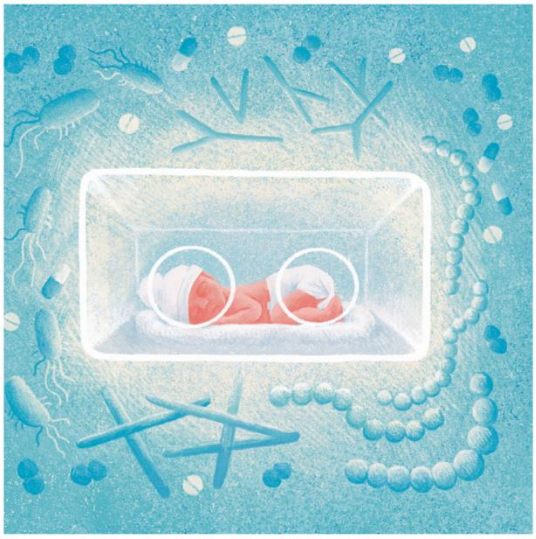
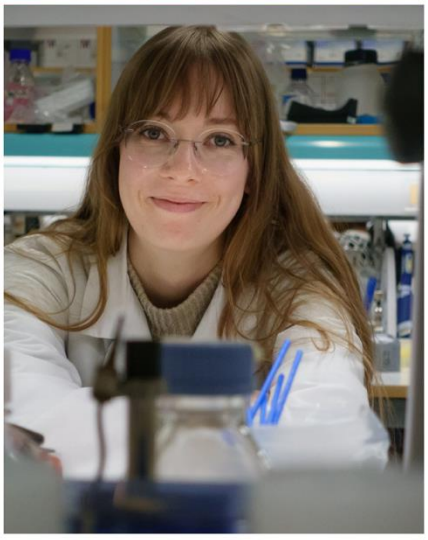
2023 Annual report

CANS – Centre for New Antibacterial Strategies







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Cover photo: Jan Fredrik Frantzen/UiT
CANS is hosted by the Department of Medical Biology and the Faculty of Health Sciences at UiT The Arctic University of Norway
@cans_uit

Annual activities 2023

The core centre annual activities for 2023 are summarized below:

1. Recruitment: The recruitment of the final PhD and postdoc positions is going on and was finalized.

2. In 2023 CANS research groups submitted more approximately 30 grant applications to internal (UiT), regional, national, and international arenas. 19 has been granted and 2 are still pending.

3. The annual CANS conference took place at Scandic Ishavshotel in March 2023 with approximately 100 participants. We had an interesting day with presentations from invited speakers, internal speakers and a poster session with poster prizes.

4. Mini-symposiums and workshops have been arranged by employees/PhD students from different research groups within CANS.

5. Within the centre, 13 master- and 4 PhD thesis have been completed.

6. During 2023, the PhD/postdoc group had several informal social gatherings with pizza where the group shared their latest news. The social highlight was when they travelled to Oslo to run Holmenkollstafetten with great success.

7. Registered peer reviewed scientific publication (n=48)..

8. Listed popular science disseminations and chronicles (n=75) tripled in 2023.

9. In 2023, CANS hosted 10 scientific seminars with international and/or internal speakers.

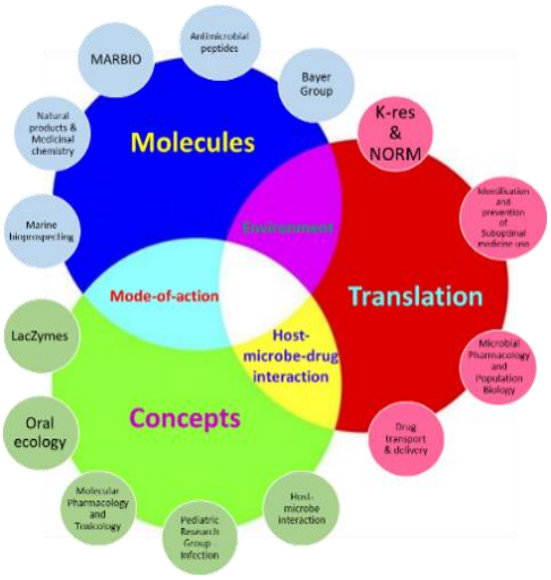
10. Nordic AMR centre collaboration: In 2023 the centers have planned a Nordic AMR conference that will take place in March 2024 in Tromsø.

About CANS

The Centre for New Antibacterial Strategies (CANS) is an interdisciplinary centre at UiT The Arctic University of Norway. CANS was established in 2019 and focuses on antimicrobial resistance activities encompassing:

- Research
- Education
- Innovation
- Dissemination

CANS includes 16 research groups located at three different faculties at UiT, the Faculty of Health Sciences, the Faculty of Science and Technology, and the Faculty of Bioscience, Fisheries and Economics. Since start-up, the focus has been on recruiting new tenure-track-, associate professor-, PhD- and postdoc positions, and to establish arenas for interactions and communication, publications and external funding.



Research communities and their expertise that form the basis for CANS

The development of CANS proceeds along three strategic axes - consolidation, fortification and direction.

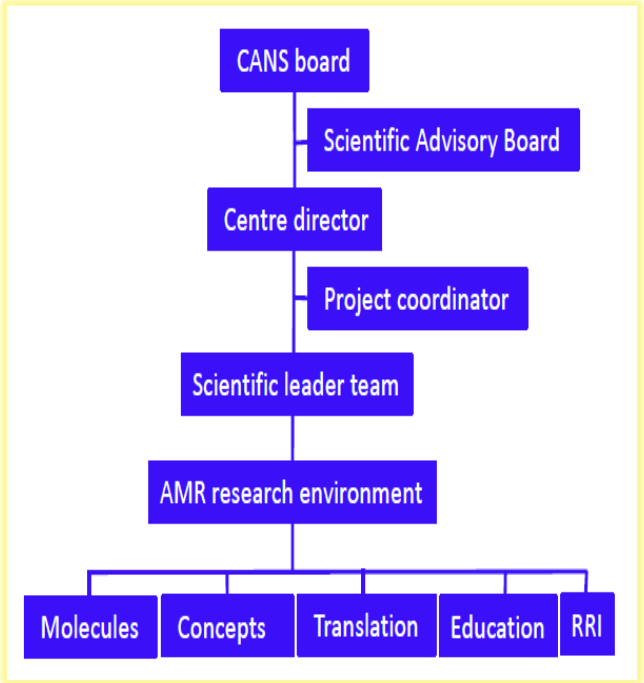
Consolidation by creating and nurturing a framework for ambitious interdisciplinary collaboration, generated by a centre-structure with management and overreaching strategy. **Fortification** by adding resources to important but underdeveloped areas within the existing portfolio of activity. Finally, adding the **direction** to the AMR research by establishing new research initiatives filling the competence gaps that inhibit our ability to realize the strategy.

The centre aims to strengthen current activities, and this has been done by granting research groups at the different faculties internal PhD and postdoc positions. All together 3 PhD- and 5 postdoc positions has been granted.

The centre also aims to support new basic research in novel concepts for sustainable activities in AMR-prevention and treatment strategies. The establishment of new research areas has been done through new permanent and temporary (tenure-track, postdoc and PhD) positions in three missing research areas at UiT: human microbiota, viral bioprospection/phage therapy and bioinformatics/machine learning. The main goal is to generate knowledge to establish new and sustainable strategies in the prevention and treatment of bacterial infections that minimize the development of antibiotic resistance and maintain microbiome integrity.

CANS Partners

CANS organization



CANS board

The CANS board are made up of representatives from the three faculties and the Rector. The board is in charge of the overall direction of the centre.

Name	Faculty
Arne Smalås, chair	Dean, NT
Gunbjørg Svineng	Dean, HVF
Jørgen Berge	Dean, BFE

Scientific Advisory Board

The scientific advisory board (SAB) consists of representatives from similar centres. The SAB will provide scientific input, evaluate CANS´ activity and provide strategic advice for future activities.

Name	Affiliation
Denize Tasdemir	GEOMAR Helmholtz Centre for Ocean Research Kiel; Germany
Jörgen Johansson	Department of Molecular Biology, Umeå University, Sweden
Ursula Theuretzbacher	Center for Anti-Infective Agents, Vienna, Austria
Ben Howden	Microbiological Diagnostic Unit (MDU) Public Health Laboratory, Melbourne, Australia

Scientific leader team

The scientific leader team is formed of professors from the three faculties. The members hold a 10% operational role in CANS and provide academic support for the centre leader who is in a 50% position.

Name	Faculty
Arnfinn Sundsfjord, Centre Leader	HVF
Pål J. Johnsen	HVF
Hanna-Kirsti Schrøder Leiros	NTF
Klara Stensvåg	BFE
Lise Nordgård, coordinator	HVF

CANS research groups

CANS´ 16 research groups are located at three faculties and covers different topics within AMR research: design and synthesis of new antibiotics and resistance inhibitors, marine bioprospecting – identification and characterization of new antibacterial activities, the evolution and molecular epidemiology of AMR, host-microbe-drug interactions as well as antibiotic stewardship.

