–nucleic acid complexes
- **Conformational changes in biomolecules**
  - Single-protein folding/unfolding behaviour
  - DNA or RNA secondary/tertiary structure dynamics
- **Visualization and manipulation of dynamic molecular events in real time**
  - Motor proteins (polymerases, helicases)
  - Transcription and translation
  - DNA repair mechanisms
  - Phase separation and biomolecular condensates
- **Biomechanical properties of molecules and cell membranes/walls**
  - Mechanical properties of biomolecules under varying conditions
  - Chromatin compaction and remodelling
  - Cell wall-cell membrane interactions
  - Ligand-cell surface receptor interactions
- **And more… come to us with your project/ideas!**

MazeMap

CONTACT

Rubén Casanova Sáez, C-Trap manager, Dept. of Plant Physiology, Umeå University: ruben.casanova-saez@umu.se

MORE INFORMATION

https://www.upsc.se/platforms/c-trap-facility.html

Poster I-7

High Performance Computing Center North - HPC2N

High Performance Computing Center North (HPC2N) is a national center for Scientific and Parallel Computing as we are a branch of the National Academic Infrastructure for Supercomputing in Sweden (NAISS). HPC2N is a National Data Science Node in ”Epidemiology and Biology of Infections” (DDLS)..

HPC2N is also a local/regional resource for researchers at HPC2N's partners (IRF, LTU, Mittuniversitetet, SLU and UmU). Our Director of HPC2N is Professor Paolo Bientinesi from the Computing Science Department.

We offer different types or hardware for computing and visualization including standard CPUs and Graphical Processing Units (GPU)s. Most common packages for Scientific Research are installed on our cluster for instance GROMACS, VASP, MATLAB, R/ Rstudio, among others.

To get started with our system, we offer different types of training courses including introductory courses, and more specialized courses in topics such as Molecular Dynamics, QM/MM, Git, R, Machine Learning, MPI, Julia, and OpenMP.

We provide a general support through a ticket system and a more advanced support for specific questions from researchers on-demand.

CONTACT

General questions: info@hpc2n.umu.se
More specific questions: support@hpc2n.umu.se

Visiting address:
Umeå University
MIT-building
HPC2N
Campustorget 5, 4th
S-907 36 Umeå
Sweden

HPC2N

MORE INFORMATION

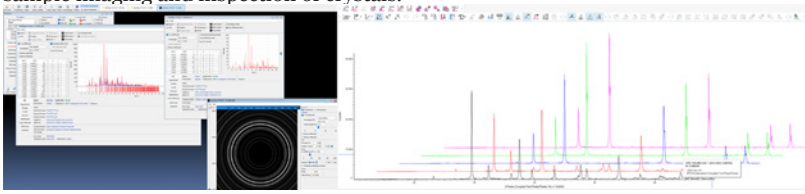
https://www.hpc2n.umu.se/

Poster I-9

Multi-purpose Adaptive X-ray Scattering platform - MAXS

Research infrastructure MAXS offers state-of-the-art X-ray diffraction, total X-ray scattering, and X-ray reflectometry with several sample environments for advanced material characterization to users from academy, industry, or public sectors. The platform also offers a comprehensive data evaluation environment with access to extensive reference databases for data collected at MAXS or elsewhere, including compatibility with data from synchrotron light sources.

The instruments at MAXS are two independent Bruker D8Advance systems with the possibility to choose from three X-ray wavelengths (Cr, Cu, and Mo), line or point X-ray profiles, variable detector configuration with two detector types, and a broad selection of sample stages to match the needs of an experiment. The users can define what they need from an experiment and the instrument can be configured accordingly. An important feature is the automatic sample changer, increasing the sample throughput. This is complemented by stereomicroscopy with imaging capabilities which enables sample imaging and inspection of crystals.



Data evaluation environment is provided locally at MAXS at two workstations with the comprehensive PDF-5+ database, but also via network for internal users permitting local installation within Umeå University with local COD database. Up to 20 users can simultaneously use the evaluation software with local installations of the crystallographic open database (COD) making it readily accessible for both research and education.

COURSES

MAXS hosts a user training course (1.5 ECTS) which includes a basic radiation safety traning module. We will open a longer course in powder X-ray diffraction (7.5 ECTS) in winter 2025/2026 which goes into details about diffraction and different strategies for data analysis.

CONTACT

The managing team consists of Nils Skoglund (manager), Charlie Ma, Markus Carlborg, and Marjan Bozaghian Bäckman. Please contact us at maxs@o365.umu.se if you are interested. We are located in room B6-39-07.

MORE INFORMATION

https://www.umu.se/en/research/infrastructure/multi-purpose-adaptive-x-ray-scattering-platform-maxs/

Poster I-10

µNordic Single Cell Hub - µNiSCH

µNiSCH (µNordic Single Cell Hub) is a cutting-edge infrastructure dedicated to advancing single cell biology at Umeå University. Our facility focuses on consolidating and expanding research in this dynamic field. We are also at the forefront of developing innovative molecular tools for single cell transcriptomics and genomics, with a special emphasis on microbial studies. The facility is located within the Department of Molecular Biology.

Both the advanced equipment and specialized expertise are open to all research groups interested in single cell biology applications on eukaryotic and prokaryotic cells, including:

- Single cell transcriptomics
- Single cell genomics
- Cell-based phenotypic screening assays
- Multi-step biological workflows in single cells
- Spatial distribution of gene expression
- Characterization of tissue microenvironment

Currently, we can offer expertise and access to the following equipment:

Onyx Microfluidics Platform, a microfluidic platform designed to generate and manipulate water-in-oil droplets or semi-permeable capsules for high-throughput single-cell and single-molecule analysis.

Chromium Single Cell Gene Expression system, a cutting-edge platform designed to analyze gene expression at the single-cell level.

BD Rhapsody HT Xpress System, a high-throughput microwell-based technology for advanced single-cell analysis.

The OT-2 multi-well pipetting robot, an automated liquid-handling system designed to streamline and enhance laboratory workflows.

The Pannoramic Midi II, an automatic digital slide scanner for high-throughput microscopy imaging, offering precision and efficiency in pathology and research applications.

LabSat Multiplex immunostaining system, an advanced automated platform designed for rapid and precise immunohistochemistry and immunofluorescence staining, particularly in research and clinical settings.

Celsee Genesis system, enable the capture of cells from liquid biopsies and other sample types. After capture, the enriched cells can be recovered for downstream analysis such as single-cell genomics, digital PCR, or culture.

Mantis Rapid Dispenser System, liquid handling platform designed to streamline and enhance precision in laboratory workflows.

CONTACT

For requests or questions, please contact:

Staff Scientist Dr. Tugrul Doruk (tugrul.doruk@umu.se)

Director of Facility Dr. Kemal Avican (kemal.avican@umu.se)

MORE INFORMATION

https://www.umu.se/en/research/infrastructure/micro-nordic-single-cell-hub/

Poster I-11

NanoLab

NanoLab is an open-access infrastructure located at the Department of Physics. It is a classified Class 100 cleanroom which comprises a variety of advanced fabrication and characterization setups, including, **thin-film deposition system (PVD75 thermal evaporator), nanoimprinter (Obducat NIL 2.5), mask aligner (Karl Süss Mask Aligner MJB3, X-ray diffractometer (PANalytical Xpert3 Powder), optical tensiometer (Attension Theta), low-pressure plasma system (diener electronics ATTO)**, **Four-Point Probe system, High Vacumm AFM,** as well as number of standard pieces of equipment, such as spin coaters, optical microscopes, vacuum ovens, hotplates, UV- curing boxes, analytical scales, etc. , visit NanoLabs website for more technical details, specific parameters and requirements for each individual equipment.

Original manuals and short user manuals for all equipment are to be found in KBC website and in the NanoLab.

The equipment in NanoLab is made available to all scientists at Umeå University, as well as external institutions. '

Besides the equipment available in the Nanolab, the Nanolab offers space for user´s own experiment inside the cleanroom. Users have access to fume hoods and central gases (N_2, Ar, H_2, O_2, liquid CO_2, compressed air) and vacuum in each working station and inside the fume hoods.

Trainings are offered annually for using the cleanroom and for the most of the equipment. Check KBC or Nanolab homepage for recent course announcements or contact Dr. Roushdey Salh (the coordinator of the NanoLab).

The infrastructure is supported by KBC and supervised by experts from department of Physics, Microbiology, and Applied physics and electronics. The NanoLab is used for both research and to educate student in advanced levels.

The NanoLab has special environment, with this unique opportunity comes many responsibilities and restrictions. All users are kindly asked follow the general rules of a cleanroom and to keep an active eye on the overall facilities and taking part in improving the cleanroom. Therefore, every user must take part in the cleanroom training seminar before having the license to use the NanoLab and the facilities independently.

CONTACT

Roushdey Salh, roushdey.salh@physics.umu.se

MORE INFORMATION

https://www.umu.se/en/research/infrastructure/nanolab/

National Bioinformatics Infrastructure Sweden - NBIS

NBIS, National Bioinformatics Infrastructure Sweden, is a distributed national research infrastructure. We are the SciLifeLab bioinformatics platform and the Swedish node in Elixir, a European intergovernmental organisation bringing together life science resources from across Europe. With over a hundred staff members, we work with bioinformatics support, infrastructure and training.

NBIS has staff at six sites: Umeå, Uppsala, Stockholm, Linköping and Lund. We provide expertise in most areas of bioinformatics, including omics analysis, genome assembly/annotation, image analysis and biostatistics. We also offer support in systems development, such as interactive websites and data processing pipelines.

NBIS is mainly funded by the Swedish Research Council, SciLifeLab, the Knut and Alice Wallenberg Foundation, and Swedish universities.

We provide:

- Weekly online drop-in sessions, Tuesdays at 14:00; http://meet.nbis.se/dropin. Join to discuss study design, data analysis or other bioinformatics-related questions.
- Free consultation meetings to discuss study design.
- Hands-on project support, ranging from assistance with smaller tasks to long-term engagement.
- Free, extensive hands-on support to a limited set of projects selected in a peer review process (enabled by a grant from Knut and Alice Wallenberg Foundation).
- Tools, data management, systems development and guidelines for the life science community.
- Introductory and advanced training events, such as workshops in RNAseq data analysis, epigenomics data analysis, tools for reproducible research, python programming, and many other bioinformatics related topics.
- The Swedish Bioinformatics Advisory program - A mentorship program for PhD students interested in guidance from a bioinformatics expert.

CONTACT

For general questions: info@nbis.se
Local contact in Umeå:
Jeanette Tångrot, jeanette.tangrot@umu.se

MORE INFORMATION

https://www.nbis.se

Poster I-12

Nuclear Magnetic Resonance - NMR

The KBC NMR Core facility provides access to state-of-the-art NMR equipment and expertise for all researchers in the KBC and Campus environment. This facility is part of the national infrastructures SwedNMR funded by VR RFI and SciLifeLab and it is operated by the Swedish NMR Centre at the University of Gothenburg and Umeå University. As a national service infrastructure, we grant access to academic and industrial researchers across Sweden.

The NMR facility offers access to powerful liquid and solid-state NMR infrastructure with spectrometers ranging from 400 to 850 MHz. Our ultrafast magic angle spinning probe and cryo-MAS probe are unique for the Nordic countries, enabling high-resolution spectra of proteins and studies and complex biological samples in the solid-state. High-field instruments are equipped with cryo-probes for optimal sensitivity for biomolecular solution NMR and environmental NMR. Robotic sample preparation and sample changers are available for high-throughput applications such as metabolomics and fragment- based screening (FBS).

SERVICE PROVIDED BY THE INFRASTRUCTURE

The NMR core facility offers nation-wide NMR access in four areas: Liquid- and solid-state structure analysis, materials science, metabolite studies and chemical biology. In addition, our personnel provide expertise according to the users need in all areas, from experimental design and sample preparation to data analysis.

Three-dimensional structures can be determined for soluble proteins, solid and membrane-bound proteins, nucleic acids and biomolecular complexes.

Metabolomics can be carried out on liquid and solid samples, including temperature-sensitive biological specimen. Advanced support of the entire process is provided, including bioinformatics data analysis support. Through collaboration with the Swedish Metabolomics Centre, we offer combined NMR- and MS-based metabolomics.

Our solid-state NMR equipment allows structural studies of insoluble protein aggregates such as amyloid fibrils and membrane proteins in their functional lipid environment.

FBS is performed using substance libraries from - and in interaction with - Chemical Biology Consortium Sweden (CBCS).

PERSONNEL

Gerhard Gröbner, prof., Platform Director, Dept of Chemistry
Jürgen Schleucher, prof., Platform Director,
Dept of Med Biochemistry and Biophysics
Mattias Hedenström, Staff Scientist, Dept of Chemistry
Tobias Sparrman, Staff Scientist, Dept of Chemistry
Ilona Dudka, Staff Scientist, Dept of Chemistry
João Figueira, Staff Scientist, Dept of Chemistry

MORE INFORMATION

https://www.umu.se/en/research/infrastructure/nmr/
https://www.scilifelab.se/units/swedish-nmr-centre/
https://www.swednmr.se

Poster I-13

Protein Expertise Platform - PEP

The Protein Expertise Platform (PEP) is a core facility at the Chemical Biological Center (KBC) and a node of the national infrastructure **Protein Production Sweden (PPS)**.