Research group	Group leader and Department
Antibiotic resistance breakers	Annette Bayer, Chemistry (IK)
Digibiotics	John S. Mjøen Svendsen, Chemistry (IK)
Drug Transport and Delivery research group	Natasa Skalko-Basnet, Pharmacy (IFA)
Health Data Lab	Lars Ailo Bongo, Informatics (IFI)
The Host-Microbe Interactions (HMI) group	Mona Johannessen, Medical Biology (IMB)
Identification and Prevention of Suboptimal medicine use	Lars Småbrekke, Pharmacy (IFA)
K-Res: Norwegian National Advisory Unit on Detection of Antimicrobial resistance	Kristin Hegstad and Ørjan Samuelsen, The University Hospital of North Norway (UNN)
The LacZymes group	Hanna-Kirsti S. Leiros, Chemistry (IK)
Marbio – an analytical platform for natural products	Jeanette Hammer Andersen, Fishery Science (NCFS)
Marine Bioprospecting	Klara Stensvåg, Fishery Science (NCFS)
Microbial Pharmacology and Population Biology	Pål J. Johnsen, Pharmacy (IFA)
Molecular Pharmacology and Toxicology	Ingebrigt Sylte, Medical Biology (IMB)
Natural Products and Medicinal Chemistry	Terje Vasskog, Pharmacy (IFA)
NORM – Norwegian organization for surveillance of antimicrobial resistance	Gunnar Skov Simonsen, The University Hospital of North Norway (UNN)
Oral Health Research Group	Mohammed Al-Haroni, Clinical Dentistry (IKO)
Research Group for Child and Adolescents Health	Trond Flægstad and Claus Klingenberg, Clinical Medicine (IKM)

Three selected research projects

Ataur Rahman, Post Doc, Marin Bioprospecting group (BFE)

Ataur Rahman was a doctoral research fellow in the Marine Bioprospecting group at the Norwegian College of Fishery Science. The group uses a bioprospecting approach to Arctic and sub-Arctic marine resources to tackle medical societal challenges, particularly antimicrobial resistance. The group focuses on obtaining basic knowledge of novel bioactive metabolites/products derived from marine invertebrates, algae, and microorganisms like bacteriophages, giant viruses, and bacteria. Ataur's PhD was part of a multidisciplinary AntifoMar project.

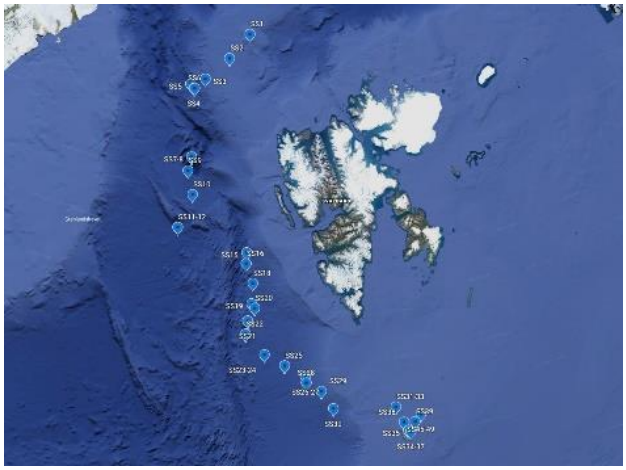
The main objective of the AntifoMar project was to develop compounds that can inhibit the establishment or removal of biofilms, both for therapeutic and industrial use. Four PhD candidates worked together to achieve this goal.

Before his PhD, Ataur had a BSc in Pharmacy from Bangladesh and a MSc in Applied Bimolecular Technology from the University of Nottingham, UK. Ataur started his PhD Journey in the middle of 2019. While Ataur was waiting for the synthetic antimicrobial compounds from his fellow PhD colleague in the AntifoMar project, he had the opportunity to work with bacterial samples from a bioprospecting research cruise north of Svalbard and into the ice toward the north pole until 84 degrees north. The samples were collected by Ataur's main supervisor, Professor Klara Stensvåg and Professor Bjarne Landfald. Due to the potential for finding new antimicrobial compounds from marine bacteria, this part of the work was included in his PhD project. Those bacterial samples kept him busy for six months.

From the end of 2019, the synthetic antimicrobial compounds started coming in different batches. There were 12 batches, with 126 compounds in total. After screening, 84 compounds were included in the two publications. The initial phase of the work was to determine the antimicrobial activity (MIC-minimum inhibitory concentration) using the panel of human pathogenic and marine biofilm-forming bacteria and *in vitro* toxicity using human red blood cells. Then, mode of action, biofilm inhibition and eradication studies, and antimicrobial activity against antibiotic-resistant clinical isolates were performed. Among many exciting events in the marine bioprospecting group that Ataur enjoyed, he wants to highlight three things from his PhD journey, which are mentioned below.

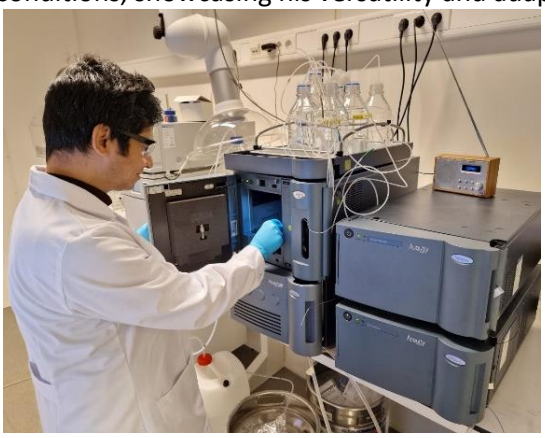
Bioprospecting research cruise

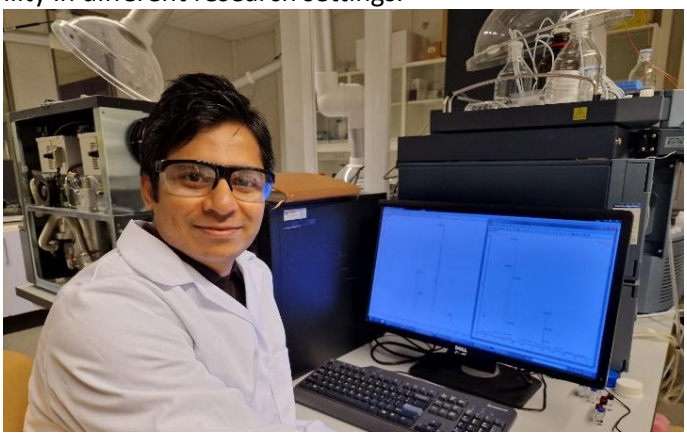
During the unprecedented COVID-19 outbreak in 2020, Ataur seized a unique opportunity. He was lucky to attend the bioprospecting research cruise with Kronprins Haakon, a journey he will forever hold dear. Despite the challenges posed by the pandemic, Ataur managed to travel from Tromsø to Svalbard and embark on the bioprospecting cruise, which spanned from Svalbard to the ice edge and back to Tromsø alongside the North Atlantic ridge. He looked for potential producers of antimicrobial compounds from marine bacteria.



Industrial internship

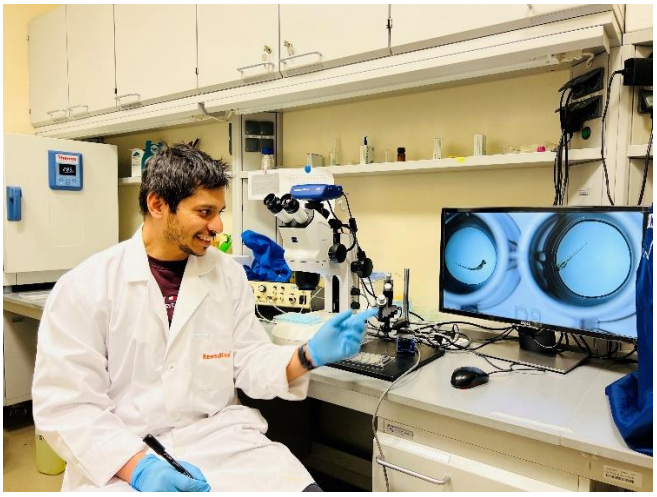
Ataur did a three-month industrial internship at Amicoat AS in 2022, financed through Digital Life Norway (DLN), which was a transformative experience. Amicoat AS, a Norwegian biotechnology company, provided him with a platform where they discover, develop, and market new antimicrobial sciences for broad applications in various industries. He worked on an exciting project on stability studies of antimicrobial peptides. He used UPLC and mass spectrometry (LC-MS) daily to see the stability and degradation pattern of the antimicrobial peptides upon challenging with different conditions, showcasing his versatility and adaptability in different research settings.

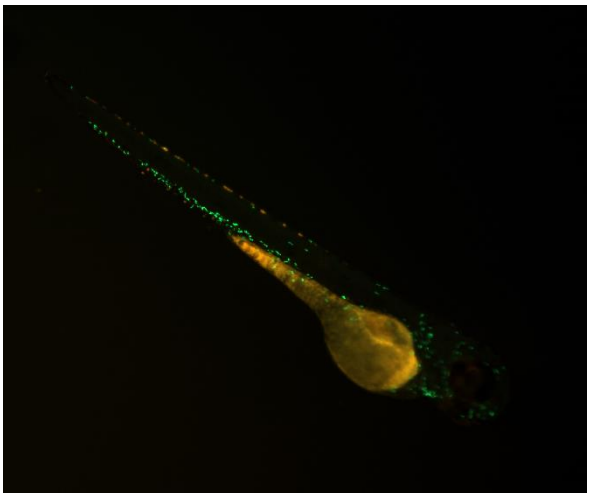




Research stay abroad

Ataur visited a lab as part of a research stay abroad program funded by the BFE faculty through a mobility grant. In 2023, he went to Jagiellonian University, Krakow, Poland, where he used a zebrafish model to test synthetic antimicrobial compounds from his PhD for toxicity and *in-vivo* antimicrobial activity.





Ataur successfully defended his PhD at the end of January 2023. The title of his thesis was "Bioactivity profiling and mode of action studies of antibacterial and antibiofilm agents of marine origin". From April 2024, Ataur started as a postdoctoral research fellow in analytical chemistry and microbiology at the Department of Chemistry. He will utilise the knowledge and expertise he gained throughout his PhD journey to study the metabolomics and microbiome of salmon and land-based recirculating aquaculture systems (RAS).