Proteins play a key role in life's processes and the Protein Expertise Platform (PEP) at Umeå University provides custom production of recombinant proteins in E. coli and plant cell suspensions. The PEP has teamed up with six other Swedish protein production platforms and, since 2022, we are part of the Protein Production Sweden (PPS) national research infrastructure for protein production, funded by VR and the local Universities. The PPS provides expert competence in a variety of expression systems, including E. coli, mammalian cells, insect cells, the yeast P. pastoris, plant cells and in cell-free translation, as well as in gene and vector design, production and purification of proteins and quality control. PPS can also produce proteins with different labels (^{13}C, ^{15}N, SeMet, ...) and with inbuilt non-natural amino acids. Researchers can apply for project support through a common application portal found on the PPS website (www.gu.se/pps).

CONTACT

For Project request or questions regarding our services:

Uwe Sauer uwe.sauer@umu.se
Phone: 090-786 5930

MORE INFORMATION

https://www.umu.se/en/research/infrastructure/pep/

Poster I-14

Swedish Metabolomics Centre - SMC

Swedish Metabolomics Centre (SMC) is a national research infrastructure launched in 2013 through an infrastructure grant from the Knut & Alice Wallenberg Foundation, with co-funding from Umeå University and the Swedish University of Agricultural Sciences. Since 2016, SMC has been part of SciLifeLab.

SMC provides access to advanced mass spectrometry-based analyses of small molecules, lipids, and metabolites in biological tissues and fluids. The centre's aim is to support researchers at Swedish universities in conducting high-quality metabolomics studies, while also serving as a knowledge hub in metabolomics and related areas.

SERVICES

All service requests begin with a discussion between the researcher and SMC staff to define the research question and determine the most appropriate analytical strategy. In addition to full-service analyses, SMC offers an Open Access Program (OAP), allowing trained researchers to perform their own analyses using SMC instruments.

- Untargeted metabolite profiling (metabolomics)
- Targeted metabolite profiling (e.g. amino acids, sugars, fatty acids, plant hormones, steroidal hormones)
- Lipid profiling
- Method development
- Basic statistics
- Open lab access services

EQUIPMENT

Mass spectrometers

- Leco Pegasus BT, GCTOFMS
- Leco Pegasus HT, GCTOFMS
- Agilent 7000C, GCQqQMSMS
- Agilent UHPLC-QqQMSMS 6495A
- Agilent UHPLC-QqQMSMS, 6495D (2)
- Agilent 6546 Accurate-Mass UHPLC-QTOFMSMS (2)
- Agilent 6560 Ion Mobility UHPLC-QTOFMSMS

CONTACT

For service requests or questions please contact:
info@swedishmetabolomicscentre.se
Head of Unit: Dr. Annika Johansson
(annika.johansson01@umu.se), +46722445254

Swedish Metabolomics Centre

MORE INFORMATION

https://www.umu.se/en/research/infrastructure/metabolomics/
https://www.swedishmetabolomicscentre.se/

Poster I-15 a,b,c,d

Umeå Center for Electron Microscopy - UCEM

UCEM provides instruments and methods in Transmission Electron Microscopy (TEM) and Scanning Electron Microscopy (SEM). The Center operates as an interdisciplinary University core facility for imaging and advanced Electron Microscopy (EM), and as a national and international research infrastructure for Cryo-EM, electron tomography, EM volume imaging and correlative microscopy methods. UCEM offer service at seven EM instruments, diverse sample preparation equipment as well as computer infrastructure and software for image processing. The facility staff scientist team provides service and training for EM users. Students and researchers have access to advanced sample preparation, imaging and image analyses at UCEM.

SEM instruments, Merlin and Evo, offer high-resolution surface imaging, with multiple detector systems. The Scios DualBeam is an instrument combining SEM with a Focused Ion Beam (FIB) volume imaging, Ga-ion and electron beam lithography. Aquilos 2 is a new FIB-SEM instrument for thin cryo-lamella preparation, cryo-lift-out, and cryo-SEM imaging, with possibilities to combine lamella preparation with subsequent TEM or cryo electron tomography analyses. Service at UCEM also includes cell culture facilities, BSL2 accommodated labs, cell and tissue fixation, resin embedding, ultra-microtome sectioning, Tokuyasu sectioning, immunolabeling and staining techniques. TEM instruments Talos L120 offer ideal TEM solutions for entry level and sample screening, negative staining, studies of cell and tissue morphology. Cryo-EM is the method of choice for structure biology and visualization of hydrated proteins, viruses, cells and small organisms. For cryo-EM samples are plunge frozen in liquid ethane, preserved in amorphous ice and imaged under cryo condition. Glacios 200 kV and Titan Krios 300 kV are equipped with autoloaders for cryo samples and equipped with direct electron detectors, Falcon 4i, including a Selectris energy filter for contrast enhancement at Titan Krios. The method cryo-EM single particle 3D reconstruction and analysis (SPA) is used for structure biology studies and cryo-electron tomography is used to study e.g. molecular complexes, subcellular volumes or microorganisms in 3D. With the same instrument configuration, we collect electron diffraction data from “sub-micro-meter” crystals for atomic structural reconstruction of proteins, molecules and chemical compounds, the method is called MicroED. Correlative Light and Electron Microscopy (CLEM) solutions for finding the precise location of a target proteins or structure of interest simplifying localization and high-resolution imaging of the same sample. Together with BICU, UCEM provides CLEM imaging support, offers micro-patterning on grids and imaging with a cryo stage fluorescence microscopy. UCEM supports sample preparation for MAX IV microscopy beamlines.

The establishment of an advanced EM facility in Umeå was made possible through external funding by the Swedish Research Council, Knut and Alice Wallenberg Foundation, the Kempe Foundations. Operations and services are supported by SciLifeLab.

At the KBC Days 2025, UCEM presents posters on Cryo-EM, Volume EM by FIB, TEM for life sciences, SEM and TEM for material and physical sciences. And support posters on MicroED, CLEM and visiting EM facilities from Luleå TU.

UCEM
Umeå Centre For
Electron Microscopy

CONTACT

For general enquiries: Linda Sandblad, UCEM Director
Visiting address:
Electron Microscopy Building, KB-D, Umeå University
Mobile: +46 (0)70 932 49 36, E-mail: linda.sandblad@umu.se

MORE INFORMATION

https://www.umu.se/en/research/infrastructure/umea-centre-for-electron-microscopy-ucem/

Poster I-15a

UCEM poster:

Volume Electron Microscopy by FIB-SEM at Umeå Centre for Electron Microscopy

Umeå Centre for Electron Microscopy is located in the KBC-building. We support local and national users with a variety of EM techniques such as SEM, TEM, FIB-SEM, SPA, cryoET and microED. We offer our users volume electron microscopy by FIB-SEM with full service on both sample preparation (conventional fixation and HPF+FS) and volume acquisition with our Scios instrument (Thermo fischer scientific). This is a national facility and part of SciLifeLab Integrated Microscopy Technologies.

Volume electron microscopy by FIB-SEM is a new technique, part of the emerging field of volumeEM. This technique can acquire a volume of a sample at excellent isometric resolution (down to 5nm) and large volumes of >10um. A Focused Ion Beam Scanning Electron Microscope (FIB-SEM) is equipped with both an electron beam and an ion beam (Ga+-ions). When a sample is placed at the coincidence point, the same area will be visible with both beams. This area is then consecutively milled with the ion beam and imaged by the electron beam. With a dedicated automated software, a series of 2D electron images is constructed to form a high-resolution 3D-volume of several tens of micrometers in dimensions. Such a volume is then aligned and segmented with a dedicated software to build a detailed model of the given volume.

MORE INFORMATION
https://www.umu.se/en/research/infrastructure/umea-centre-for-electron-microscopy-ucem/

Poster I-16

UCEM support poster: MicroED structure determination and developments

Johan Unge, Linda Sandblad, Uwe Sauer and Niklas Söderholm
Department of Chemistry, Umeå University

The CryoEM technique MicroED, complimentary to both Single-particle analysis and X-ray crystallography, is being implemented since 2023 at Umeå Center for Electron Microscopy and is now an established technique in Umeå. Several targets have been successfully structurally determined using MicroED supporting local, national and international researchers. **Small molecules structures** can be determined directly from powder samples facilitating analysis of only partially crystallized samples. UCEM is also setup to enable **protein structure determination** from nano-crystals which are too small for X-ray synchrotron beamlines. MicroED has been used for several **inorganic samples** at UCEM to verify or identify phases in a complex system. Were for instance high-resolution images of lattices was previously used to identify crystals systems, inherently difficult due to presence of carbon, MicroED can precisely determine the crystal structures of the compounds in a mixed sample.

Resolution ranges are usually 0.6-1.0 Å for inorganic and organic structures, and 1-3 Å for protein and large nucleic acid structures.

The new analysis pipeline Effortless automatically handles the data, enabling anyone without full experience in MicroED to get the most out of the diffraction images. At the same time hardware and software have been updated at UCEM to support MicroED in both manual and automatic mode, providing a more robust workflow and ensures that the MicroED at Umeå is unique and enables structure determination of the most difficult samples.

Current development in protein crystallography regards ways to identify nano-sized crystals in an high-throughput approach, invisible in normal light microscopes, that may be suitable for MicroED structure determination. UCEM is open to all and collaborations on MicroED structure determination are welcome.

MORE INFORMATION
https://www.umu.se/en/research/infrastructure/umea-centre-for-electron-microscopy-ucem/

Poster I-17

UCEM guest:

LUMIA – Bridging Scales in Materials Characterization: Correlative Multiscale Workflows at LUMIA

Erik Nilsson
Luleå Materials Imaging and Analysis (LUMIA), Luleå University of Technology (LTU)

LUMIA – Luleå Material Imaging and Analysis at Luleå University of Technology is a research infrastructure that produces high-quality analytical data supporting publications in leading scientific journals. LUMIA is currently developing an integrated environment for exploring materials across multiple dimensions and scales. Building on recent investments through the **Wallenberg Initiative Materials Science for Sustainability (WISE)**, LUMIA is establishing a **correlative multiscale workflow** that not only connects local laboratory investigations within LUMIA, but also links them to national facilities such as **MAX IV** and **ARTEMI**, as well as to advanced **APT** and **ToF-SIMS** analyses.

This workflow bridges **2-D, 3-D, and 4-D characterization**, enabling researchers to correlate structure, composition, and time-dependent behaviour within a single methodological framework. Newly implemented electron and X-ray imaging systems extend capabilities from nanoscale features to bulk volumes, allowing both high-resolution surface analysis and dynamic in-situ experiments. Together, they create a continuum in which microstructural mechanisms can be studied in direct relation to macroscopic performance.

LUMIA thus serves as a **strong stand-alone analytical facility**, as well as an **entry environment** where experiments can be initiated, refined, and correlated with measurements at large-scale infrastructures such as **MAX IV**, or with specialized instruments such as **APT** or **TEM** at collaborating laboratories. By integrating imaging, spectroscopy, and tomography within a unified data flow, researchers can follow materials from synthesis to degradation—observing how atomic-scale phenomena manifest in real-world performance.

MORE INFORMATION
https://www.ltu.se/en/research/research-infrastructure/lumia---lulea-material-imaging-and-analysis

Poster I-18

Umeå Marine Sciences Centre - UMF

Umeå Marine Sciences Center is a complete research facility with all the platforms required to conduct world-leading research. We have several research vessels, smaller boats, a hovercraft, snowmobiles, mesocosms, a diverse array of field and lab-based analytical instrumentation, a research dive team and an engineering workshop, all underpinning world-class research and innovation.

Our indoor mesocosm facility is one of the most advanced in Europe. It enables us to conduct large-scale deep-water experiments with high precision and accuracy over environmental conditions, including control of temperature, salinity, stratification, convective stirring, haloclines, ice cover, carbonate chemistry and light fields.

Mesocosm highlights:

- 12 replicated 6m deep mesocosms
- Full salinity range (2-34)
- 3 adjustable temperature depths enabling stratification and convective stirring from polar to tropical temperatures (2-30°C accuracy +/- 0.5° C)
- Carbonate chemistry control for example in multiple stressor experiments
- Advanced adjustable light sources emulating daylight spectra for any biome globally
- Control of over-chamber atmospheric air temperature down to -200 C
- Ice cover where freezing or thawing rate can be adjusted
- Intact bottom sediments can be transferred to the mesocosms

At Sea: Umeå Marine Sciences Center also has 12 transportable free-floating mesocosms, designed for experiments in extreme and icy conditions which can be used in situ, or transported to other locations.

In the Laboratory: Our facility contains two experimental halls with smaller mesocosms and aquaria including licencing for fish-based investigations. Our advanced water treatment allows experiments with environmentally hazardous chemicals and pharmaceuticals or biological agents.

A full list of our facilities is available here: https://www.umu.se/en/umea-marine-sciences-centre/infrastructure-and-services/.

Link to funding for free access: https://www.umu.se/en/umea-marine-sciences-centre/funded-infrastructure-access/.