Christopher Frølich, Post Doc, The Microbial Pharmacology and Population Biology (MicroPop) research group (Helsefak)

Decoding β-Lactamase Evolution: Strategies to Counteract Antimicrobial Resistance

MicroPop focuses on fundamental research in microbial evolution. One of our major research topics aims to gain fundamental new knowledge in understanding the evolution, selection, and spread of antibiotic resistance. Although it is known that the frequency of antimicrobial drug resistance correlates with the level of antimicrobial consumption, the link between reduced consumption and a decrease in resistance levels remains unclear. We are currently exploring various mechanisms that might hinder the reversal of antimicrobial resistance in environments with diminished selective pressures. These include the biological cost of resistance, horizontal gene transfer, and genetic stability of resistance determinants. Within this research framework we also include transmission dynamics and molecular epidemiology of bacterial populations, with a particular focus on understanding the underlying selective forces shaping successful bacterial clones.

Background

With a formal training as a chemical lab technician and several years' experience in the pharmaceutical industry, Christopher received an MSc degree at the Applied University Rhein-Sieg and a PhD degree at the UiT the Arctic University of Norway in Structural Biology and Evolution in Tromsø. His PhD work focused on molecular driving forces of antimicrobial resistance development. During this time, he spent eight months at the University of British Columbia in Vancouver (Canada) where he worked in Nobuhiko Tokuriki's lab on protein evolution of resistance enzymes. While he is currently still working as a CANS postdoctoral fellow in protein evolution at UiT, he was awarded with the Marie Curie fellowship and obtained at the same time a Young Investigator Grant from the Northern Norway Regional Health Authority. This will allow him to further establish himself at UiT with a focus on protein and biofilm evolution.

Research Interests/Project

Christopher's research primarily focuses on the evolution of β-lactamases and their pivotal role in antibiotic resistance, offering profound insights into microbial adaptability and potential countermeasures against antibiotic threats. Specifically, he is interested in how mutations acquired during the evolution of these resistance enzymes modulate their function and structure. This requires advanced skills and knowledge in the fields of enzyme evolution and structural biology, marrying directed evolution techniques with X-ray crystallography. At the moment, he his focusing on two major evolutionary pathways in these enzymes and trying to answer i) how can/do mutations work together to amplify resistance development and ii) how can external factors such as biofilm evolution affect the evolution of these resistance enzymes.

The CANS postdoctoral project aimed to address the first research question by studying how mutations within the β-lactamases OXA-48 can interact during evolution to shape strong synergetic improvements in resistance development. To do so, we set up an interdisciplinary project involving researcher from the University of British Columbia in Vancouver (Canada), ETH in Zürich, and the Bristol University.

From Start-Up to Finalizing Your Project

His project, which has now been published in Nature Catalysis, began by setting precise and ambitious goals. Understanding the molecular mechanisms behind antibiotic resistance, particularly focusing on how mutations enhance enzyme functionality, is a field that is still highly understudied. Establishing a solid hypothesis early directed all subsequent research activities and informed the methodologies to be employed. This clear direction was crucial for maintaining focus and ensuring that each step of the project contributed to the overarching objective. Christophers PhD research provided a robust foundation for this project. It involved studying how β-lactamases evolved under different selection pressures, such as exposure to varying antibiotic concentrations. These studies were instrumental in building a strong base of knowledge and expertise, which supported his application for funding through CANS. This early work was not only crucial for securing the necessary resources but also set the stage for deeper exploration. To expand the project's depth and breadth, collaborations were established with leading institutions: the University of British Columbia in Canada and Bristol University in the UK. These partnerships brought together diverse expertise from fields such as enzyme evolution, enzymology, computational biology, and structural biology. The collaborative efforts were key to integrating cutting-edge techniques and methodologies into his research, thus enhancing the quality and impact of the findings significantly.

The core of the project revolved around the exploration of evolution through iterative rounds of directed evolution. This involved mutagenizing the β-lactamase gene, expressing these variants in a microbial host, and then testing each variant's activity under increasing antibiotic pressures to select for enhanced functionality. Each cycle of experimentation refined our hypotheses and understanding based on the latest data, crucial for developing a detailed mechanistic understanding of the mutations' effects. Data obtained from these experiments set the base for in-depth investigations of evolutionary changes on an enzymatic level using enzymology, structural, and computational biology methods.

Finally, disseminating the findings was a critical component of the project. Christopher presented his research at both national and international conferences. This not only allowed for valuable feedback but also helped in establishing him as a young investigator. This recognition not only bolstered his research portfolio but also opened new opportunities for further research and collaboration.

Srijana Bastakoti Belbase, PhD student, Host microbe interaction group (Helsefak)

Løyrin **2017-2019**, as a waitress


UiT **2020-2024**, as a PhD candidate

My PhD Journey: In the timeless words of Albert Schweitzer, "**Success is not the key to happiness. Happiness is the key to success. If you love what you are doing, you will be successful**." My name is Srijana Bastakoti, and I proudly hail from the beautiful country of Nepal. In 2017, I embarked on a journey to Norway to pursue a master's degree, and since then, I've called this place home.

During my master's degree, I gracefully balanced my studies with a job as a waitress, serving customers with a warm smile and unwavering positivity. Through every twist and turn, I remained optimistic and determined, always believing in the power of a bright outlook.

Now, as I stand on the cusp of earning my Ph.D., that same smile still adorns my face. Despite the ups and downs along the way, I've stayed true to my passion for scientific research, particularly in the field of applied science, medical health, and antibiotic resistance.

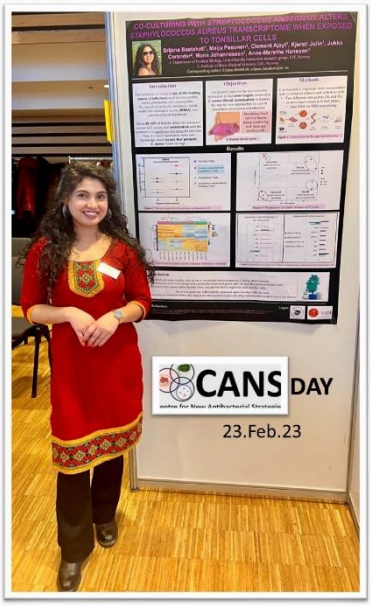
In the midst of the uncertainties of the COVID-19 pandemic, a silver lining emerged: I secured a Ph.D. position at The Arctic Norway University, within the Faculty of Health Science at host-microbe interaction research group. This opportunity not only fulfills my personal dreams but also aligns with my broader objective of effecting positive change in Nepal's scientific landscape.

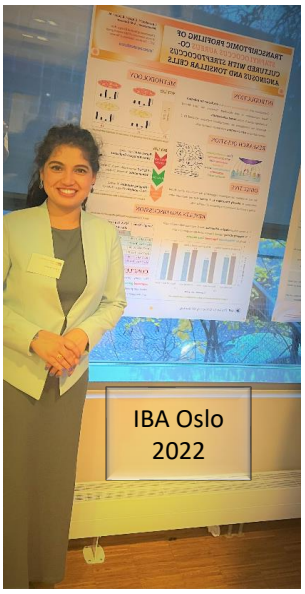
Driven by a deep enthusiasm for medical and health science, I am committed to leveraging my skills and experiences to contribute meaningfully to the field. My ultimate goal is to establish an organization dedicated to scientific reforms, paving the way for progress and innovation in Nepal and beyond.

Moreover, my academic journey has been enriched by a diverse background in Microbiology, Molecular Biology, and Biotechnology, with a strong focus on laboratory and Bioinformatics work related to genomics, transcriptomics, and proteomics science. Recently, I submitted my Ph.D. thesis titled "Exploring *Staphylococcus aureus* Adaptation in *In vitro* Colonization and Infection Models: A Transcriptomics Approach," under the guidance of Associate Professors Anne-Merethe Hanssen, Professor Mona Johannessen, and Post Doc Clement Ajayi. This research, conducted at UiT – The Arctic University of Norway in collaboration with the University of Oslo (UiO), honed my expertise in infection biology, experimental design, laboratory techniques, Next-generation sequencing (NGS), and NGS data

analysis. My PhD project deepened my fascination with omics science, particularly its applications in diagnosing infections and understanding antimicrobial resistance.

Reflecting on my journey, I cannot deny that the person I am today is a product of my past experiences, earned through several internship stays during my undergraduate, postgraduate, and Ph.D. studies. For instance, my former internship period at the Norwegian Institute of Public Health (NIPH, 2019) groomed me and made me eligible to secure the Ph.D. position. Similarly, my internship at the Nepal Agriculture Research Council (NARC, 2017) became the steppingstone that led me to Norway.





I am immensely grateful to organizations like CANS, IBA Research School, and BioCat for their invaluable support, which encompasses courses, funding and connections with other Ph.D. students and senior researchers. The courses provided not fulfilled mandatory credit requirements for my Ph.D but also served as an excellent platform for networking and scientific collaboration. This platform has played a pivotal role in enabling me to pursue my career plan exactly as I envisioned it, making my journey even more memorable and valuable.

Now, armed with their support, I feel more confident than ever to engage in discussions and undertake work from both the biological and bioinformatic perspectives, allowing me to communicate more clearly and assertively with fellow scientific communities.

Additionally, I had the opportunity to present my research at various conferences, including CANS Day 2022, NSCMID 2023, IBA annual meeting, and NCMG meeting Oslo, where I shared our successful NGS story in identifying targets for preventing *S. aureus* colonization and infection. As an invited young scientist, I was honored to speak at some of these conferences and even received the award for the best poster presentation. Furthermore, I have contributed public communication texts to ScienceNorway and forskersonen.no. This support has been critical in enhancing my visibility and impact within both the scientific community and the broader public, and I am deeply thankful for their continued assistance, especially from Jan Fredrik Frantzen at CANS.

As I reflect on my journey thus far, I am filled with gratitude for how far I've come. But I know that this is just the beginning. With determination in my heart and a smile on my face, I am poised to achieve even greater heights and make a lasting impact on the world. My hearty thankfulness goes to CANS for giving me a platform to share my PhD journey and insights.

Education and training

PhD thesis completed.

Name	Research group	Title of PhD-thesis
Mushtaq TS AL-Rubaye	*Host Microbe Interaction Research groups*	Exploring the genomes of the Norwegian vancomycin resistant enterococci
Jónína Gudmundsdóttir	*MicroPop*	Cancer Drugs as drivers for antibiotic resistance"
Fatema Rahman	*Molecular and Pharmacology and Toxicology*	Zinc binding and chelating compounds as inhibitors of bacterial metalloproteases *and human matrix metalloproeases*
Danijela Simonovic	Natural Products and Medicinal Chemistry	Synthesis and structure-activity relationship studies of marine-derived antimicrobial peptides and small cyclic peptidomimetics

Master's thesis completed.

Name	Research group	Title of master thesis
Victoria Stenbakk	*Drug Transport and Delivery Research Group*	*Application of outer membrane vesicles from ESKAPE pathogens as native models of bacterial membranes*
Hassan Ali Alkedro	*Drug Transport and Delivery Research Group*	Lipid nanoparticle co-delivery of tetrahedral DNA framework and antimicrobial peptides"
Trine Marie Henriksen	*Drug Transport and Delivery Research Group*	*Liposomes containing curcumin for the localized therapy of vaginal infections: The effect of surface modification on drug efficacy*.
Miranda Ramadani	*Drug Transport and Delivery Research Group*	*Liposomal quercetin for localized therapy of vaginal infections: Optimizing mucoadhesive properties*.
Stian Rølvaag Martinsen	*Haugland Lab*	A dual-headed linker for antibiotic conjugation"
Karoline Lerengen	*Host Microbe Interaction Research groups*	Isolation of drug-resistant Enterobacterales from faecal samples of healthy newborns and characterisation of Bifidobacterium-mediated inhibition of drug-resistant Escherichia coli.
Rolf Simon	*Host Microbe Interaction Research groups*	Härmä Effects of microbiota modifying treatments on the faecal metabolome of infants: A systematic review
Sonja Niederl,	*Host Microbe Interaction Research groups*	Profiling of the distribution of specific surface molecules in Staphylococcus aureus cell populations.
Waleed Abbas	*Marine Bioprospecting group*	Exploring the Presence of Norwegian Giant Viruses in the Arctic: Isolation attempts using water samples and determination of viral characteristics
Sabuj Hosen	*Marine Bioprospecting group*	Isolation and Characterization of Arctic Marine Bacteriophages
Zaaron Ricky	*Marine Bioprospecting group*	Screening giant viruses using Arctic protists as hosts
Palerud, Jocelyn Hernandez	*Marine Bioprospecting group*	Impact of CRISPR Cas 9 procedures on expression of selected immune genes in salmonids.
Brocklesby, Charlotte Kit Mun	*Marine Bioprospecting group*	The use of traditional and unconventional culturing methods for the discovery of antimicrobial compounds derived from marine microorganisms

Wasifa Kabir	Host Microbe Interaction Research groups	Duration and dynamics of Klebsiella pneumoniae species complex gut carriage in a community-based adult population coho

Bachelor`s degrees completed.

Name	Research group	
Helene Victoria Rosså	*Host Microbe Interaction Research groups*	Investigations of Lactobacilli Potential to Inhibit Extended-Spectrum β-lactamase-Producing Escherichia coli
Eiril Texmo Limstrand	*Marine Bioprospecting group*	Bacteriophages - a future solution for the seafood industry
Emma Murvold	*Marine Bioprospecting group*	Testing of biosensors for use in mode of actions antibacterial studies. Cloning and testing a dual biosensor.
Helene Johansen Holen	*Marine Bioprospecting group*	Antimikrobielle forbindelser fra arktiske marine invertebrater

Mobility students

Marine Bioprospecting group

- Katharina Stark, 1.4.23, 8.6.2023, Germany exchange student – ERASMUS. Characterization of Carnobacterium phages
- Victoria Fulgencio Queiroz, 17.7.23, 6.1.2024, mobility PhD with CAPES-PRINT funds- Brazil. PROSPECTION OF GIANT VIRUS IN BRAZIL AND NORWAY: STRUCTURAL AND GENOMIC CHARACTERIZATION AND EVALUATION OF ANTIMICROBIAL ACTIVITY

Research visit

- M. Bril'kov to Prof T. Viitala, Åbo Academy University, 17. April to 17. May 2023
- 01.04.23 – 30.06.23 Short-term senior research fellowship for Professor Johanna U Ericson at Alfried Krupp Wissenschaftskolleg and visiting Universität Greifswald, and especially the research groups from Professor Barbara Bröker and Professor Uwe Völker.

Advanced and interactive antimicrobial resistance course

MBI-8005, September 2023. 11 Phd-students including three from Sweden.

External funding initiatives

In 2023, CANS applied for funding from different external funds. The table shows the projects that were granted funding. Of 29 application initiatives, 19 has been funded.

International funding

Research group	Title	Programme	Status
Drug Transport and Delivery Research Group	To UiT: 1 student – Project titled "Design of lipid nanoparticles for delivery of nucleic acids to the skin"	Erasmus traineeship	Funded
Host-Microbe Interaction Group	Single-cell phenotyping of heterogenous bacterial pathogen populations enabled by a chemical biology platform	ERC Consolidator Grant	Not funded
Host-Microbe Interaction Group	Dynamics of bacterial adaptation to the infant gut ADATTO	ERC Starting Grant	Not funded
Host-Microbe Interaction Group	Re-sensitizing MDR Enterococcus faecium through phages	HSFP	Not funded
Host-Microbe Interaction Group	PETRI: Phages against MDR Enterococcus faecium	Marie Skłodowska-Curie Actions MSCA Postdoctoral Fellowships	Funded
Marbio	"Title"	Europe/ INFRA-2023 -DEV-01/ EUREMAP-	Funded
Marbio	MoSTFun (Monitoring Strategies and Tools to address knowledge gaps on aquatic Fungal biodiversity)	Funded through the Biodiversa+ EU Biodiversity Partnership	Funded
Marine Bioprospecting group	From waste to taste: exploring innovative food applications of postharvest fish losses	Italy/WASTE2TASTE	Funded
Marine Bioprospecting group	Predicting phage-mucin binding in silico	HFSP - Human Frontier Science Program	Not funded
Marine Bioprospecting group	Prophylactic phage therapy: the next step for fighting bacterial diseases	ERC advanced grant	Not funded
Marine Bioprospecting group	Desenvolvimento de modelos de aprendizado de máquina para identificação de bacteriófagos aderentes ao muco	CNPq - Brazil	Not funded
Marine Bioprospecting group	Networking project on AMPs	CNPq - Brazil	Funded
Marine Bioprospecting group	Networking project on phages	CNPq - Brazil	Funded
Marine Bioprospecting group	The phage that came in from the cold: microbial exploration of the Arctic	Seed grant (Lund)	pending
Marine Bioprospecting group	Isolating the first ARCtic GIant viRUSes and their bioactive compounds (ARCGIRUS)	Marie Skłodowska-Curie Actions MSCA	Funded

National funding

Research group	Title	Programme	Status
Haugland lab	NFR FRIPRO Tidlig karriere (prosjektleder).	NFR fripro	Pending
Host-Microbe Interaction Group	Karakterisering av fms15 som virulensfaktor i E. faecium	NORM UNN	Not funded
Host-Microbe Interaction Group	Karakterisering av fms15 som virulensfaktor i E. faecium	Pasteurlegatet	Not funded

Regional funding

Research group	Title	Programme	Status
Host-Microbe Interaction Group	Closing the diagnostic gap in adaptive antimicrobial resistance of multi-drug resistant Gram-negative pathogens´	Helse Nord	Funded
MicroPop	BATTLE: Bacterial Biofilm Impacts the Evolution of β-Lactamase Enzymes, Researcher grant	Helse Nord	Funded
MicroPop	Cancer chemotherapy as potential driver of antibiotic resistance and pathogen success. Postdoc position	Helse Nord	Funded
UNN-Kres	Loosing the last-line drug Linezolid – how do we contain the multidrug resistant enterococci in the Norwegian health care	Helse Nord	Funded
Research Group for Child and Adolescents Health	HNF1689-23 OPTIMIST – Optimizing mastitis identification and treatment.	Helse Nord	Funded
Research Group for Child and Adolescents Health	Klinisk og mikrobiologisk betydning av Staphylococcus borealis,	Helse Nord	Funded
Research Group for Child and Adolescents Health	PhD project: Probiotics to improve health in Tanzanian infants	Helse Nord	Funded

UiT funding

Research group	Title	Programme	Status
Drug Transport and Delivery Research Group	UiT: Nanostructured Amphiphiles for Topical Biofilm Applications	Grant for establishment for collaborations with Singapore-UiT:	Funded
Drug Transport and Delivery Research Group	UiT: Funding awarded to Obuobi for excellent mark	UiT Incentive Funds for ERC proposal	Funded
Drug Transport and Delivery Research Group	UiT_ 2 PhD mobility grants from UiT to Singapore and Finland	UiT Mobility grants	Funded

CANS day 2023

This year annual conference took place at Scandic Ishavshotel in March. We had an interesting day with presentations from invited speakers, internal speakers and a poster session

Poster awards

Three posters were awarded for a posterprise at the conference:

- **Alexandra Sofia Antunes de Sousa**, Drug Transport Delivery Group, *"Modified DNA nanoparticles against bacterial biofilms"*.
- **Srijana Bastakoti**, Host-Microbe Interaction Research group; "*EXPLORING DIFFERENTIALLY EXPRESSED GENES OF STAPHYLOCOCCUS AUREUS EXPOSED TO HUMAN TONSILLAR CELLS USING RNA-SEQUENCING*".
- **Ataur Rahman**, Marine Bioprospecting groups, "*Antimicrobial compounds from Arctic and sub-Arctic marine bacteria and their potential against ESKAPE pathogens".*

PhD PD activities

During 2023, the PhD/postdoc group had several informal social gatherings with pizza where the group shared their latest news. The social highlight was when they travelled to Oslo to run Holmenkollstafetten with great success.