CONTACT
Dr Regina Kolzenburg: regina.kolzenburg@umu.se

MORE INFORMATION
https://www.umu.se/en/umea-marine-sciences-centre/

Poster I-19

Umeå Plant Science Centre Bioinformatics Facility - UPSCb

The UPSC bioinformatics facility (UPSCb) is a small group of bioinformaticians involved in supporting research, training and teaching at UPSC and outside of it.

Since its foundation in 2016, the facility has been handling a total of 314 projects for 65 different principal investigators (PIs); i.e. involving over 50 percent of all research and associated research groups at UPSC.

We have a strong expertise in High Throughput Sequencing (HTS) data analysis, having been involved in the genome assembly of four species and having handled several thousands of RNA-Seq samples (including single-cell sequencing), as well as ribosome profiling, transcription starting site sequencing data, methyl-seq, ATAC-seq, and others.

We offer mainly 4 types of services:

- scientific project's data analysis training: PI "contributes" a PhD / Post-doc who is to be supervised by the facility to learn doing the analyses (800 SEK / h)
- data processing as a service: the facility runs states of the art tools to process the data (800 SEK / h)
- data science teaching: the PI books us to give one or more lessons in a course they are running (500-800 SEK / h)
- data storage: we match the legal requirements by storing two copies on two different media in two locations (800 kr / TB / year)

CONTACT

While UPSC groups have priority, we also work with several groups outside of it, contact us at bioinfo-facility@upsc.se.

MORE INFORMATION

https://www.upsc.se/platforms/upsc-bioinformatics-facility.html

The UPSC Microscopy Facility

The Umeå Plant Science Centre (UPSC) Microscopy Facility offers hands-on introductions, user consultation, and open-access usage following mandatory introduction based on a flat rate fee per hour for usage of equipment.

UPSC Microscopy Facility has the main focus to work with plant images and hence our confocal and multiphoton systems are tailormade for work with thick samples, have spectral detectors to adapt to autofluorescence, very sensitive HyD or GaAsP PMT detectors and long working distance objectives as well as high resolution objectives. We have sectioning equipment, motorized stages for tiling and stitching at our imaging microscopes and often both highly sensitive monochromatic cameras and color cameras. Our latest addition is a Thunder flexisystem stereo/macroscope to remove out of focus blur and thus clarify fluorescence imaging using computational clearing and adaptive deconvolution.

EQUIPMENT

- **Sectioning:** Cryostat – CryoStar NX70 equipped with CryoJane tape system, Vibratome VT1000S, Microtome Zeiss HM 350, Ultramicrotome – Power Tom XL
- **Light microscopes:** Leica DMi8 inverted fluorescence microscope, Leica 205FA epifluorescence microscope, Leica Thunder Imager Model Organism etc.
- **Fluorescence Activated Cell Sorter** (FACS) BD FACS **Aria III** Flow Cytometer and the BD FACS **Melody™** Cell Sorter (new solution eliminate manual steps and simplify your workflow with smart automation. The system is typically ready in less than 17 minutes)
- **Atomic Force Microscope** NanoWizard® 4 XP BioScience with Leica LSI HSC macroconfocal is placed on top.
- **Confocal** microscopes: Zeiss **LSM880** CLSM with airyscan, airyfast, PicoQuant FLIM, FLIM-FRET, FCS, FCCS and inverted stand; Zeiss **LSM800** CLSM with airyscan and upright stand; Leica **Stellaris 8** DIVE multiphoton with White light laser, powerful Mai-Tai multiphoton laser, Tau, Lightning and inverted stand; Nikon CrEST Cicero Spinning Disks for fast imaging and an upright stand Nikon LV100ND microscope; Zeiss **LSM980** CLSM, with black box around the system can either be operated at room temperature or with a temperature-controlled stage insert (10-40°C).
- **Brillouin Microscope -** Label-free, non-invasive mechanical imaging of living plant tissues in 3D. Equipped in 780 nm fibre-coupled laser. Detection by multi-stage dispersive spectrometer with cooled 4.2 MP sCMOS camera and free spectral measurement rangerange ≥ 15 GHz. Fully integrated with Zeiss LSM 780 confocal microscope.

CONTACT

Facility Director: Stéphane Verger stephane.verger@umu.se

Facility managers:

Marta Derba-Maceluch marta.derba-maceluch@slu.se

Luciano Di Fino luciano.di.fino@slu.se

MORE INFORMATION

https://www.upsc.se/platforms/microscopy-facility.html

Vibrational Spectroscopy Core Facility - ViSp

ViSp provides FT-IR and Raman spectroscopy and microspectroscopy services, ranging from design of experiments to measurements and data analysis. ViSp has state-of-the-art instrumentation, including two vacuum bench FTIR spectrometers, two confocal Raman microscopes with 5 laser lines (from 405 to 785 nm), a portable Raman spectrometer and a cutting-edge combined optical photothermal infrared (OPTIR) and Raman microscope. The techniques are suitable to detect and localise (at submicron resolution) chemical changes in a wide range of samples, at high speed and low cost, non-destructively and free of external agents (dyes, markers, labels). ViSp can provide both hardware and software development to adapt the techniques to the needs of the users / projects.

EXAMPLE APPLICATIONS/RESEARCH PROJECTS

Due to the exceptional versatility of the techniques, example projects cover a wide range of scientific disciplines and applications. Among the most prominent are materials sciences (nanotechnology, semiconductors), plant sciences (high-throughput chemotyping/screening, investigating the effects of gene manipulations or environmental factors), environmental sciences and biofuel applications (from microplastics, to biochars, and algae), bio/geo/chemistry (absorption on mineral surfaces, real-time, in situ monitoring of reactions, protein conformational changes) and medicine (assessing tissue compositional changes under various pathological conditions, diagnosing and monitoring disease onset and progression, drug targeting and molecular mechanistic studies, in vivo chemical compositional analysis of tissues). ViSp is primarily research driven and actively participates in projects where new methods need to be developed as well as applying existing methodologies in new areas.

TEACHING ACTIVITIES / COURSES

A User Licence Course is run twice a year, giving a basic introduction to vibrational spectroscopy in general and training users in running their own experiments at ViSp. ViSp is also involved in several courses at Umeå University and SLU.

LOCATION

Chemistry Department, Building C, floors 1 and 6.

CONTACT

András Gorzsás, manager
E-mail: andras.gorzsas@umu.se

VIBRATIONAL SPECTROSCOPY CORE FACILITY

MORE INFORMATION

https://www.umu.se/en/research/infrastructure/visp/

Poster I-20

X-Ray Photoelectron Spectroscopy Platform - XPS

The X-ray photoelectron spectroscopy (XPS) platform is an open infrastructure at Umeå University enabling users both within UmU and outside to obtain analyses of the chemical composition of their sample surface. Knowledge of the elemental composition, oxidation state and spatial distribution of atoms at surfaces, near-surfaces, and interfaces is crucial to our understanding of key reactions in nature and technology. Surfaces are, after all, the interface through which materials - as small as nanoparticles and bacteria, to as big as nuclear fuel reactors and spaceships - interact with their environments. XPS, also known as Electron Spectroscopy for Chemical Analysis (ESCA), is now one of the most widely used tools in countless fields of science and engineering where advanced analyses of surfaces and interfaces is needed. The platform provides surface analysis by XPS, UPS, and LEIPS techniques. Full range of conventional XPS experiments is available including monochromatic Al Kα excitation, angle- resolved XPS, XPS imaging, and cryogenic measurements.

EQUIPMENT

AXIS Ultra DLD is an electron spectrometer manufactured by Kratos Analytical, Ltd. (UK). The instrument was installed at the Dept of Chemistry in 1999 and upgraded twice in 2004 and 2009.

The new XPS spectrometer **AXIS SUPRA+** is installed and put in operation November 2023.

SERVICES

In the outermost 10 nm of a surface (10 atomic layers), XPS provides:

- Identification of all elements (exc. H and He) present in concentrations >0.1 atomic %
- Semi quantitative determination of the elemental surface composition
- Information about the molecular environment (oxidation state, bonding atoms, etc.)
- Non-destructive elemental depth profile 10 nm into the sample and surface heterogeneity assessment
- Lateral variations in surface chemical composition (XPS imaging with spatial resolution of 1-5 µm)
- Studies on wet/hydrated (frozen) samples
- Experimental determination of band gap, work function, electron affinity and ionization energy in materials with UPS (HOMO) and LEIPS (LUMO)

The XPS platform is **the only facility for XPS analyses in Northern Sweden** (north of Uppsala). The platform supports a unique field of research, developed at the Department of Chemistry involving investigations of fast-frozen samples including mineral-aqueous solution interfaces, interfaces of biomaterials with biologically relevant media, and surface chemistry of microorganisms. The platform also supports a large range of research areas by providing state-of-the-art surface analysis in areas including ecology, chemistry, physics, archeology, molecular biology and engineering. .

STEERING BOARD

Andrey Shchukarev (Assoc. Prof., Dept of Chemistry), Knut Irgum (Prof., Dept of Chemistry), Jean-François Boily (Prof., Dept of Chemistry), Ludmilla Morozova-Roche (Prof., Dept of Medical Biochemistry and Biophysics)

CONTACT

Andrey Shchukarev, Dept of Chemistry, KB.C6, B6-35-07 (XPS lab) & B6-33-07 (office), tel. 090-786 5361. andrey.shchukarev@umu.se

MORE INFORMATION

https://www.umu.se/en/research/infrastructure/xps/

X-Ray Diffraction Facility - XRDF

The X-Ray Diffraction Facility (XRDF) at the Dept. of Chemistry and the Chemical Biological Centre takes your project from pure protein (in collaboration with the Protein Expertise Platform, PEP) to 3D structure. The XRDF provides expert crystallographic advice and hands-on access to nano-drop crystallization robots as well as to automated crystal imaging and storage system. Collections of X-ray diffraction data is done on the state of the art X8 PEOTEUM X-Ray diffraction system providing atomic resolution 3D structures of proteins and their complexes with DNA and RNA.

XRDF Crystallization Services

- Crystallization Set-ups in 96-Well Plates (up to 288 different conditions per plate) using Commercial and Custom Crystallization Screens
- Crystal Imaging, Evaluation & Storage
- Optimization of initial crystallization conditions

X-ray Diffraction Data Collection (using in-house X-ray Generator & Synchrotron)

- From Single Crystals (Powders Diffraction also possible)
- X-Ray Crystal Structure Determination
- 3D Structure Refinement, Quality Validation & PDB data deposition

X-Ray User Training Courses

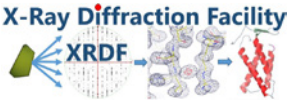
- Course in Crystallography & Crystallization
- User training for crystallization robot and crystal imager (“driver’s licences”)

Collaborations with KBC platforms (added value):

- **PEP**, UCEM, NMR, LCBU, Imaging facility, ..

CONTACT

Uwe Sauer, Assoc. Prof.
e-mail: uwe.sauer@umu.se



MORE INFORMATION

https://www.umu.se/en/research/infrastructure/x_ray_diffraction_facility/

Overview Infrastructure Presentations

Research Infrastructure	Contact persons	Poster	Tour	Drop-in
Biogeochemical Analytical Facility (BAF)	anders.jonsson@umu.se			
Biopolimer Analytical Platform (BAP)	junko.TS@slu.se	**I-1**	Yes (12/11 and after conference)	Yes
Biochemical Imaging Centre Umeå (BICU)	irene.martinez@umu.se sebastian.ronfeldt@umu.se fouzia.bano@umu.se	**I-2a** **I-2b** **I-2c**	Yes (12/11)	
BioMolecule Characterization Unit (BMCU)	johan.olofsson.edlund@umu.se	**I-3**	Yes (after conference)	Yes
Computantional Analytics Support Platform (CASP)	katie.bennett@umu.se	**I-4a** **I-4b**		
Chemical Biology Consortium Sweden (CBCS)	stina.berglund.fick@umu.se	**I-5**		Yes
Clinical Genomics Umeå (CG Umeå)/Genomic Medicine Center North (GMS)	linda.konn@umu.se			
C-Trap Facility	Ruben.casanova-saez@umu.se	**I-6**	Yes (12/11 and after conference)	
High Performance Computing Center North (HPC2N)	pedro.ojeda-may@umu.se	**I-7**	Yes (12/11 and after conference)	
InfraVis	karin.danielsson@umu.se	**I-8**		
Multi-purpose Adaptive X-ray Scattering platform (MAXS)	nils.skoglund@umu.se mahesh.ramakrishnan@umu.se charlie.ma@umu.se	**I-9**	Yes (12/11)	
µNiSCH µNordic Single Cell Hub (µNiSCH)	tugrul.doruk@umu.se	**I-10**	Yes (12/11 and after conference)	Yes
NanoLab	roushdey.salh@umu.se	**I-11**		
National Bioinformatics Infrastructure Sweden (NBIS)	jeanette.tangrod@umu.se	**Roll-up**		
Nuclear Magnetic Resonance Core Facility (NMR)	tobias.sparrman@umu.se	**I-12**	Yes (12/11 and after conference)	Yes
Protein Expertise Platform (PEP)	uwe.sauer@umu.se	**I-13**	Yes (12/11)	Yes
Swedish Metabolomics Centre (SMC)	annika.johansson01@umu.se	**I-14**	Yes (12/11)	
Umeå Centre for Electron Microscopy (UCEM)	linda.sandbland@umu.se sara.henriksson@umu.se sara.sandin@umu.se nils.hauff@umu.se agnieszka.ziolkowska@umu.se	**I-15a** **I-15b** **I-15c** **I-15d**	Yes (12/11)	
UCEM / MicroED	johan.unge@umu.se	**I-16**		

Overview Infrastructure Presentations

Research Infrastructure	Contact persons	Poster	Tour	Drop-in
UCEM guest: LUMIA – Luleå Material Imaging and Analysis at LTU	erik.1.nilsson@ltu.se	**I-17**		
Umeå Marine Sciences Centre (UMF)	regina.kolzenburg@umu.se nick.kamenos@umu.se	**I-18**	Yes (after the conference)	Yes
The UPSC Bioinformatics Facility (UPSCb)	edoardo.piombo@umu.se	**I-19**		Yes
The UPSC Microscopy Facility	marta.derba-maceluch@slu.se	**roll-up**		
Vibrational Spectroscopy Core Facility (ViSp)	andras.gorzsas@umu.se	**roll-up**	Yes (12/11)	Yes
X-Ray Photoelectron Spectroscopy (XPS)	dmitry.shevela@umu.se	**I-20**		
X-Ray Diffraction Facility (XRDF)	uwe.sauer@umu.se			

MORE INFORMATION ABOUT RESEARCH INFRASTRUCTURE AT KBC

https://www.umu.se/en/chemical-biological-centre/kbc-scientific-infrastructures/

Supplementary material of research articles may make it difficult to put Open Science policies into practice

Theresa Kieselbach, Olivia Ekman, Amalia Juneström, Kristoffer Lindell, and Johanna Österåker
Umeå University Library, Umeå University

The Swedish Government wants that Swedish Higher Education Institutions transition to Open Science by 2026. Researchers who receive public funding are expected to publish the results of this research with Open Access and to give access to the research data on which their scholarly publications are based. As for access to research data from public funding, the Swedish Research Council and other funders recommend that this data is as open as possible and as closed as necessary.

A central idea of giving access to research data from public funding is making them re-usable in future research because it is expensive to create new research data. In this context, two building blocks come into play. One of them are standards and the FAIR-data guiding principles that give advice on how researchers should describe their research data and give access to them. The other one is trusted repositories for research data that give researchers the tools that they need to put the FAIR-data guiding principles into practice.

In this study, we screened the recent publications of the Swedish Metabolomics Center at SciLifeLab to learn how researchers who received support from this infrastructure put Open Science into practice. The results from this study can serve as a preliminary model to discuss scholarly publication in life science.

Between 2016 and 2024, SciLifeLab reports 285 research publications that received support from the Swedish Metabolomics Center. The dataset of these publications contains 279 research articles, of which 216 have a Creative Commons License for Open Access.

As for giving access to research data, the dataset includes 93 articles, in which the authors describe how parts of their research data are openly accessible in a trusted repository. In 13 of these cases data from metabolomics experiments are accessible in a trusted repository for metabolomics. In most other cases where researchers gave access to their research data, these data contained nucleic acid sequences and no metabolomics data.

One reason to not give open access to research in a trusted repository is to protect privacy and health information of people who participated in a research study. That applies potentially to 82 of the 285 research articles of this dataset and it does not explain why the number of studies where researchers give access to data from metabolomics experiments is low.

A potential key to understanding this situation might be the common practice to publish research data in the form of supplemental material that the authors of a research article can add to their manuscript. In this dataset, 254 of 285 research articles had supplementary material that contained research data. Our current state of analysis indicates that researchers in life science and natural science prefer sharing research data in the form of supplementary material instead of creating datasets that meet the quality criteria of the FAIR-data principles and Open Science.

A disadvantage of this approach is that research data in supplementary material usually does not follow any standards and does not comply with the FAIR-data principles. We discuss potential implications of this behavior for scholarly communication.

References

This abstract is a revised version of the poster abstract by Kieselbach et al. (2025). https://doi.org/10.17044/scilifelab.29447684.v1. This applies also to the poster.

PhD student presentation abstracts

PhD student presentation abstract

Elevator talk #1✓ **Poster #1**

Burning Question: Where Does Chromium Hide in Bottom Ash?

Jeenu Jegy[1], Kajsa Sigfridsson Clauss[2], Anna Strandberg[1], Jenny Rissler[3], Nils Skoglund[1]

[1] *Thermochemical Energy Conversion Laboratory, Department of Applied Physics and Electronics, Umeå University, Sweden*

[2] *MAX IV Laboratory, Lund University, Sweden*

[3] *Ergonomics and Aerosol Technology, Design Sciences, Lund University, Sweden*

The transgressing planetary boundaries for the flow of phosphorus into water stream advocate the need for nutrient recovery from residual streams to increase phosphorus circularity[1]. Combustion ashes seem to be an effective alternative but limited by toxic metals if present[2]. Because of the volatile nature of most of the heavy metals[3], bottom ash from the boiler could be a potential fertilizing agent as the total concentration of almost all heavy metals are below permissible limit, and due to the high temperature reaction in the boiler, the organic pollutants were also eliminated. In the case of Cr metal, toxicity is oxidation state dependent, and Cr (VI) is toxic as it enters the human system due to the tetrahedral structure, it mimics the phosphate ions and negatively interferes with various biological processes.

This work is related to analyzing the oxidation state of Cr in bottom ash obtained from 10MWth grate-fired boiler at Lycksele, Sweden. The major phase identification of bottomash was carried out using X-ray Diffraction (XRD) at MAXS platform, Umeå university. Because of the ppm-level concentration of Cr, no Cr crystalline phases were identified from the lab XRD. Scanning Electron Microscopy coupled with Energy dispersive Spectroscopy (SEM-EDS), conducted at UCEM, Umeå university, was used to study the elemental correlation which aided in XRD phase identification. Under high magnification traces of Cr spots were identified from SEM-EDS on ash sample casted on epoxy. 100 micrometer thin slices of the same sample were analysed using synchrotron-based X-ray absorption spectroscopy (XAS) together with X-ray fluorescence (XRF) and XRD measurement at Balder beamline, MAX IV Laboratory. XAS is a powerful tool to study the electronic structure of an atom as X-ray Absorption Near Edge Structure (XANES) is oxidation state specific and can be used quantitatively with references. The motive of combining XRF is to find the Cr hotspot, and correlation with other elements. XRD provided crystalline composition at Cr hotspot, and the possibility of Cr to be in a solid solution of an identified main phase from lab XRD. The approach is to elucidate the heterogeneous distribution of Cr in ash matrix by solving the local chemistry of Cr using XAS, and XRD in Cr hotspot of XRF map.

To understand all the possible Cr phases, XAS measurement was also carried out in finely powdered ash sample, this gave qualitative and quantitative details of Cr compounds in the bulk of the sample, the data is useful while considering the fertilizing application of bottom ash integrated along with plant experiment.

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(2) Kasina, M. The assessment of phosphorus recovery potential in sewage sludge incineration ashes — a case study. *Environmental Science and Pollution Research*. DOI: https://doi.org/10.1007/s11356-022-22618-4
(3) Anna Strandberg, M. T., Joel Falk, Marcus Öhman, Nils Skoglund. Morphology and phosphate distribution in bottom ash particles from fixed-bed co-combustion of sewage sludge and two agricultural residues. *Waste Management* **2024**, 177.

PhD student presentation abstract

Elevator talk #2✓ **Poster #2**

ELEVATE – Implementing new technologies into alpine vegetation monitoring programs

Arvid Sjöberg[1], Anna Allard[1], Hans Gardfjell[1], Ruben Valbuena[1] and Sven Adler[1]

[1] Department of Forest Resource Management, SLU Umeå

Environmental monitoring creates a foundation for understanding our natural environment and making informed policy and management decisions (Allard et al 2023). In Sweden, monitoring of open landscapes and habitats is gathered under the NILS (National Inventories of Landscape in Sweden) program. One such habitat is the alpine areas in Northwestern Sweden. The NILS alpine inventory relies on a two-stage inventory design where satellite-derived wall-to-wall models predict which areas that should be visited by field personnel. Ensuring that the correct areas are visited is essential for a cost-effective inventory, underscoring the importance of accurate model predictions. New technical solutions could assist in creating even better models.

In recent years drones have emerged as a mature and versatile tool for data collection. Paired with high-resolution cameras and advanced photogrammetry software, high-quality orthophotos and point clouds can be created. Those data sets can be used for a variety of tasks such as object detection and vegetation cover mapping. Drone imagery can also be used as a bridging solution between field inventories and relatively low-resolution satellite imagery (Steenvoorden et al 2023), creating a “near ground truth” data set. Another emerging area of research is computer vision using DNNs (Deep Neural Networks). Such algorithms paired with drone and satellite data have been successfully used to classify vegetation cover in grasslands (Du et al 2025), however similar research on Scandinavian alpine vegetation types is lacking.

ELEVATE seeks to address these issues by using drone data collected by NILS field personnel along with satellite scenes to develop robust DNN workflows to estimate vegetation cover, type and change. LiDAR, aerial and field data will also be used to fine tune models. The project started in July 2025 and is expected to finish mid-2028, with the goal to deliver a generalized and useable model for project stakeholders.

References

Adler, S., Hedenås, H., Ranlund, Å. & Hagner, Å. (2023) NILS fjällinventering 2022. Working Report 552. Umeå: Swedish University of Agricultural Sciences, Department of Forest Resource Management. ISSN 1401-1204. Available at: https://pub.epsilon.slu.se/id/document/20426259 [Accessed 24 October 2025].

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PhD student presentation abstract

Elevator talk #3✓ **Poster #3**

Light-dependent modulation of sustained quenching during overwintering in *Pinus koraiensis* seedlings

Mingyu Liu[1,2] , Stefan Jansson[2], and Peng Zhang[1,3]

[1] *College of Forestry, Northeast Forestry University, Harbin, 150040, China*

[2] *Umeå Plant Science Centre, Department of Plant Physiology, Umeå University, Umeå, Sweden.*

[3] *Key Laboratory of Sustainable Forest Ecosystem Management, Ministry of Education, Northeast Forestry University, Harbin, 150040, China*

Evergreen conifers in temperate and boreal regions face combined stress from low temperature and high light during winter. To survive, they rely on a sustained quenching mechanism that dissipates excess energy over long periods. *Pinus koraiensis*, a relic conifer dominant in Northeast China, often shows winter injury and needle reddening under full light, whereas shaded seedlings overwinter safely. To determine whether P. *koraiensis* seedlings employ sustained quenching and how it responds to light shifts, we simulated three light environments—full light, shade, and transfer from shade to full light (Trans)—and monitored photosynthetic performance during overwintering and recovery. During winter, Fv/Fm remained low (Light > Shade > Trans). In early spring, DEPS was highest under full light, and thylakoid ultrastructure showed strong destacking, while shade seedlings maintained organized thylakoids. Protein abundance patterns indicated stable regulation under shade and disordered responses under Trans. Upon recovery, Fv/Fm increased faster under shade. These results demonstrate that *P. koraiensis* seedlings utilize sustained quenching under both light conditions but with differing efficiency, while failure to activate it under Trans explains their high photodamage risk and provides insight into winter survival and regeneration strategies.

Keywords: Sustained quenching, Photoprotection, Pinus koraiensis, Light environment, Overwintering

Elevator talk #4✓ **Poster #4**

Longitudinal Assessment of Tubular and Glomerular Kidney Function After COVID-19 – a prospective cohort study

Hanna Jerndal[1]*, Jennifer Ödeen[2]*, Johan Hultdin[2], Guilherme W.F. Barros[3], Alicia Lind[4], [5], Clas Ahlm[1], Mattias Forsell[1], Sara Cajander[6], Anne-Marie Fors Connolly[1], Bernd Stegmayr[7], Johan Normark[1]**, Kristina Stefansson[2]**

[1]Dpt. of Clinical Microbiology, [2]Dpt. of Medical Biosciences, Clinical Chemistry, [3]Integrated Science Lab, Dpt. of Physics, [4]Dpt. of Diagnostics and intervention, [5]The Laboratory for Molecular Infection Medicine Sweden, Umeå University, [6]Dpt. of Infectious Diseases, Örebro University Hospital, [7]Dpt. of Public Health and Clinical Medicine, Umeå University

Background: COVID-19 is a multiorgan disease affecting the kidneys[1-2]. However, the extent of kidney injury, where in the kidney damage occurs and the usefulness of novel kidney injury biomarkers following COVID-19 are yet to be evaluated.

Purpose: To assess kidney injury biomarkers in hospitalized and non-hospitalized COVID-19-patients post SARS-CoV-2 infection.

Method: Plasma samples from 218 COVID-19 patients, recruited in a prospective Swedish study (CoVUm), were analyzed for kidney injury biomarkers during acute COVID-19 disease, 3 months and 6 months post-infection. Novel kidney injury biomarkers Kidney Injury Molecule-1 (KIM-1), osteoactivin, Trefoil Factor 3 and Vascular Endothelial Growth Factor-A (VEGF-A) were analyzed with Meso Scale Discovery sandwich immunoassay[3-4] and compared with clinical kidney injury biomarkers (creatinine and cystatin C)[5]. Differences in kidney injury markers between hospitalized and outpatients were evaluated with Mann-Whitney U-test.