Social pizza meetings

CANS to Holmenkollstafetten 2023

Outreach activities

The research has been communicated to both the scientific and the general public in different ways. Outreach activities include meetings, publications, and regular scientific seminars with invited- or internal speakers.

CANS seminars

The CANS seminars are a valuable platform for invited speakers and CANS researchers to present and discuss different areas within AMR research. In 2023, CANS hosted 10 seminars with international speakers as well as internal speakers.

	Speaker	Title of presentation
1	Alexandra Sousa, PhD student, Department of Pharmacy, UiT	DEVELOPMENT OF DNA NANOPARTICLES AGAINST BACTERIAL BIOFILMS
2	Cayetano Pleguezuelos, Hans Clevers lab, Hubrecht Institute, Utrecht, The Netherlands.	Organoid-bacteria co-cultures to study host-pathogen interactions in human disease
3	PhD Zdenek Kamenik, Institute of Microbiology, Czech Acad Sci, Prague, Czech Republic	Bioinformatics Tool to Identify and Analyze Gene Clusters
4	Professor Mark Broenstrup, Department Chemical Biology at the Helmholtz Centre for Infection Research (HZI)	Assault, Siege, Trojan Horses or Gentle Disarmament: Molecular Strategies to Fight Bacterial Infections
5	Daniel Salamonsen, PhD student, Department of Chemistry, UiT	Functional trade-offs of penicillinase and cephalosporinase activity in the carbapenemase enzyme OXA-48
6	Prof. Robert Beiko, Faculty of Computer Science and Institute for Comparative Genomics, Dalhousie University	The sharp edges of mobilome prediction and phylogenomics
7	Associate professor Yunn-Hwen Gan, Department of Biochemistry, Yong Loo Lin School of Medicine at the National University of Singapore	Convergence of AMR and hypervirulence in Klebsiella pneumoniae
8	Associate professor Pablo Bifani	Compassionate or standard-of-care combination phage therapy for the treatment of recalcitrant infections
9	Prof. Dr. Heinrich Jung, Ludwig-Maximilians-Universität München	Prokaryotic Solute/Sodium Symporters in Nutrient Acquisition and Signal Transduction
10	Associate professor Rachel Ee, Deputy Head of Research and Founding Director of the Pharmaceutical Science Program in the Department of Pharmacy at the National University of Singapore (NUS)	Peptide Nanonets as Antimicrobial and Anti-inflammatory Agents

R course for beginners, February 2023

In February 20023 Post Doc Dorota Buczek (HMI) and PhD student Ahmed Bargheet (HMI/Ped Info) arranged a 5-day R course for beginners. The course consisted of lessons covering everything needed to know regarding how to use R on your own. People from the CANS network attended and the topics for the course were:

- How to install R and RStudio, and perform R basics tasks
- How to install packages, import them, manipulate the data (dplyr, tidyR, and other packages), and do basic statistics
- How to visualize the data (ggplot package)

Arctic Biofilms Symposium, June 2023

Associate professor Elizabeth Aarag (MiroPop) and Jorun Pauline Cavanagh (Ped Info) arranged a two days minisymposium with the title “Arctic Biofilms Symposium” in June 2023.
During the symposium different aspects of bacterial biofilms was highlighted, such as basic research on biofilm evolution as well as how biofilms represent a clinical problem and treatment of biofilm-associated infections.

Workshop on bacterial heterogeneity, 2023

Hosted by Christian Lenz, HMI.

Media coverage

In 2023, we tripled the number of stories and citings in the news from 23 to 75. We also experienced a wider variety of coverage than in 2022, due to more “hard core” research results with more potential impact, as well as translating more news stories into English with extensive use of ChatUiT and publishing in new popular science websites.

Research group	Title	Journal/website/location
Host microbe interaction	Forbigående "sovende" ervervet resistens - en økende utfordring for resistensbestemmelse	UNN/K-res
Marbio	Vår neste antibiotika kan komme fra fjæra i Berlevåg	forskersonen.no
Host microbe interaction	Bacteria hide their resistance - a challenge for diagnostics	AMR Insights
Marbio	Vår neste antibiotika kan komme fra fjæra i Berlevåg	Forskerhjørnet
Host microbe interaction	Norsk studie: Skjult antibiotikaresistens gir terapisvikt	Dagens Medisin
Host microbe interaction	Bakterienes hemmelige våpen	Forskerhjørnet
Marbio	Gjorde unikt funn i fjæra: -Dette er en drømmehistorie	iFinnmark
Host microbe interaction	Beyond detection: The perils of bacteria’s secret weapons	EurekAlert
Host microbe interaction	Did you know that bacteria can hide their antibiotic resistance?	Researchers zone
Antibiotic resistance breakers	Making antibacterial supermolecules	en.uit.no
Antibiotic resistance breakers	Lager antibakterielle supermolekyler	uit.no
Antibiotic resistance breakers	Making antibacterial supermolecules	AMR Insights
Antibiotic resistance breakers	Forskere har laget draps-molekyler som tar knekken på bakterier	forskning.no
Pediatric research group	Ny norsk studie om probiotika og premature fødsler: - Bruken og nytteverdien er omdiskutert	dagensmedisin.no
Pediatric research group	Probiotika skader orden i tarmen til premature babyer, og bekjemper antibiotikaresistens	uit.no
Pediatric research group	Development of early life gut resistome and mobilome across gestational ages and microbiota-modif	AMR Insights
Pediatric research group	Probiotika har enda flere positive effekter enn tidligere antatt	nrk.no/troms
Pediatric research group	Studie: Probiotika har enda flere positive effekter enn tidligere antatt	msn.no
Pediatric research group	Studie: Probiotika har enda flere positive effekter enn tidligere antatt	tv2.no
Pediatric research group	Studie: Probiotika har enda flere positive effekter enn tidligere antatt	ABC Nyheter
Pediatric research group	Studie: Probiotika har enda flere positive effekter enn tidligere antatt	Adresseavisen
Pediatric research group	UiT-studie støtter tidligere funn	Harstad Tidende
Pediatric research group	Probiotika er bra for premature	Klassekampen
Pediatric research group	How beneficial bacteria can help premature babies thrive	sciencenorway.no
Pediatric research group	Probiotics create order in preterm babies' gut, and fight antimicrobial resistance	EurekAlert
Pediatric research group	Probiotika skader orden i tarmen til premature babyer, og bekjemper antibiotikaresistens som bonus	helse-nord.no
Pediatric research group	Probiotics shown to create order in preterm babies' gut, fight antimicrobial resistance	Medical X press
Pediatric research group	Probiotics shown to create order in preterm babies' gut, fight antimicrobial resistance	Today Headline
Pediatric research group	Probiotika skader orden i tarmen til premature babyer, og bekjemper antibiotikaresistens som bonus	unn.no
K-res	Antibiotikabruk hos dyr gir resistens hos mennesker	tidsskriftet.no
K-res	Forekomsten av antibiotikaresistens er fortsatt lav	dagensmedisin.no
K-res	Forekomsten av antibiotikaresistens er fortsatt lav	fhi.no
K-res	Fortsatt lite antibiotikaresistens i Norge	unn.no
K-res	Vellykkede strategier i Norge mot resistens	Rogalands Avis
K-res	Antibiotikaresistens	Nordlys
K-res	FHI: Forekomsten av antibiotikaresistens er fortsatt lav	Ambulanseforum
K-res	FHI: Vellykka strategiar i Norge mot antibiotikaresistens	Møre
K-res	FHI: Vellykkede strategier i Norge mot antibiotikaresistens	sykepleien.no
K-res	Vellukka strategiar i Norge mot antibiotikaresistens	vestavind.no
Marine bioprospecting	The Arctic Giant from Tromsø	Research corner/UiT
Marbio	Marin sopp: en skattkiste fra havet	Forskerhjørnet
Host microbe interaction	Enterokokker er bakterienes "dr. Jekyll and mr. Hyde"	forskersonen.no
Host microbe interaction	Enterokokker: Bakterienes Jektll and Hyde	Forskerhjørnet
Management	Kriger sprer antibiotikaresistens	Dagens Medisin
Pediatric research group	Hudbakterie kan redde liv	uit.no
Marbio	Marin sopp: en skattkiste fra havet	framsenteret.no
Pediatric research group	Skin bacteria can save lives	EurekAlert!
Pediatric research group	Newly Discovered Bacteriocin Holds Promise Against Antibiotic-Resistant Bacteria	Express Healthcare Management
Pediatric research group	Reseachers Discover New Bacteriocin with Potential to Combat Antibiotic-Resistant Bacteria	CityLife
Pediatric research group	Certain skin bacteria can inhibit growth of antibiotic-resistant bacteria	The News Motion
Pediatric research group	Can a New Bacteriocin Thwart Antibiotic Resistance?	practical dermatology
Pediatric research group	Certaines bactéries cutanées peuvent inhiber la croissance de bactéries résistantes aux antibiotiques	Crumpe
Pediatric research group	Exploring the Potential of Skin Microbiome in Fighting Antibiotic Resistance	Express Healthcare Management
Pediatric research group	New hope in antibiotic resistance: Discovery of Romsacin in skin bacteria	Knowridge Science Report
Pediatric research group	Anumite bacterii pielii pot inhiba cresterea bacteriilor rezistente la antibiotice	stirilazi.ro
Pediatric research group	Forskning antibiotika (0:27)	NRK Dagsnytt/radio
Pediatric research group	Nytt funn i bakterie har fått samisk navn	NRK Sapmi
Pediatric research group	Forsker fant middel mot resistente bakterier	FAUNA
Pediatric research group	Norsk bakterie-forskning kan redde liv	NRK Kveldsnytt
Pediatric research group	Skin's Secret Weapon: Common Bacteria Battles Antibiotic-Resistant Strains	COMPSMAG
Pediatric research group	Common Skin Bacteria Inhibits Antibiotic-Resistant Bacteria	Technology Networks
Pediatric research group	Common Skin Bacteria Could Save Millions of Lives	Today Headline
Pediatric research group	Ze zivota mikroutu - cerstve novinky	Aktuálne.cz
Pediatric research group	Millions of lives could be saved ny combating common skin bacteria...	list23.com
Pediatric research group	Norske forskarar med gjennombrot: Hudbakterie kan redde liv	NRK Troms og Finnmark
Pediatric research group	Une bactérie de la peau pourrait nous aider à lutter contre l'antibiorésistance	Microsoft Start
Drug transport and delivery	Antibiotikaresistens: Fant ny måte å bekjempe biofilm	farmatid.no
Host microbe interaction	Utvikler potensiell vaksine mot antibiotikaresistens sykehusbakterie	NTB Kommunikasjon
Host microbe interaction	Utvikler potensiell vaksine mot hissig sykehusbakterie	uit.no
Host microbe interaction	Ny forskning kan stoppe fryktet sykehusbakterie	NRK Troms og Finnmark
Host microbe interaction	Utvikler potensiell vaksine mot hissig sykehusbakterie	iTromsø
Host microbe interaction	Potensiell vaksine mot hissig sykehusbakterie utvikles på UiT	itromso.no
Host microbe interaction	Et viktig skritt på veien mot antibiotikaresistens...	NRK P1 Troms Distriktsprogram
Host microbe interaction	Researchers develop potential vaccine against antibiotic-resistant enterococci	EurekAlert!
Host microbe interaction	Utvikler potensiell vaksine mot hissig sykehusbakterie	forskning.no
Pediatric research group	Fantastisk om man kan klare å redde livet til noen i fremtiden med dette	nordlys.no