Results: Hospitalized patients were older compared to outpatients (mean age 56 vs. 47 years), represented more men (63.6 vs. 42.3%), had more comorbidities e.g. cardiovascular disease (14.2 vs. 4.2%) and hypertension (35.0 vs. 14.2%), and had a higher BMI (mean 30.4 vs. 24.9 kg/m2). Hospitalized patients had lower $eGFR_{cystatin\ C}$ at all time points, and lower $eGFR_{creatinine}$ 6 months following COVID-19. The markers for tubuli damage, VEGF-A and KIM-1 levels in plasma were higher in hospitalized patients at all 3 time points. Osteoactivin was lower during the acute phase and higher at 3- and 6-months post-infection in hospitalized patients.

Conclusion: Both glomerular and tubular function were more affected in hospitalized patients than in outpatients. Hospitalized COVID-19 patients had lower renal function than outpatients 6 months following COVID-19. $eGFR_{cystatin\ C}$ was a more adequate marker for identifying kidney injury, compared to $eGFR_{creatinine}$ in hospitalized patients, especially during acute infection. The novel biomarkers VEGF-A and KIM-1 correlated to kidney injury and can be useful to predict those at risk of COVID-19-related kidney injury.

References:

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PhD student presentation abstract

Elevator talk #5✓ **Poster #5**

Landscape Breeding: A new paradigm in forest tree management using remote sensing and AI

Annica Nordström, Rosario García Gil

Department of Forest Genetics and Plant Physiology, Umeå Plant Science Centre (UPSC), Swedish University of Agricultural Sciences (SLU)

Background

Our main goal is to develop a digitized game-changing Norway spruce breeding strategy that overcomes the limitations of conventional breeding. Landscape breeding aims to accelerate forest tree improvement by operating directly on commercial forests and accounting for climatic and environmental variables.

Methods

We will build models from ultra-high-resolution remote sensing data to access canopy, branch allometry, stem volume and quality in forest field trials. Then construct predictive models to access frost damage and phyllosphere diseases traits from airborne multispectral high-resolution images in sapling field trials. Finally, we will integrate ultra-high resolution laser scanner phenotyping, multispectral images, and molecular markers to monitor genetic diversity, estimate realized genetic gain and increase the accuracy of selection to accelerate tree selection.

Conclusion

To achieve this, we have five work packages. One for finding new methods for the assessment of canopy branch allometry, stem volume and quality (remote sensing). Another one to develop new models to predict abiotic damage. One to develop a new remote sensing model to predict phyllosphere diseases. One to find the best genomic tool for tree selection, and finally, one for implementation of Landscape Breeding in commercial plantations.

PhD student presentation abstract

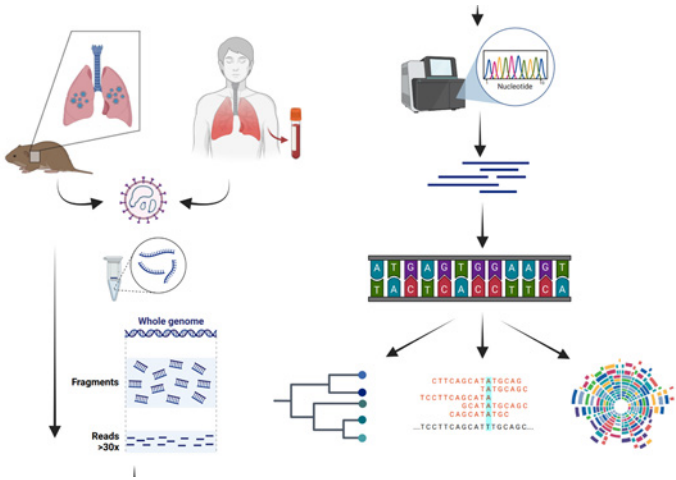
Elevator talk #6✓

Characterizing the Genetic Landscape of Puumala virus in Sweden

Rebecca Lantto[1], Samuel M. Goodfellow[1], William Rosenbaum[2], Yonas Meheretu[3], Anne-Marie Fors Connolly[1], Sebastian Kalucza[1], Lisa Pettersson[1], Clas Ahlm[1], Frauke Ecke[34], Steven Bradfute[5], Pär Larsson[6], and Anne Tuiskunen Bäck[178]

[1] Department of Clinical Microbiology, Umeå University, [2] Department of Medical Biosciences, Umeå University, [3] Department of Wildlife, Fish and Environmental Studies, SLU Umeå, [4] Organismal and Evolutionary Biology Research Programme, University of Helsinki, [5] Center for Global Health, University of New Mexico, [6] Clinical Genomics Umeå, Umeå University, [7] Umeå Centre for Microbial Research, UCMR, Umeå University, [8] Molecular Infectious Medicine Sweden, MIMS, Umeå University

Orthohantaviruses are globally distributed RNA viruses transmitted by rodents, causing severe diseases like Hantavirus cardiopulmonary syndrome and haemorrhagic fever with renal syndrome (HFRS), with mortality rates up to 60%. No effective vaccines or antivirals exist. My research focuses on *Orthohantavirus puumalaense* (PUUV), a HFRS-causing virus endemic in northern Europe. The genetic variability of PUUV in outbreaks remains poorly explored, as sequencing of the viral genome primarily has been conducted on cell-cultured virus strains, not reflecting real world diversity. As a result, complete wild-type genomes have remained largely unavailable. Utilizing a targeted hybrid-capture protocol, we've sequenced complete wild-type PUUV genomes from both human and bank vole samples, some dating back to the 1990s. This enables us to explore viral genetic diversity over time and space, aiming to uncover links between genotypes, disease severity, and transmission. The goal is to better understand PUUVs variability, with the potential to generate insights that may improve diagnostics and inform the development of antiviral strategies and therapeutic antibodies against PUUV and other orthohantaviruses.



Elevator talk #7✓

Genome-wide Characterization of Microbial Gene Functions

Florian Albrecht[a,b,c], Iryna Yakovenko[a,b], Jyoti Verma[a,b,c], Johan Henriksson[a,b,c]

[a]*Department of Molecular Biology, Umeå University, Umeå, Sweden*

[b]*Umeå Centre for Microbial Research (UCMR)*

[c]*Integrated Science Lab (IceLab), Umeå, Sweden*

With the advent of single-cell RNA-seq methods, there have been a lot of insights into transcriptomic heterogeneity and regulation of eukaryotes. However, similar approaches have not yet been established from microbes. One such method is Perturb-seq, which is aimed to map the function of every gene in an organism, in a single experiment. This is done by disrupting genes at random using lentiviral CRISPR/Cas9 followed by single-cell RNA-seq to detect transcriptomic changes. To obtain an analogous assay for microbes, we use Tn5 transposition for perturbation, and develop a new single-cell readout method to detect which gene has been knocked out. Our approach is based on Atrandi semi-permeable capsules and split-pool barcoding, as this system enables advanced bespoke library preparation. Inverse PCR can obtain the location of Tn5 insertions in bulk and work is ongoing to enable the same in single-cell. Simultaneous single-cell RNA-seq is already unlocked in eukaryotic cells and work is ongoing to do the same in microbes. Our method has the potential for a paradigmatic transformation of the research on microbial gene functions.

Poster #6

Syringe Holder with Synchronized Push-Pull

Daniel P.G. Nilsson[1], and Magnus Andersson[1,2]

[1] *Department of Physics, Umeå University, 90187, Sweden*

[2] *Umeå Centre for Microbial Research, Umeå University, 901 87, Sweden*

When performing biological or chemical experiments in open containers, e.g. culture plates or test tubes, steps like washing, staining, or replenishing the sample medium often require a controlled exchange of liquids. This poses a challenge when the sample volume must be kept constant. One way to mitigate this is by operating two syringes in a push-pull configuration, extracting the old liquid while adding the same amount of new liquid.

Since this is hard to do by hand, electronic syringe pumps are often used instead. However, these are expensive to buy and time-consuming to set up. Typically requiring a computer and power supply to run, as well as hoses and connectors to reach the sample. During the last decade, several 3D printable syringe pumps have been developed to help reduce the cost, but these pumps instead require engineering knowledge to construct and program. So, to combat these challenges, we invented a simple syringe holder that mechanically synchronize two syringes in a push-pull configuration, making for easier liquid exchanges in open sample containers. This device can also be used on closed systems, like micro-channels, phantoms models, organ-on-a-chip and fuel cells, to prevent a build-up of pressure and allowing for fluidic multiplexing.

The *Push2Pull* syringe holder accepts standard disposable syringes of sizes 1-60 mL and can be used in the field, requiring no electricity or extra components. The addition/extraction accuracy is measured to more than 98% v/v during the whole travel range. The *Push2Pull* syringe holders can be 3D printed and assembled in the lab by anyone, while costing less than $10 in materials. With this, we hope to increase the accuracy of fluid exchanges and reduce the risk of mistakes, while providing a cheaper and simpler option to electric syringe pumps.

Poster #7

Exploring the relationship between gut bacteria and the protective colonic mucus layer under the influence of diet and antibiotic use

R. H. Feeney[1,2,3], and B. O. Schröder[1,2,3]

[1]Department of Molecular Biology, Umeå University, Umeå Sweden,
[2]Laboratory for Molecular Infection Medicine Sweden (MIMS), Umeå University, Umeå, Sweden,
[3]Umeå Centre for Microbial Research (UCMR), Umeå University, Umeå, Sweden

External factors, such as diet and antibiotics, can have a significant impact on our gut health. With growing concerns surrounding Western style diet (WSD) consumption and continued overuse of antibiotics, it is essential to understand how these factors can affect the gut environment. Previous studies have shown that both diet and antibiotics shape gut microbiota composition, with low dietary fibre content being particularly detrimental.

The colon mucus layer serves as a critical line of defence in the gut, physically separating the gut microbiota from the epithelium and preventing inflammation. Under low-fibre conditions, the microbiota composition can shift, and certain bacteria can begin to metabolise mucus-derived glycans, thereby compromising the integrity of the mucus barrier. Similarly, antibiotics can also alter gut microbiota composition, potentially promoting growth of mucin-utilising bacterial species and disrupting mucus function.

Building on our previous work using human-to-mouse faecal microbiota transplantation and specialised *ex-vivo* mucus function assays, we now aim to deepen our understanding of the interplay between gut bacteria and mucus function. Specifically, we investigate correlations between the abundance of specific bacterial taxa and colonic mucus growth rates, presenting preliminary findings from these analyses.

Furthering our knowledge of how modern dietary patterns and medications affect gut microbiota composition and mucus barrier function is crucial for improving our understanding of gastrointestinal diseases. These insights may help guide the development of new therapeutic strategies and support efforts to promote long-term gut health in the general population.

Poster #8

Critical Role Of *Bacillus cereus* Endospore Appendages In Biofilm Formation and Surface Adhesion Under Industry-Relevant Conditions

Jennie Ann Allred[1], Unni Lise Albertsdottir Jonsmoen[1], Dmitry Malyshev[2], Jonas Segervald[2], Magnus Andersson[2,3] and Marina Elisabeth Aspholm[1]*

[1] *Department of Paraclinical Sciences, Faculty of Veterinary Medicine, Norwegian University of Life Sciences (NMBU), Ås, Norway*

[2] *Department of Physics, Umeå University, Umeå, Sweden*

[3] *Umeå Centre for Microbial Research (UCMR)*

Bacterial species within the *B. cereus* group present a major challenge to the food industry, as they frequently contaminate dairy products and various food items. Their ability to produce resilient endospores makes them especially difficult to eliminate from food processing environments, posing risks to both food quality and consumer safety. The endospores are decorated by various pilus-like endospore appendages (ENAs), which have been shown to facilitate spore-to-spore interactions and are believed to play in a role in both spore adhesion to abiotic surfaces and in biofilm formation (1).

To investigate ENAs role in adhesion to abiotic surfaces, spores of wildtype and isogenic mutant strains lacking ENAs were tested on various materials relevant to food industry environments. The hydrophobicity of the spores, both with and without ENAs, were also assessed, alongside their adhesion properties under conditions of relevance to the industry. The results show that ENAs contribute significantly to spore adhesion to specific materials such as stainless steel and polypropylene, while their contribution is less pronounced on other materials. By testing spore adhesion over time, we found that spores lacking ENAs detached from the surface within 1 hour, whereas wildtype spores remained firmly adhered. This underscores the critical role of ENAs in maintaining prolonged surface attachment. Overall, spores expressing ENAs adhered consistently better than bald spores, regardless of suspension medium and surface material. Spore adhesion is an initial step in biofilm formation, and ENAs are believed to play a role in this process. Our preliminary results indicate that ENAs are essential for maintaining biofilm integrity, resulting in a larger mass compared to those formed by spores lacking ENAs.

Understanding the mechanisms of *B. cereus* spore adhesion and biofilm formation is essential for developing more effective and sustainable cleaning strategies in the food industry, but also necessary to improve food safety.

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Participants

Participants

First name	Last name	E-mail	Affiliation
Abubakar	Abdelbagi	abubakar.abdelbagi@umu.se	Medical Biochemistry and Biophysics, UMU
Agnieszka	Ziolkowska	Agnieszka.Ziolkowska@umu.se	Umeå Centre for Electron Microscopy (UCEM), Chemistry, UMU
Aicha	Kriaa	aicha.kriaa@umu.se	Molecular Infection Medicine Sweden (MIMS), UMU
Ainhoa	Querejeta	ainhoa.querejeta@umu.se	SciLifeLab Umeå
Ajeet	Singh	ajeet.singh@umu.se	Medical Biochemistry and Biophysics, UMU
Albertas	Dvirnas	albertas.dvirnas@umu.se	Icelab, UMU
Aleksandra	Foltynowicz	aleksandra.foltynowicz@umu.se	Physics, UMU
Alexander	Talyzin	alexandr.talyzin@umu.se	Physics, UMU
Alexandra	Aveling	alexandra.aveling@umu.se	Chemistry, UMU
Alexandre	Salou	Alexandre.salou@umu.se	Applied Physics and Electronics, UMU
Alexej	Schmidt	alexej.schmidt@umu.se	Medical Biosciences, UMU
Alice	Kempe		Kempestiftelserna
Alice	Olivier	alol106@student.umu.se	Umeå University
Alva	Abrahamsson	alva.abrahamsson@umu.se	Chemistry, UMU
Alžbeta	Kuižová	alzbeta.kuizova@umu.se	Physics, UMU
Amir	Mahboubi	amir.mahboubi@umu.se	Plant Physiology, UPSC, UMU
Ana	Vital	ana.vital@umu.se	MAL - Environmental Archaeology Lab; Chemistry, UMU
Anders	Eman	anders.eman@slu.se	Forest Genetics and Plant Physiology, UPSC, SLU
Andras	Gorzsas	andras.gorzsas@umu.se	Vibrational Spectroscopy Core Facility (ViSp), Chemistry, UMU
Andrea	Rosina	andrea.rosina@umu.se	Physics, UMU
Andreas	Eriksson	andreas.eriksson@umu.se	Chemistry, UMU
Andreas	Kohleer	andreas.kohler@umu.se	Medical Biochemistry and Biophysics, UMU
Andreas	Tellström	andreas.tellstrom@techtum.se	Techtum
Anika	Reinhardt	anika.reinhardt@umu.se	Chemistry, UMU
Ann	Sehlstedt	ann.sehlstedt@slu.se	Forest Genetics and Plant Physiology, UPSC, SLU
Anna	Arnqvist Björklund	anna.arnqvist@umu.se	Medical Biochemistry and Biophysics, UMU
Anna	Butsyk	anna.butsyk@umu.se	Medical Biochemistry and Biophysics, UMU
Anna	Eriksson	anna.u.eriksson@umu.se	Chemistry, CBCS, UMU
Anna	Nordström	anna.nordstrom01@umu.se	Molecular Infection Medicine Sweden (MIMS), UMU

Participants

First name	Last name	E-mail	Affiliation
Anna	Shevtsova	anna.shevtsova@umu.se	Chemical Biological Centre (KBC), UMU/ SLU
Anna	Strandberg	anna.strandberg@umu.se	Applied Physics and Electronics, UMU
Anna Karin	Nilsson	annakarin.nilsson@umu.se	Medical Biochemistry and Biophysics, UMU
Anna-Karin	Strömberg	anna.karin.stromberg@slu.se	Forest Genetics and Plant Physiology, UPSC, SLU
Annasara	Lenman	annasara.lenman@umu.se	Clinical Microbiology, UMU
Anne	Honsel	anne.honsel@slu.se	Umeå Plant Science Centre, UMU/SLU
Anne	Mirich	anne.mirich@umu.se	Historical, Philosophical and Religious Studies, Archaeology, UMU
Annica	Nordström	annica.nordstrom@slu.se	Forest Genetics and Plant Physiology, UPSC, SLU
Annika	Gärdén	annika.garden@umu.se	Clinical Microbiology, UMU
Annika	Johansson	annika.johansson01@umu.se	Swedish Metabolomics Centre (SMC), Plant Physiology, UPSC, UMU
Ann-Katrin	Israelsson	ann.katrin.israelsson@slu.se	Forest Genetics and Plant Physiology, UPSC, SLU
Anton	Sandström	anton.sandstrom01@umu.se	Ecology, Environment and Geoscience, UMU
Antonio	Rodriguez Blazquez	Antonio.rodriguez@umu.se	Chemistry, Medical Biochemistry and Biophysics, UMU
Anubha	Yadav	anubha.yadav@umu.se	Chemistry, UMU
Anup	Ram	anup.ram@umu.se	Molecular Biology, MIMS, UMU
Aparna	Biswas	aparna.biswas@umu.se	Molecular Biology, UMU
Arabela	Vivar Morón	arabela.vivar@umu.se	Molecular Biology, UMU
Arindan	Mandal	arindan.mandal@umu.se	Ecology, Environment and Geoscience, UMU
Artem	Piddubnyi	artem.piddubnyi@umu.se	Medical Biochemistry and Biophysics, UMU
Arvid	Sjöberg	arvid.sjoberg@slu.se	Forest resource management, SLU
Åsa	Berglund	asa.berglund@umu.se	Ecology, Environment and Geoscience, UMU
Åsa	Strand	asa.strand@umu.se	Plant Physiology, UPSC, UMU
Audrey	Rigaud	audrey.rigaud@umu.se	Plant Physiology, UPSC, UMU
Axel	Karlsson	axel.karlsson@umu.se	Molecular Biology, UCMR, UMU
Azam	Mahmoudi Aznaveh	azam.mahmoudi-aznaveh@umu.se	Umeå Centre for Molecular Medicine (UCMM), UMU
Bastien	Dauphin	bastien.dauphin@umu.se	Plant Physiology, UPSC, UMU
Behnam	Lak	behnam.lak@umu.se	Chemistry, UCEM, UMU
Ben	Johns	ben.johns@umu.se	Physics, UMU

Participants

First name	Last name	E-mail	Affiliation
Benedicte Riber	Albrectsen	benedicte.albrectsen@umu.se	Plant Physiology, UPSC, UMU
Bhaskara Rao	Yenduri	bhaskara.yenduri@umu.se	Chemistry, UMU
Bianka	Csitari	bianka.csitari@bionordika.se	BioNordika Sweden AB
Björn	Schröder	bjorn.schroder@umu.se	Molecular Biology, UMU
Brigitte	Mukarunyana	brigitte.mukarunyana@umu.se	Chemistry, UMU
Cecilia	Pettersson	cecilia.pettersson@slu.se	Forest Genetics and Plant Physiology, UPSC, SLU
Cemal	Erdem	cemal.erdem@umu.se	Medical Biosciences, UMU
Chandan	Kumar	chandan.kumar@umu.se	Chemistry, UMU
Changchun	Chen	changchun.chen@umu.se	Molecular Biology, UMU
Chaojun	Tang	chaojun.tang@umu.se	Chemistry, UMU
Charikleia	Nikolaou	charikleia.nikolaou@slu.se	Forest Genetics and Plant Physiology, UPSC, SLU
Charlie	Ma	charlie.ma@umu.se	Multi-purpose Adaptive X-ray Scattering platform (MAXS), UMU
Christian	Kugge	christian.kugge@sca.com	SCA Forest Products
Christoffer	Boman	christoffer.boman@umu.se	Applied Physics and Electronics, UMU
Clara	Cuesta Turull	clara.cuesta.turull@slu.se	Forest Genetics and Plant Physiology, UPSC, SLU
Clarice D.	Aiello		Quantum Biology Institute
Claudia	Salou-Quineche	claudia.quineche@umu.se	Chemistry, UMU
Corentin	Fournier	corentin.fournier@umu.se	Ecology, Environment and Geoscience, UMU
Cristian	Ramirez Gutierrez	cristian.ramirez.gutierrez@umu.se	Ecology, Environment and Geoscience, UMU
Cristine	Tagliapietra Schons	cristine.tagliapietra.schons@slu.se	Forest Genetics and Plant Physiology, UPSC, SLU
Daniel	Nilsson	daniel.pg.nilsson@umu.se	Physics, UMU
Daniel	Scheller	daniel.scheller@umu.se	Molecular Biology, UMU
Daniel	Svensson	daniel.svensson@umu.se	Ecology, Environment and Geoscience, UMU
Daniela	Muraja	daniela.muraja@slu.se	Forest Genetics and Plant Physiology, UPSC, SLU
Deniz	Meydan	deniz.meydan@cytiva.com	Cytiva
Dennis	Svedberg	dennis.svedberg@umu.se	Chemistry, MIMS, UMU
Dhruba	Khakurel	dhruba.khakurel@slu.se	Forest Genetics and Plant Physiology, UPSC, SLU

Participants

First name	Last name	E-mail	Affiliation
Diego Alejandro	Miranda	diego.miranda@umu.se	Chemistry, UMU
Dinesh	Dhurvas Chandrasekaran	dinesh.dhurvas@umu.se	Molecular Infection Medicine Sweden (MIMS), Wallenberg Centre for Molecular Medicine at Umeå University (WCMM), UMU
Diya Elizabeth	Shaji	diya.shaji@umu.se	Molecular Biology, UMU
Dmitry	Malyshev	dmitry.malyshev@umu.se	Physics, UMU
Dmitry	Shevela	dmitry.shevela@umu.se	X-Ray Photoelectron Spectroscopy (XPS), Chemistry, UMU
Dmytro	Sokol	dmytro.sokol@umu.se	Chemistry, UCMR, UMU
Edgar	Sanchez	edgar.sanchez@slu.se	Forest Genetics and Plant Physiology, UPSC, SLU
Edoardo	Piombo	edoardo.piombo@umu.se	The UPSC Bioinformatics Facility, Plant Physiology, UPSC, UMU
Ehsan	Estaji	ehsan.estaji@umu.se	Plant Physiology, UPSC, UMU
Ekaterina	Chernova	ekaterina.chernova@umu.se	Physics, UMU
Elin	Larsson	Elin.larsson@umu.se	Medical and Translational Biology, UMU
Elin	Näsström	elin.m.nasstrom@slu.se	Forest Genetics and Plant Physiology, UPSC, SLU and SMC
Elin	Pudas	elin.pudas@ uminovainnovation.se	Uminova Innovation
Elisabeth	Baland	elisabeth.baland@umu.se	Chemistry, UMU
Elisabeth	Sauer-Eriksson	elisabeth.sauer-eriksson@ umu.se	Chemistry, UMU
Eliska	Prchalova	eliska.prchalova@umu.se	Chemistry, UMU
Emelie	Boström	emelie.bostrom@umu.se	Chemistry, UMU
Emma	Rohdin	emma.rohdin@slu.se	Forest Genetics and Plant Physiology, UPSC, SLU
Eric	Capo	eric.capo@umu.se	Ecology, Environment and Geoscience, UMU
Erik	Chorell	erik.chorell@umu.se	Chemistry, UMU
Erik	Nilsson	erik.1.nilsson@ltu.se	Luleå Materials Imaging and Analysis (LUMIA) LTU
Erik	Steinvall	erik.steinvall@umu.se	Applied Physics and Electronics, UMU
Eva	Selstam	eva.selstam@umu.se	Plant Physiology, UPSC, UMU
Felicia	Granberg	felicia.granberg@umu.se	Clinical Microbiology, MIMS, UMU
Feven	Solomon	feven.solomon@ nordicbiolabs.se	Nordic Biolabs
Florian	Albrecht	florian.albrecht@umu.se	Molecular Biology, UMU

Participants

First name	Last name	E-mail	Affiliation
Florian	Schmidt	florian.schmidt@umu.se	Applied Physics and Electronics, UMU
Fouzia	Bano	fouzia.bano@umu.se	Biochemical Imaging Centre Umeå (BICU), UMU
Francisco Javier	Contreras Moreno	francisco.contreras@umu.se	Molecular Biology, UCMR, UMU
Franziska Lilian	Brunozzi	franziska.brunozzi@slu.se	Forest Genetics and Plant Physiology, UPSC, SLU
Fredrik	Almqvist	fredrik.almqvist@umu.se	Chemistry, UCMR, MIMS, UMU
Gabriel	Torrens	gabriel.torrens@umu.se	Molecular Biology, UMU
Georgia Antonia	Vergou	georgia.vergou@umu.se	Chemistry, UMU
Gerard	Rocher-Ros	gerard.rocher.ros@umu.se	Ecology, Environment and Geoscience, and IceLab, UMU
Gergö	Mótyán	gergo.motyan@umu.se	Chemistry, UMU
Gerhard	Gröbner	gerhard.grobner@umu.se	Chemistry, UMU
Gopinathan	Manavalan	gopinathan.manavalan@umu.se	Forest Biomaterials and Technology, SLU
Gunnar	Öquist	gunnar.oquist@umu.se	Forest Genetics and Plant Physiology, UPSC, SLU
Gustavo	Carvalho	gustavo.carvalho@umu.se	Chemistry, UMU
Hanna	Jerndal	hanna.jerndal@umu.se	Clinical Microbiology, UMU
Hanna	Öhman	hanna.ohman@umu.se	Plant Physiology, UPSC, UMU
Haris Ali	Khab	haris.khan@umu.se	Plant Physiology, UPSC, UMU
Heidi	Burdett	heidi.burdett@umu.se	Ecology, Environment and Geoscience, Umeå Marine Sciences Centre (UMF), UMU
Helene	Wahlstedt	helene.wahlstedt@bionordika.se	BioNordika
Héloïse	Chat	heloise.chat@umu.se	Molecular Infection Medicine Sweden (MIMS)
Hui	Liu	hui.liu@umu.se	Ecology, Environment and Geoscience, UMU
Huibin	Wang	huibin.wang@slu.se	Forest Genetics and Plant Physiology, UPSC, SLU
Ieva	Ragaisyte	ieva.ragaisyte@umu.se	Chemistry, UMU
Iftikhar	Ahmad	iftikhar.ahmad@slu.se	Forest Genetics and Plant Physiology, UPSC, SLU
Ikenna	Obi	ikenna.obi@umu.se	Medical Biochemistry and Biophysics, UMU
Ilian Giordano	Ponce Pineda	giordano.ponce@umu.se	Plant Physiology, UPSC, UMU
Ilona	Dudka	ilona.dudka@umu.se	Chemistry, UMU