The WHO World AMR Awareness Week (WAAW)

In 2023, CANS decided to take a step up and joined in on the World AMR Awareness Week 18-24 November. Among other things, we coordinated the news release on the finding of the new bacteriocin Romsacin by Runa Wolden and Jorunn Pauline Cavanagh to correspond with this week.

Many thanks to the communication department at UiT for cooperating on this press release. The story generated interest both locally, nationally and internationally.

Norske forskarar med gjennombrot: Hudbakterie kan redde liv

Forskarmiljøet på UiT – Noregs arktiske universitet har gjort eit funn som kan hemme veksten av antibiotikaresistente bakteriar.

Kari Anne Skoglund
Journalist

Aslaug Aarsæther
Journalist

Vi rapporterer frå Tromsø

Publisert 24. nov. 2023 kl. 17:13
Oppdatert 30. nov. 2023 kl. 08:06

Stipendiat Runa Wolden er blant forskarane som har funne det nye bakteriestoffet. Det kan hemme veksten av antibiotikaresistente bakteriar.
FOTO: JØRN BERGER NYVOLL / UIT NORGES ARKTISKE UNIVERSITET

On 21 November we had a chronicle published in Dagens Medisin starring CANS-leader Arnfinn Sundsfjord and Kristian Tonby from Oslo University Hospital. The theme: The effects that the wars in Ukraine and Gaza will have on the spread of antibiotic resistance.

The day before, PhD student Jeanette Grunnvåg had a popular science piece on enterococci published in both Forskersonen.no and UiTs Forskerhjørnet: Enterococci: The Jekyll and Hyde of Bacteria.

In cooperation with the medical students' union (NMF), the old poster hanging in various parts of the Faculty of Health Sciences was updated by NMF in cooperation with medical and research student Knut Heydrik from the Host-Microbe Research Group to provide the new poster: Resist the Resistance.

WHO AMR Awareness Week

18 - 24 November

HANDLE ANTIMICROBIALS WITH CARE

CANS

Centre for New Antibacterial Strategies

Researchers and Phd students in CANS were also given access to the WHO graphical materials to publish in their own preferred channels, in order to put extra focus on AMR during the World AMR Awareness Week.

The National Science Week (Forskningsdagene)

CANS was not represented during the 2023 National Science Week.

The UiT Health Week

The last couple of years, The Health Faculty at UiT have contributed to the Science Centre of North Norway (Nordnorsk Vitensenter) initiative called “Helseuka”. In May 2023, the leader of the Host-Microbe Interaction Group Mona Johannessen contributed with a staggering 10 lectures on antibiotic resistance for around 350 ninth graders.

Pint of Science

Pint of Science is a voluntary international organization that was started up by young researchers in 2013. Their driving force was to present science to the general public in an informal and popular science way, accompanied by a pint or two in a public arena.

On 23 May 2023, PhD candidate Stephen Ahator from the Host-Microbe Interaction Group gave a presentation in the “Smart tech for health”-session in Bastard Bar.

Scientific Publications

1. Bargheet A, Klingenberg C, Esaiassen E, Hjerde E, Cavanagh JP, Bengtsson-Palme J, Pettersen VK. Development of early life gut resistome and mobilome across gestational ages and microbiota-modifying treatments.EBioMedicine. 2023 Jun;92:104613. doi: 10.1016/j.ebiom.2023.104613. Epub 2023 May 13.PMID: 37187112
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10. Fellner M, Walsh A, Dela Ahator S, Aftab N, Sutherland B, Tan EW, Bakker AT, Martin NI, van der Stelt M, Lentz CS. 2023. Biochemical and Cellular Characterization of the Function of Fluorophosphonate-Binding Hydrolase H (FphH) in Staphylococcus aureus Support a Role in Bacterial Stress Response. ACS Infect Dis. 9(11):2119-2132 https://doi.org/10.1021/acsinfecdis.3c00246
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14. Heim A von BT, Janice J, Bjørnholt JV, Lunestad BT, Hegstad K, Svanevik CS. 2023. Genomic insights into Enterococcus faecium isolates from marine bivalves highlight One Health concerns and healthcare linkages. Microb Genom. 9:001154. Doi: 10.1099/mgen.0.001154.
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Other Publications (Workshops, meetings, conferences)

1. 02.03.2023 Stensvåg, Klara. Havet som skattekammer – hva er framtidsmulighetene? Åpen dag 2023; 2023-03-02 - 2023-03-02
2. 03.01.2023 Ågnes, Christoffer; Rahman, Ataur; Devold, hege; Stensvåg, Klara; Strøm, Morten B.; Haug, Tor. Antibacterial and antibiofilm activity in Arctic and sub-Arctic marine benthic invertebrates. The 11th International Conference on Marine Bioprospecting (BIOPROSP_23); 2023-03-14 - 2023-03-16.
3. 03.03.2023 Stensvåg, Klara; Haug, Tor; de Freitas Almeida, Gabriel Magno; Hansen, Ida Kristine Østnes. Antibacterial natural products from the ocean - a promising source for future antiinfectives. Webinar Uppsala Antibiotic Center; 2023-03-03 - 2023-03-03.
4. 07.03.2023 Rey, Isabel Victoria; Devold, Hege; Sørensen, Arthur; Stark, Katharina; Limstrand, Eiril; Stensvåg, Klara; de Freitas Almeida, Gabriel Magno. Building a collection of aquaculture-related phages in the Arctic (Norway). Viruses of Microbes 2023; 2023-07-03 - 2023-07-07
5. 07.06.2023 , Seminário em Pós-Graduação, Instituto de Ciências Biológicas, UnB, Brasil, online, Bacteriófagos e os cem anos de historia da fagoterapia. Gabriel Almeida
6. 07.09.2023 Rahman, Ataur; Langer, Manuel K; Michno, Bartosz; Blencke, Hans-Matti; Haug, Tor; Ericson, Johanna U; Strøm, Morten B.; Bayer, Annette; Prajsnar, Tomasz; Stensvåg, Klara. In vivo toxicity and activity of newly developed novel analogues of short-cationic antimicrobial peptides as novel antibacterial agents. 12th European Zebrafish Meeting; 2023-07-09 - 2023-07-13
7. 14.03.2023 Rahman, Ataur; Ågnes, Christoffer; Elvheim, Andrea Iselin; Hansen, Ida Kristine Østnes; Blencke, Hans-Matti; Landfald, Bjarne; Haug, Tor; Stensvåg, Klara. Molecular characterization of marine bacteria and their potential as being antimicrobial producers: a pilot study using co-cultures. The 11th International Conference on Marine Bioprospecting (BIOPROSP_23); 2023-03-14 - 2023-03-16
8. 15.05.2023 Dey, Hymonti; Simonovic, Danijela; Hagen, Ingrid Sofie Norberg-Schulz; Vasskog, Terje; Fredheim, Elizabeth G. Aarag; Blencke, Hans-Matti; Strøm, Morten B.; Haug, Tor. Antimicrobial activity and mode of action study of short cyclic analogues of the marine antimicrobial peptide Turgencin A. The 11th International Conference on Marine Bioprospecting (BIOPROSP_23); 2023-03-14 - 2023-03-16.
9. 15.05.2023 Langer, Manuel K; Rahman, Ataur; Dey, Hymonti; Anderssen, Trude; Blencke, Hans-Matti; Haug, Tor; Stensvåg, Klara; Strøm, Morten B.; Bayer, Annette. Tetrasubstituted hydantoins: Novel membranolytic antimicrobials. International Helmholtz Drug Discovery Conference (HDDC2023); 2023-05-15 - 2023-05-16
10. 15.6.2023, Arctic Biofilm symposium 2023 ; UiT - Norway, UiT - pharmacy, Bacteriophage-bacteria interactions in mucosal conditions and its importance for clinics . Gabriel Almeida
11. 19.01.2023 Rahman, Ataur; Langer, Manuel K; Blencke, Hans-Matti; Haug, Tor; Ericson, Johanna U; Strøm, Morten B.; Bayer, Annette; Stensvåg, Klara. Development of novel antimicrobial peptides: two classes with improved antimicrobial and antibiofilm activity. Contact Meeting 2023 NBS; 2023-01-19 - 2023-01-22.
12. 22.01.2023 Ågnes, Christoffer; Rahman, Ataur; Devold, Hege; Stensvåg, Klara; Strøm, Morten Bøhmer; Haug, Tor. Antibacterial and antibiofilm compounds in six marine invertebrates from Arctic and sub-Arctic Oceans. The 58th Norwegian Biochemical Society Contact Meeting 2023; 2023-01-19 - 2023-01-22
13. 23.2.2023, CANS day 2023 , Tromsø, Including viruses of microbes as a resource for marine bioprospection. Gabriel Almeida
14. 23.2.2023, CANS day 2023 , Tromsø, Isolation and Characterization of Bacteriophages from the Arctic Ocean, Md Sabuj Hosen, Ataur Rahman, Klara Stensvåg, Gabriel MF Almeida
15. 24.04.2023 Visit to the zebrafish facility in Krakow Marine natural products and anti-bacterial potential. Klara Stensvåg
16. 24.3.2023, Scanvir 2023 , Tromsø, Isolation and Characterization of Bacteriophages from the Arctic, Md Sabuj Hosen, Ataur Rahman, Klara Stensvåg, Gabriel MF Almeida
17. 24.3.2023, Scanvir 2023 , Tromsø, Isolation and characterization of the first Nordic giant virus found in Finland. Gabriel Almeida
18. 27.4.2023, Fundamentals of Basic and Applied Phage Biology , Biology Department, Lund University, Lund, Sweden, Phage-bacteria interactions in mucosal conditions. Gabriel Almeida
19. 3.7.2023 to 7.7.2023, VoM2023 Tbilisi, Georgia, Building a collection of aquaculture-related phages in the Arctic (Norway), Isabel Victoria Rey, Hege Devold, Arthur Kruse Sørensen, Katharina Stark, Eiril Texmo Limstrand, Klara Stensvåg, Gabriel Magno de Freitas Almeida

20. 3.7.2023 to 7.7.2023, VoM2023 Tbilisi, Georgia, Searching for the first giant virus of protists in the Arctic, Juliana Miranda Tatara, Waleed Abbas, Zaroon Ricky, Klara Stensvåg, Gabriel Magno de Freitas Almeida
21. 31.8.2023, Symposium on capsule- and phage-related projects , MH-UiT, UiT - MH, Phages in the North – the first two years. Gabriel Almeida
22. 5.7.2023 , VoM2023 Tbilisi, Georgia, Bacteriophage adherence to mucus and its relevance for phage-based prophylaxis. Gabriel Almeida
23. 6.12.2023 to 9.12.2023, 5th Ringberg Symposium on Giant Virus Biology, Tegernsee, Germany, The search for Nordic giant viruses, Lotta-Riina Sundberg, Victoria Fulgencio Queiroz, Juliana Miranda Tatara, Waleed Abbas, Zaroon Ricky, Klara Stensvåg, Gabriel Magno de Freitas Almeida
24. 8.12.2023, 5th Ringberg Symposium on Giant Virus Biology, Tegernsee, Germany, The search for Nordic giant viruses. Gabriel Almeida
25. A dual-headed linker for antibiotic conjugation. Stian Rølvaag Martinsen and Marius Myreng Haugland. Poster, The 36th Organic Chemistry Winter Meeting, Skeikampen, Norway, 5-8 January 2023.
26. Alexandra Kondratieva: 36. Organisk kjemisk vintermøte 5.-8.01.2023; Titel: "Synthesis of metallo-b-lactamase inhibitors" (won prize for best lecture); program with abstracts can be found here: https://www.kjemi.no/okv36/
27. Andersen, Jeanette, Marine Bioprospecting in the Arctic and the value of participating in EU Projects and Initiatives. Natural Products - Emerging Opportunities, 18-19th July 2023, Swansea
28. Andersen, Jeanette: Bioteknologidagen, 15. februar 2023, OSLO – Medisin fra havbunnen (panelinnlegg)
29. Antimicrobial activity and mode of action study of short cyclic analogues of the marine antimicrobial peptide Turgencin A
30. Bacterial extracellular vesicles (bEVs) as a ready to use model to study membrane interactions, The Nordic AMR Centre Conference 13th to 16th of March 2024, Tromsø, Norway (oral)
31. Bargheet, Claus Klingenberg, Eirin Esaiassen, Erik Hjerde, Jorunn Pauline Cavanagh, Johan Bengtsson-Palme, Veronika K Pettersen. "Development of early life gut resistome and mobilome across gestational ages and microbiota-modifying treatments" Poster presentation at Cell Symposia: Infection biology in the age of the microbiome (08-06-2023).
32. Bargheet, Claus Klingenberg, Eirin Esaiassen, Erik Hjerde, Jorunn Pauline Cavanagh, Johan Bengtsson-Palme, Veronika K Pettersen. "Development of early life gut resistome and mobilome across gestational ages and microbiota-modifying treatments" presentation at Microbiome MVIF (15-11-2023).
33. Bastakoti, Srijana; Pesonen, Maiju; Ajayi, Clément; Julin, Kjersti; Corander, Jukka; Johannessen, Mona Susan; Hanssen, Anne-Merethe Christiansen. Co-culturing with Streptococcus anginosus alters Staphylococcus aureus transcriptome when exposed to tonsillar cells. Norwegian Consortium for Microbial Genomics (NCMG) Meeting; 2023-12-07
34. Bastakoti, Srijana; Pesonen, maiju; Ajayi, Clément; Julin, Kjersti; Johannessen, Mona Susan; Corander, Jukka; Hanssen, Anne-Merethe Christiansen. Co-culturing with Streptococcus anginosus alters Staphylococcus aureus transcriptome when exposed to tonsillar cells. Nordic Society of Clinical Microbiology and Infectious Diseases (NSCMID) conference; 2023-09-19 - 2023-09-24
35. Bastakoti, Srijana; Pesonen, Maiju; Ajayi, Clément; Julin, Kjersti; Korander, Jukka; Johannessen, Mona Susan; Hanssen, Anne-Merethe Christiansen. Co-culturing with Streptococcus anginosus alters Staphylococcus aureus transcriptome when exposed to tonsillar cells. Centre for new antibacterial strategies (CANS) DAY; 2023-02-23
36. Bø, Gaute H. and Pettersen, Veronika K. Absolute quantification of short-chain fatty acids, organic acids and amino acids in feces using liquid chromatography-mass spectrometry. 4th International World of Microbiome Conference, Sofia, Bulgaria. 2023–10–27. Poster presentation.
37. Bø, Gaute H.; Grijseels, Sietske S.; Mardal, Marie; Vasskog, Terje; Pettersen, Veronika K. Absolute quantification of short-chain fatty acids, organic acids and amino acids in feces using liquid chromatography-mass spectrometry. 3rd Nordic Metabolomics Conference Trondheim, Norway. 2023-10-18. Poster presentation and short talk.