Participants

First name	Last name	E-mail	Affiliation
Ingrid	Söderbergh	ingrid.soderbergh@umu.se	Clinical Microbiology, UCMR, UMU
Ioannis	Theodorou	ioannis.theodorou@umu.se	Plant Physiology, UPSC, UMU
Irene	Martinez	Irene.martinez@umu.se	Biochemical Imaging Centre Umeå (BICU), Medical Biochemistry and Biophysics, UMU
Irina	Iakovleva	irina.iakovleva@umu.se	Chemistry, UMU
Iryna	Tkachenko	Iryna.tkachenko@umu.se	Medical Biochemistry and Biophysics, UMU
Jan	Karlsson	Jan.p.karlsson@umu.se	Ecology, Environment and Geoscience, UMU
Janis	Heuer	janis.heuer@umu.se	Chemistry, UMU
Jeanette	Tångrot	jeanette.tangrot@umu.se	National Bioinformatics Infrastructure Sweden (NBIS), Plant Physiology, UPSC, UMU
Jed	Biolcati-Brennan	jed.biolcati.brennan@slu.se	Forest Genetics and Plant Physiology, UPSC, SLU
Jeenu	Jegy	jeenu.jegy@umu.se	Applied Physics and Electronics, UMU
Jennie	Allred	Jennie.ann.allred@nmbu.no	Norwegian University of Life Sciences, The Faculty of Veterinary Medicine
Jenny	Lundqvist	jenny.lundqvist@umu.se	Chemistry, UMU
Jia	Wang	jia.wang@umu.se	Physics, UMU
Jingyu	Pan	jingyu.pan@umu.se	Medical and Translational Biology , UMU
Joanna	Porankiewicz Asplund	joanna@agrisera.com	Agrisera Antibodies
João	Figueira	joao.figueira@umu.se	Chemistry, UMU
Joaquin	Fernandes	joaquin.fernandez@slu.se	Plant Physiology, UPSC, UMU
Johan	Henriksson	johan.henriksson@umu.se	Molecular Biology, UMU
Johan	Jonsson	johan.jonsson@umu.se	Physics, UMU
Johan	Nordlund	Johan.Nordlund@ umuholding.se	Umeå University Holding AB
Johan	Trygg	johan.trygg@umu.se	Chemistry, UMU
Johan	Unge	johan.unge@umu.se	Chemistry, UCEM, UMU
Johan	van Snippenberg	johan.van.snippenberg@ umu.se	Ecology, Environment and Geoscience, UMU
Johan	Olofsson Edlund	johan.olofsson.edlund@ umu.se	BioMolecule Characterization Unit (BMCU), UMU
Johanna	Ivarsson	johanna.ivarsson@slu.se	Forest Genetics and Plant Physiology, UPSC, SLU
Johannes	Messinger	johannes.messinger@umu.se	Plant Physiology, UPSC, UMU
Jonas	Segervald	jonas.segervald@umu.se	Physics, UMU
Jordan	Barrows	jordan.barrows@umu.se	Molecular Biology, UMU
Josy	ter Beek	josy.beek@umu.se	Medical Biochemistry and Biophysics, UMU

Participants

First name	Last name	E-mail	Affiliation
Julianna	Neyvaldt	julianna.neyvaldt@bernerlab.se	Berner Lab
Junko	Schmidt	junko.ts@slu.se	Biopolimer Analytical Platform (BAP), Forest Genetics and Plant Physiology, UPSC, SLU
Jurgen	Schleucher	jurgen.schleucher@umu.se	Medical Biochemistry and Biophysics,UMU
Jyoti	Verma	jyoti.verma@umu.se	Clinical Microbiology, UMU
Karin	Danielsson	karin.danielsson@umu.se	InfraVis, Humlab, UMU
Karina	Persson	karina.persson@umu.se	Chemistry, UMU
Karl	Poncha	karl.poncha@umu.se	Molecular Biology, MIMS, UMU
Katarína	Cacaná	katarina.cacana@umu.se	Medical Biochemistry and Biophysics, UMU
Katarzyna	Jankowska	katarzyna.jankowska@umu.se	Chemistry, UMU
Kateryna	Hrimanova	grimanova.ket@gmail.com	Chemistry, UMU
Katie	Bennett	katie.bennett@umu.se	Computational Analytics Support Platform (CASP), Chemistry, UMU
Keh Chien	Lee	keh.chien.lee@slu.se	Forest Genetics and Plant Physiology, UPSC, SLU
Keith	Larson	keith.larson@umu.se	Ecology, Environment and Geoscience, UMU
Keridwen	Whitmore	keridwen.whitmore@umu.se	Ecology, Environment and Geoscience, UMU
Keshi	Chung	keshi.chung@umu.se	Molecular Biology, UMU
Kia	Skalin	kia.skalin@umu.se	Chemistry, UMU
Kieran	Deane-Alder	kieran.deane-alder@umu.se	Medical Biochemistry and Biophysics, MIMS, WCMM, UMU
Kiran	Dhobale	kiran.dhobale@umu.se	Clinical Microbiology, UMU
Kishan	Mandal	kishan.mandal@umu.se	Chemistry, UMU
Konstantinos	Magkakis	konstantinos.magkakis@umu.se	Chemistry, UMU
Kumar	Saumya	kumar.saumya@umu.se	Physics, UMU
Lars	Litzén	lli@ninolab.se	Ninolab
Lars	Nilsson	lars.nilsson@umu.se	Molecular Biology, UMU
Lars-Anders	Carlson	lars-anders.carlson@umu.se	Medical Biochemistry and Biophysics, UMU
Laura	Bacete Cano	laura.bacete@umu.se	Plant Physiology, UPSC, UMU
Laura	Carroll	Laura.carroll@umu.se	Clinical Microbiology, UMU
Laura	Morales	laura.morales@slu.se	Forest Genetics and Plant Physiology, UPSC, SLU
Linda	Sandblad	linda.sandblad@umu.se	Chemistry, UMU

Participants

First name	Last name	E-mail	Affiliation
Linda	Köhn	linda.kohn@umu.se	Clinical Genomics Umeå, Medical Biosciences, UMU
Lisa	Johansson	lisa.m.johansson@umu.se	Medical Biochemistry and Biophysics, UMU
Lorene	Gonnin	lorene.gonnin@umu.se	Chemistry, UMU
Lorinda Devi	Loitongbam	lorinda.devi.loitongbam@slu.se	Forest Genetics and Plant Physiology, UPSC, SLU
Louisa	Eurich	louisa.eurich@slu.se	Forest Resource Management, SLU
Louise	Lindbäck	louise.lindback@umu.se	Clinical Microbiology, UMU
Lucía	Pérez	lucia.perez@umu.se	Chemistry, Molecular Biology, UMU
Ludmilla	Morozova-Roche	ludmilla.morozova-roche@umu.se	Medical Biochemistry and Biophysics, UMU
Ludvig	Lizana	ludvig.lizana@umu.se	Physics, UMU
Luis Jose	Fernando	luis.fernando@umu.se	Ecology, Environment and Geoscience, UMU
Madeleine	Cauwel	madeleine.cauwel@umu.se	Chemistry, UMU
Madhusree	Mitra	madhusree.mitra@slu.se	Umeå Postdoc Society (UPS), Forest Genetics and Plant Physiology, UPSC, SLU
Magnus	Anderson	magnus.andersson@umu.se	Physics, UMU
Magnus	Lundell	mlu@ninolab.se	Ninolab
Mahesh	Ramakrishnan	mahesh.ramakrishnan@umu.se	Applied Physics and Electronics, UMU
Maja	Lindström	maja.lindstrom@umu.se	Icelab, UMU
Manikkaraja	Chidhambaram	manikkaraja.chidhambaram@umu.se	Medical Biochemistry and Biophysics,UMU
Manish	Bhattacharjee	manish.bhattacharjee@umu.se	Medical and Translational Biology, UMU
Manju	Maharjan	manju.maharjan@umu.se	Plant Physiology, UPSC, UMU
Manoj Kumar	Mandal	manoj.kumar.mandal@slu.se	Forest Genetics and Plant Physiology, UPSC, SLU
Manuel	Serif	manuel.serif@umu.se	Chemistry, UMU
Manuela	Jurca	manuela.jurca@umu.se	Plant Physiology, UPSC, UMU
Marco	Bassani	marco.bassani@umu.se	Chemistry, UMU
Marcus	Johansson	marcus.johansson@cytiva.com	Cytiva
Marcus	Wallin	marcus.wallin@slu.se	Swedish Infrastructure for Ecosystem Science (SITES)
Maria	Ahnlund	maria.ahnlund@slu.se	Forest Genetics and Plant Physiology, UPSC, SLU
Maria	Eriksson	maria.eriksson@umu.se	Plant Physiology, UPSC, UMU
Maria	Klintenäs	maria.klintenas@slu.se	SLU Holding

Participants

First name	Last name	E-mail	Affiliation
Marianne	Sommarin	marianne.sommarin@umu.se	Plant Physiology, UPSC, UMU
Marie	Lindgren	marie.lindgren@umu.se	Clinical Microbiology, UMU
Mariia	Morozan	mamo0460@student.umu.se	Chemistry, Umeå University
Marketa	Buderova	Marketa.Buderova@slu.se	Forest Genetics and Plant Physiology, UPSC, SLU
Marta	Bally	marta.bally@umu.se	Clinical Microbiology, UMU
Marta	Derba-Maceluch	marta.derba-maceluch@slu.se	The UPSC Microscopy Facility, Forest Genetics and Plant Physiology, UPSC, SLU
Martina	Wölflingseder	martina.wolflingseder@umu.se	Molecular Biology, UMU
Max	Renner	max.renner@umu.se	Chemistry, UMU
Max	Yan	max.yan@umu.se	Applied Physics and Electronics, UMU
Maxime	Donzel	maxime.donzel@umu.se	Chemistry, UMU
May Si Min	Ho	may.ho.si.min@umu.se	Molecular Biology, UMU
Megha	Megha	megha.megha@umu.se	Molecular Biology, UMU
Mikael	Elofsson	mikael.elofsson@umu.se	Chemistry, UMU
Mikael	Peedu	mikael.peedu@umu.se	Umeå Marine Sciences Centre (UMF)
Mingyu	Liu	mingyu.liu@umu.se	Plant Physiology, UPSC, UMU
Mireia	Mallorquí	mireia.mallorqui@umu.se	Molecular Biology, UMU
Mitul	Srivastava	mitul.srivastava@umu.se	Chemistry, UMU
Mizuki	Taguchi	mizuki.taguchi@umu.se	Molecular Infection Medicine Sweden (MIMS), UMU
Mohammad	Ilyas	ilyas.mohammad@umu.se	Molecular Biology, MIMS, UMU
Morgan	Jones	morgan.jones@umu.se	Ecology, Environment and Geoscience, UMU
Najat	Dzaki	najat.dzaki@umu.se	Umeå Postdoc Society (UPS)
Nasim	Sabouri	nasim.sabouri@umu.se	Medical Biochemistry and Biophysics, UMU
Nhat Long	Le	long140402@gmail.com	Chemistry, UMU
Nick	Kamenos	nick.kamenos@umu.se	Umeå Marine Sciences Centre (UMF), UMU
Nicolò	Maccaferri	nicolo.maccaferri@umu.se	Physics, UMU
Nils	Skoglund	nils.skoglund@umu.se	Multi-purpose Adaptive X-ray Scattering platform (MAXS), UMU
Nils Valentin	Hauff	nils.hauff@umu.se	Umeå Centre for Electron Microscopy (UCEM), Chemistry, UMU
Ola	Billing	ola.billing@umu.se	Diagnostics and Intervention, UMU
Oleksandr	Ilchenko	oleksandr.ilchenko@slu.se	Forest Genetics and Plant Physiology, UPSC, SLU
Olena	Rakhimova	olena.rakhimova@umu.se	Odontology, UMU