38. Bø, Gaute H.; Grijseels, Sietske S.; Mardal, Marie; Vasskog, Terje; Pettersen, Veronika K. Absolute quantification of short-chain fatty acids, organic acids and amino acids in feces using liquid chromatography-mass spectrometry. Centre for new antibacterial strategies (CANS) day. 2023-02-23. Poster presentation.
39. Bø, Gaute H.; Grijseels, Sietske S.; Mardal, Marie; Vasskog, Terje; Pettersen, Veronika K. Absolute quantification of short-chain fatty acids, organic acids and amino acids in feces using liquid chromatography-mass spectrometry. IBA annual conference. 2023-10-09. Poster presentation.
40. Conformational tuning improves the stability of spirocyclic nitroxides with long paramagnetic relaxation times. Anna-Luisa Warnke, Mateusz Piotr Sowinski, Sahil Gahlawat, Bjarte Aarmo Lund, Kathrin Helen Hopmann, Janet E. Lovett and Marius Myreng Haugland. Oral presentation, The 36th Organic Chemistry Winter Meeting, Skeikampen, Norway, 5-8 January 2023.
41. Conformational tuning improves the stability of spirocyclic nitroxides with long paramagnetic relaxation times. Mateusz Piotr Sowinski, Sahil Gahlawat, Bjarte Aarmo Lund, Anna-Luisa Warnke, Kathrin Helen Hopmann, Janet E. Lovett and Marius Myreng Haugland. Poster, The 10th Pacific Symposium on Radical Chemistry, Kyoto, Japan, 4-9 June 2023.
42. Espen Holst Hansen, Kine Østnes Hansen, Teppo Rämä and Jeanette Hammer Andersen
43. Espen Holst Hansen. SCIENTIFIC SYMPOSIUM: CENTER FOR SYSTEM-BASED ANTIBIOTIC RESEARCH (CESAR). 2023.05.05
44. Fenzel, Carolin Kornelia; Pöntinen, Anna K.; Johannessen, Mona; Hegstad, Kristin; Wagner, Theresa. Characterization of competition between commensal and clinical strains of Enterococcus faecium. CANS day; 2023-02-23 - 2023-02-23 UiT
45. Grunnvåg JS, Hegstad K, Lentz C. Activity-based protein profiling of serine hydrolases and penicillin-binding proteins in *Enterococcus faecium*. Poster presentation. 6th ICE, Porto, Portugal; 2023-09-11 - 2023-09-14.
46. Hegstad K. Linezolidresistens hos enterokokker – mekanismer og diagnostikk. Invited speaker NORM dagen, Gardermoen, Norway; 2023-11-29.
47. Hegstad K. The Marine environment – a reservoir for *E. faecium*. Invited speaker The AMR-BRIDGE symposium on One Health AMR, Sommarøy, Norway; 2023-06-19 - 2023-06-20.
48. Hira J, Singh B, Ajayi C, Johannessen M, Lentz CS. High throughput single cell-derived growth analysis in isogenic Staphylococcus aureus populations. Poster presentation. FEMS Congress Hamburg, Germany, 2023-07-09 – 2023-07-13
49. Hira, Jonathan; Singh, Bhupender; Ajayi, Clément; Johannessen, Mona Susan; Lentz, Christian Stephan. Poster presentation. Sorting out their differences – High-throughput phenotypic profiling of single cells and subpopulations within isogenic bacterial pathogen cell populations. EMBL Symposium: New Approaches and Concepts in Microbiology; 2023-06-27 - 2023-06-30
50. Hira, Jonathan; Singh, Bhupender; Wagner, Theresa Maria; Hegstad, Kristin; Johannessen, Mona Susan; Lentz, Christian Stephan. A high-throughput platform for phenotypic profiling of bacteria coupled to single cell-derived growth analysis. Poster presentation. 6th International Congress on Enterococci; 2023-09-11 - 2023-09-14
51. Hymonti Dey, Danijela Simonovic, Ingrid Sofie Norberg-Schulz Hagen, Terje Vasskog, Elizabeth G. Aarag Fredheim, Hans-Matti Blencke, Morten Bøhmer Strøm, Tor Haug.
52. M. Bril'kov, V Steinbakk, J.P. Cavanagh, J.U. Ericson, J. Isaksson, G.E. Flaten
53. M. Bril'kov, J.P. Cavanagh, J. Isaksson, J.U. Ericson, G.E. Flaten. Bacterially produced in vitro mambrane model systems from resistant- and non-resistant clinical isolates. (poster) CANS day, 23rd of February 2023, Tromsø, Norway
54. Maharjan, Sailesh; Isaksson, Johan; Rämä, Teppo; Hansen, Kine Østnes; Andersen, Jeanette Hammer; Hansen, Espen. Cytotoxic and anti-inflammatory activities of Phomenins from
55. Maharjan, Sailesh; Isaksson, Johan; Rämä, Teppo; Hansen, Kine Østnes; Andersen, Jeanette Hammer; Hansen, Espen. Extraction and Isolation of thermolabile Phomenins from bioactive extract of *Phialophorophoma litoralis*. Bioprosp_23. 2023.03.14- 2023.03.16
56. Manuel Langer: 36. Organisk kjemisk vintermøte 5.-8.01.2023; Titel: "The total synthesis of Aspergilone A in batch and flow – A comparison"; program with abstracts can be found here: https://www.kjemi.no/okv36/

57. Manuel Langer: International Hemholtz Drug Discovery Conference (HDDC 2023); Titel: “Tetrasubstituted hydantoins: Novel membranolytic antimicrobials”
58. MARINE BIOPROSPECTING WITH AN ARCTIC PERSPECTIVE: THE MARBIO SCREENING PLATFORM AND ITS INVOLVEMENT IN LARGER EUROPEAN PROJECTS. SATELLITE WORKSHOP AT 31ST INTERNATIONAL SYMPOSIUM ON THE CHEMISTRY OF NATURAL PRODUCTS BY EU-OPENSCREEN. 2023.10.19
59. Mathiesen I, Pöntinen AK, Johannessen M, Hegstad K, Wagner T. Characterization of putative virulence factors in *Enterococcus faecium*. Experimental Health Research Conference (EHRC) - Mímisbrunnr 2023; 2023-06-21 - 2023-06-22
60. Mathiesen I, Ross TA, Pöntinen AK, Holsbø E, Kampffmeyer M, Johannessen M, Hegstad K, Wagner T, Characterization of Putative Virulence Factors in *Enterococcus faecium*. 6th ICE, Porto, Portugal; 2023-09-11 - 2023-09-14.
61. Pettersen,2023 5th International Metaproteomics Symposium “Unlocking microbiome functions”, Avignon, France – invited keynote talk
62. Pettersen,2023 Institute of Microbiology of the Czech Academy of Sciences, Prague, Czechia: invited talk
63. Pettersen,2023 World of Microbiome Conference, Sofia, Bulgaria - Development of early life gut resistome and mobilome - invited talk
64. *Phialophorophoma litoralis*. XIII European Conference on Marine Natural Products and XVII International Symposium on Marine Natural Products (MaNaPro). 2023.09.03- 2023.09.08
65. Photoredox catalyzed radical alkene chain-transfer. Floriane Baussière and Marius Myreng Haugland. Oral presentation, The 36th Organic Chemistry Winter Meeting, Skeikampen, Norway, 5-8 January 2023.
66. Radical group transfer reactions of vinyl and alkynyl silanes driven by photoredox catalysis. Floriane Baussière and Marius Myreng Haugland. Poster, Annual Meeting of the National Graduate School of Infection Biology and Antimicrobials, Oslo, Norway, 9-10 October 2023.
67. Radical group transfer reactions of vinyl and alkynyl silanes driven by photoredox catalysis. Floriane Baussière and Marius Myreng Haugland. Poster, The 10th Pacific Symposium on Radical Chemistry, Kyoto, Japan, 4-9 June 2023.
68. Ross TA, Pöntinen AK, Holsbø E, Peter J, Corander J, Kampffmeyer M, Hegstad K. Differentiating genome content and population structure of *E. faecium* and *E. lactis*. Oral presentation 6th International Congress on Enterococci (ICE), Porto, Portugal; 2023-09-11 - 2023-09-14
69. Ross TA, Pöntinen AK, Holsbø E, Peter J, Corander J, Kampffmeyer M, Hegstad K. Differentiating genome content and population structure of *E. faecium* and *E. lactis*. Oral presentation 7th Annual meeting National Graduate School in Infection Biology and Antimicrobials (IBA), Oslo, Norway; 2023-10-09 - 2023-10-10.
70. Rämä, Teppo. Arctic driftwoodstock: new fungi and bioactive compounds. CanFunNet2023; 2023-05-31 - 2023-06-02
71. Rämä, Teppo. Intertidal fungi in the Arctic - tough and threatened. IUBMB Focused Meeting on Extremophilic fungi; 2023-09-19 - 2023-09-22
72. Rämä, Teppo. Marine microbiomes and their role in the biodiscovery of new antibacterials. CANS day; 2023-02-23 - 2023-03-23
73. Rämä, Teppo. The enigmatic marine fungi in the order Lulworthiales. Joy of Discovery; 2023-12-11 - 2023-12-11
74. S. Antunes de Sousa, K. Julin, A. Bayer, M. B. Strøm, M. Johannessen, N. Škalko-Basnet, S. Obuobi. Drug-loaded DNA nanoparticles against biofilms. (poster) CANS day, 23rd of February 2023, Tromsø, Norway
75. S. Obuobi, A. Sousa, K. Julin, M. Johannensen, N. Skalko-Basnet: Developing DNA-based hybrid carriers to control bacterial persistence and virulence in chronic skin wounds. (Oral ppt), Seminar, National University of Singapore.
76. S. Obuobi, A. Sousa, N. Škalko-Basnet. Developing DNA-based hybrid carriers to control bacterial persistence and virulence in chronic skin wounds. (poster) New Horizons in Drug Delivery and Formulations, Uppsala, Sweden.
77. S. Obuobi: Advancing drug delivery via DNA nanocarrier design to treat persistent infections (Oral ppt). Experimental Health Research Conference, Tromsø.
78. S. Obuobi: Advancing drug delivery via nanocarrier design to treat biofilm infections. (Oral ppt) Arctic Biofilm Symposium, Tromsø.

79. S. Obuobi: DNA-BASED HYBRID CARRIERS FOR BACTERIAL AND WOUND THERAPY (Oral ppt): EUGLOH Workshop
80. Synthesis of fluorescently labelled aminoglycoside antibiotics. Anna-Luisa Warnke, Bhupender Singh, Christian S. Lentz and Marius Myreng Haugland. Poster, International Helmholtz Drug Discovery Conference, Braunschweig, Germany, 15-16 May 2023.
81. Talks given at meetings and conferences: Several talks by members of the research group (Experimental Health Research Conference, Eurobiofilms 2023 (poster), Arctic Biofilms, Tromsø, 2023) and European Society of pediatric Research, Rome 2023
82. The 11th International Conference on Marine Bioprospecting (Bioprosp_23)
83. Uddin MJ, Viveen MC, Top J, Johannessen M, Zoete MRD, Willem RJL, Lentz CS. Activity-Based Protein Profiling identifies *Klebsiella pneumoniae* Serine Hydrolases With Potential Roles in Host-Pathogen Interactions. Poster presentation. FEMS Congress Hamburg, Germany, 2023-07-09 – 2023-07-13
84. Wagner TM, Pöntinen AK, Fenzel C, Engi D, Janice J, Santos AA, Freitas A, Peixe L, Johannessen, M, Hegstad K. Competition between commensal and clinical isolates of *Enterococcus faecium*. Oral presentation 6th ICE, Porto, Portugal; 2023-09-11 - 2023-09-14.
85. Wagner TM, Romero-Saavedra F, Laverde D, Johannessen M, Hübner J, Hegstad K. Enterococcal membrane vesicles as vaccine candidates. Poster P3019 33rd European Congress of Clinical Microbiology and Infectious Diseases (ECCMID), Copenhagen, Denmark; 2023-04-15 – 20203-04-18.