Participants

First name	Last name	E-mail	Affiliation
Olivier	Keech	olivier.keech@umu.se	Plant Physiology, UPSC, UMU
Ololade	Awoyomi	ololade.awoyomi@umu.se	Medical Biochemistry and Biophysics, UMU
Omotayo	Sindiku	omotayo.sindiku@umu.se	Chemistry, UMU
Ondrej	Hodek	ondrej.hodek@slu.se	Forest Genetics and Plant Physiology, UPSC, SLU
Pär	Byström	par.bystrom@umu.se	Ecology, Environment and Geoscience, UMU
Paulina	Wanrooij	paulina.wanrooij@umu.se	Medical Biochemistry and Biophysics, UMU
Pedro	Ojeda May	pedro.ojeda-may@umu.se	High Performance Computing Center North (HPC2N), UMU
Peggy	Roth	peggy.roth@nordicbiolabs.se	Nordic Biolabs
Per Ola	Andersson	perola.andersson@foi.se	FOI, CBRN Defence and security (in Umeå)
Petter	Marthall	petter.marthall@integra-biosciences.com	INTEGRA Biosciences
Poonam	Bharti	poonam.bharti@umu.se	Medical Biochemistry and Biophysics, UMU
Poul Martin	Bendix		Biocomplexity, University of Copenhagen
Qinsong	Yang	qinsong.yang@slu.se	Forest Genetics and Plant Physiology, UPSC, SLU
Rabindra	Das	rabindra.das@umu.se	Chemistry, UMU
Rachel	Feeney	rachel.feeney@umu.se	Molecular Biology, MIMS, UCMR, UMU
Raghumoy	Ghosh	raghumoy.ghosh@umu.se	Molecular Biology, UMU
Rahul	Puthan Valappil	rahul.puthan.valappil@slu.se	Forest Genetics and Plant Physiology, UPSC, SLU
Rashmi	Arora	Rashmi.arora@umu.se	Medical and Translational Biology, UMU
Rasmus	Öberg	rasmus.oberg@umu.se	Physics, UMU
Rebecca	Lantto Reinman	rebecca.lantto@umu.se	Clinical Microbiology, MIMS, UCMR, UMU
Regina	Kolzenburg	regina.kolzenburg@umu.se	Umeå Marine Sciences Centre (UMF), UMU
Riccardo	Diamanti	riccardo.diamanti@thermofisher.com	ThermoFisher Scientific
Rishabh	Karnawat	rishabh.karnawat@umu.se	Chemistry, UMU
Roger	Festin	roger.festin@nordicbiosite.com	Nordic Biosite
Roushdey	Salh	Roushdey.Salh@umu.se	NanoLab, UMU
Ruben	Casanova Saez	ruben.casanova-saez@umu.se	C-Trap Facility, Plant Physiology, UPSC, UMU
Ryo	Morimoto	ryo.morimoto@umu.se	Molecular Biology, MIMS, UCMR, UMU
Saba	Parween	saba.parween@umu.se	Molecular Infection Medicine Sweden (MIMS)
Sabrina	Galizia	sabrina.galizia@umu.se	Clinical Sciences, UMU
Sagar	Bhat	sagar.bhat@umu.se	Plant Physiology, UPSC, UMU

Participants

First name	Last name	E-mail	Affiliation
Sakina	Khwaja	sakina.khwaja@umu.se	Chemistry, UMU
Samantha	The	samantha.the@slu.se	Umeå Plant Sciences Centre, SLU
Samrat	Banerjee	samrat.banerjee@umu.se	Forest Genetics and Plant Physiology, UPSC, SLU
Sandra	Holmberg	sandra.holmberg@umu.se	Molecular Biology, UMU
Sanja	Vanhatalo	Sanja.vanhatalo@umu.se	Molecular Biology, UMU
Santosh	Khokarale	santosh.khokarale@umu.se	Chemistry, UMU
Sara	Henriksson	sara.henriksson@umu.se	Umeå Centre for Electron Microscopy (UCEM), Chemistry, UMU
Sara	Sandin	sara.sandin@umu.se	Umeå Centre for Electron Microscopy (UCEM), Chemistry, UMU
Saumita	Chakravarty	saumita.chakravarty@umu.se	Chemistry, UMU
Sebastian	Rönfeldt	sebastian.ronfeldt@umu.se	Biochemical Imaging Centre Umeå (BICU), UCEM, UMU
Sena Gizem	Süer	sena.gizem@umu.se	Molecular Biology, UMU
Sepideh	Farmand	Sepideh.farmand@umu.se	Medical Biochemistry and Biophysics, UMU
Shalini	Shalini	shalini.shalini@umu.se	Chemistry, UMU
Shaochun	Zhu	shaochun.zhu@umu.se	Chemistry, UMU
Shatrudhan	Palsaniya	shatrudhan.palsaniya@umu.se	Applied Physics and Electronics, UMU
Shi	Tang	shi.tang@umu.se	Physics, UMU
Shi-Wei	Zhao	shi-wei.zhao@umu.se	Plant Physiology, UPSC, UMU
Siamsa	Doyle	siamsa.doyle@slu.se	Forest Genetics and Plant Physiology, UPSC, SLU
Sobiah	Rauf	sobiah.rauf@umu.se	Clinical Microbiology, UMU
Sofie	Johansson	Sofie.Johansson@slu.se	Forest Genetics and Plant Physiology, UPSC, SLU
Sonja	Viljamaa	sonja.viljamaa@slu.se	Forest Genetics and Plant Physiology, UPSC, SLU
Sourov	Mondal	sourov.mondal@umu.se	Chemistry, UMU
Souvik	Sarkar	souvik.sarkar@umu.se	Chemistry, UMU
Stefan	Björklund	stefan.bjorklund@umu.se	Medical Biochemistry and Biophysics, UMU
Stefanie	Sandberg	Stefanie.sandberg@umu.se	Medical Biochemistry and Biophysics, UMU
Stephan	Wenkel	stephan.wenkel@umu.se	Plant Physiology, UPSC, UMU
Stephanie	Robert	stephanie.robert@slu.se	Forest Genetics and Plant Physiology, UPSC, SLU
Stephanie	Werner		Centre for Planetary Habitability, University of Oslo

Participants

First name	Last name	E-mail	Affiliation
Stina	Berglund Fick	stina.berglund.fick@umu.se	Chemical Biology Consortium Sweden (CBCS), UMU
Supapit	Wongkuna	supapit.wongkuna@umu.se	Molecular Infection Medicine Sweden (MIMS), UMU
Suresh	Banjara	suresh.banjara@umu.se	Chemistry, UMU
Sushma	Sharma	sushma.sharma@umu.se	Medical Biochemistry and Biophysics, UMU
Sven	Adler	sven.adler@slu.se	Forest Resource Management, SLU
Svenja	Stöven	svenja.stoven@umu.se	European CBRNE Center
Tao	Chen	Tao.chen@umu.se	Chemistry, UMU
Taylor	Devlin	taylor.devlin@umu.se	Medical Biochemistry and Biophysics, UMU
Thanat	Chookajorn	thanat.chookajorn@slu.se	SLU
Theerarat	Kochakarn	theerarat.kochakarn@umu.se	Plant Physiology, UPSC, UMU
Theresa	Kieselbach	theresa.kieselbach@umu.se	Umeå University Library
Thilde	Andersson	thilde.andersson@umu.se	Chemistry, UMU
Thomas	Olofsson	thomas.olofsson@umu.se	Applied Physics and Electronics, UMU
Tobias	Hainzl	tobias.hainzl@umu.se	Chemistry, UMU
Tobias	Sparrman	tobias.sparrman@umu.se	Nuclear Magnetic Resonance Core Facility (NMR), Chemistry, UMU
Tobias	Tovedal	tobias.tovedal@ubi.se	Umeå Biotech Incubator
Tom	Guilbeaud	tom.guilbeaud@thermofisher.com	ThermoFisher Scientific
Tomas	Selicky	tomas.selicky@umu.se	Medical Biochemistry and Biophysics, UMU
Trond Helge	Torsvik		University of Oslo
Trung	Nguyen	trung.nguyen@umu.se	Chemistry, UMU
Tugrul	Doruk	tugrul.doruk@umu.se	µNiSCH µNordic Single Cell Hub (µNiSCH), Molecular Biology, UMU
Tulio	Yoshinaga	tulio.yoshinaga@umu.se	Clinical Microbiology, UMU
Uwe	Sauer	uwe.sauer@umu.se	Protein Expertise Platform (PEP), Chemistry, UMU
Vaishali	Rani	vaishali.rani@umu.se	Chemistry, UMU
Valentin	Duvauchelle	valentin.duvauchelle@umu.se	Chemistry, UMU
Vamsi Krishna	Katta	vamsi.katta@umu.se	Chemistry, UMU
Vasiliki	Zacharaki	vasiliki.zacharaki@umu.se	Chemistry, UMU
Verena	Kohler	verena.kohler@umu.se	Molecular Biology, UMU
Victor	Hellgren	victor.hellgren@umu.se	Chemistry, UMU
Víctor	Pinedo	victor.pinedo@umu.se	Chemistry, UMU

Participants			
First name	Last name	E-mail	Affiliation
Vikash	Kumar	vikash.kumar@umu.se	Plant Physiology, UPSC, UMU
Vimal	Parkash	vimal.parkash@umu.se	Medical Biochemistry and Biophysics, UMU
Wanfeng	Li	liwf@caf.ac.cn	Plant Physiology, UPSC, UMU
xi	chen	xi.chen@umu.se	Chemistry, UMU
Xian	Li	xian.li@umu.se	Molecular Infection Medicine Sweden (MIMS), UMU
Xiaojing	Xu	xiaojing.xu@umu.se	Chemistry, UMU
Xiao-Ru	Wang	xiao-ru.wang@umu.se	Ecology, Environment and Geoscience, UMU
Xiuqiang	Liu	xiuqiang.liu@umu.se	Ecology, Environment and Geoscience, UMU
Xu	Jin	xu.jin@umu.se	Forest Genetics and Plant Physiology, UPSC, SLU
Xueen	Jia	xueen.jia@umu.se	Physics, UMU
Yalin	Zhang	yalin.zhang@slu.se	Forest Genetics and Plant Physiology, UPSC, SLU
Ying	Wang	ying.wang@umu.se	Ecology, Environment and Geoscience, UMU
Yuan	Gao	yuan.gao@umu.se	Public health and clinical medicine, UMU
Yue	Li	yue.li@umu.se	Chemistry, UMU

Coordinated Services at KBC

Coordinated services at KBC	Contact person/contact e-mail address
KBC Communications Office	Anna Shevtsova, info.kbc@umu.se, anna.shevtsova@umu.se
KBC Service Centre	servicecenter.kbc@umu.se
KBC Head of Service	Clas Wikström, clas.wikstrom@umu.se
Mechanic workshop at the Department of Physics	peter.wikstrom@umu.se isak.silander@umu.se
KBC IT-support	http://kbc-support.ad.umu.se/IT/
KBC Chem Store	https://www.umu.se/en/department-of-chemistry/chemshop/

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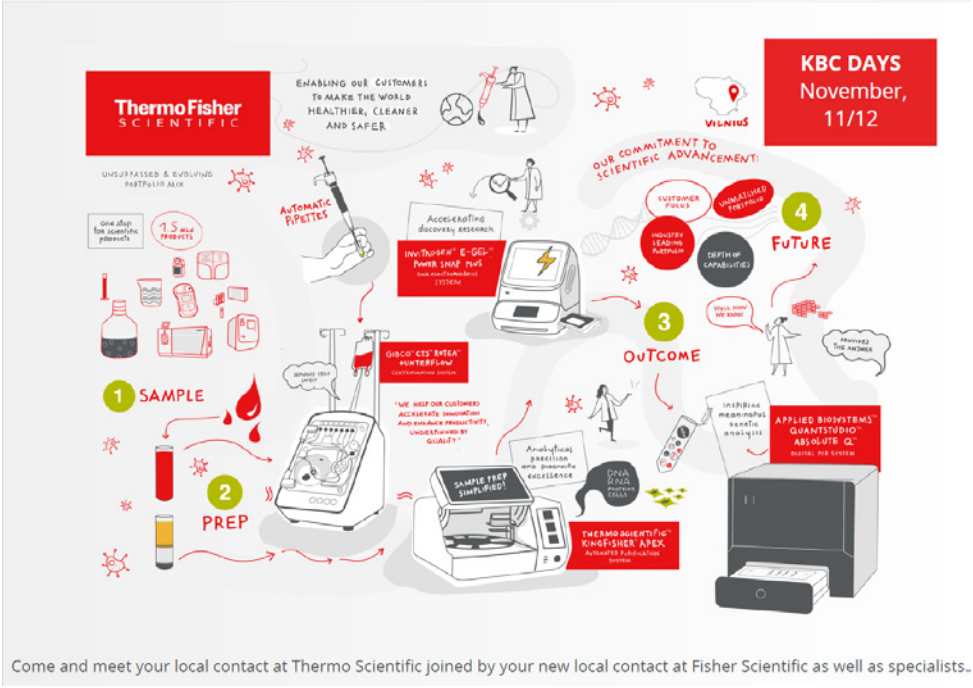

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Chemical Biological Centre (KBC)

Stefan Björklund, Scientific coordinator of KBC
Professor, Dept. of Medical Biochemistry and Biophysics
stefan.bjorklund@umu.se

Communications Office
info.kbc@umu.se

Anna Shevtsova, PhD, Communications officer KBC
anna.shevtsova@umu.se
+46 70 547 2672

Umeå University, KBC building
Linnaeus väg 6,
90736 Umeå, SWEDEN
www.umu.se/en/kbc

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