Principal Investigators

Prof. Peter Golyshin

Research in Golyshin's group is focused on specialized petroleum-biodegrading marine microorganisms, new microbial taxa from extreme environments and their enzymes and molecules of industrial importance.

Prof. Davey Jones

Plant-soil-microbe interactions, Environmental Pollution, Human Pathogens, Dissolved Organic Nitrogen, Soil Quality, Freshwater pollution, Crop Science, Greenhouse Gas Emissions, Agronomy and Modelling.

Prof. Alexander Iakounine

Research in Yakunin's group is focused on enzyme discovery and biochemical characterization of novel enzymes, with a particular emphasis on novel hydrolases (polyesterases), oxidoreductases, and transferases for applications in biocatalysis and bioremediation.

Dr. Olga Golyshina

Environmental and applied microbiology, biogeochemistry, meta/genomics, extremophilic microbial diversity, isolation and genomic analysis of hyperacidophilic archaea.

Research Projects and Education

Subjects of potential projects include (but are not limited to) the discovery of novel enzymes of industrial relevance from extremophilic microorganisms and their communities, the microbiology of petroleum degradation in marine environments (cultivation and OMICS studies), the investigation of the role of marine microorganisms and their enzymes in the fate of synthetic polyester plastics.

Past and ongoing projects include:

- NERC Plastic Vectors plasticvectors.stir.ac.uk
- H2020 INMARE inmare-h2020.eu
- EU FP7 Kill-Spill killspill.eu

Postgraduate course

The **MSc by Research in Environmental Microbiology and Biotechnology** is a lab-based full-time programme that differs from a taught Master programme by placing more emphasis on research. This degree will equip participants with confidence and competence in the latest research skills and they have the opportunity to take advantage of the training programme provided by the College of Environmental Sciences and Engineering Graduate School and the University Doctoral School in both subject-specific and generic postgraduate-level skills.
Informal enquiries: o.golyshina@bangor.ac.uk
bangor.ac.uk/courses/postgraduate/environmental-microbiology-and-biotechnology-msc-by-research

Our Partners

- Institute of Catalysis CSIC (Spain) - Manuel Ferrer
- FZ Juelich (Germany) - Karl Jaeger
- University of Calgary (Canada) - Alexei Savchenko
- University of Pretoria (South Africa) - Oleg N. Reva
- Institute for Biological Resources and Marine Biotechnology CNR (Italy) - Michail M. Yakimov
- Winogradsky Institute of Microbiology (Russian Academy of Sciences) - Elizaveta Bonch-Osmolovskaya, Ilya Kublanov
- Bayer AG
- Novozymes A/S
- Almac Group

Let's keep in touch

Get in contact with a member of the staff or submit a general enquiry to Dr. Olga Tverezovskaya

o.tverezovskaya@bangor.ac.uk
@CEB_Bangor

School of Natural Sciences
2nd Floor Thoday Building
Deiniol Road
Bangor University
Bangor, Gwynedd (UK)
LL57 2UW

CEB

CENTRE FOR ENVIRONMENTAL BIOTECHNOLOGY

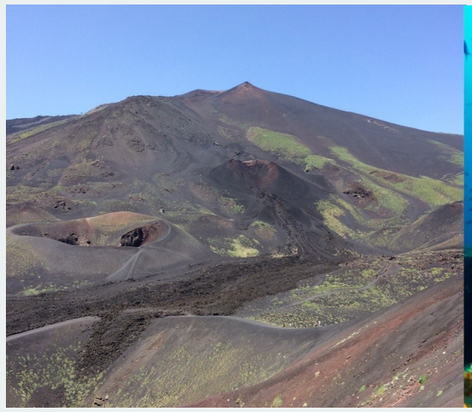
World-leading research centre in Extremophiles for Biotechnology

Prifysgol Bangor University
School of Natural Sciences

environmental-biotechnology.bangor.ac.uk

PRIFYSGOL BANGOR UNIVERSITY

Cronfa Datblygu Rhanbarthol Ewrop
European Regional Development Fund



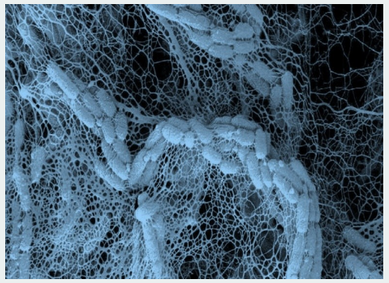
Group Profile

The Centre for Environmental Biotechnology (CEB) is a leading research division within the School of Natural Sciences, opened in 2018 and directed by Prof. Peter Golyshin. The CEB facility provides state-of-the-art equipment and world-leading expertise in enzyme discovery research, extremophile microbiology and bioanalytical chemistry.

CEB research activities aim to streamline and shorten the biodiversity discovery pipeline, addressing all steps from sampling biodiversity hotspots , to enzyme and bioactive compound discovery with the implementation of innovative approaches.

Most industrial biotechnology processes are derived from microorganisms; enzymes of microbial origin are an exceptional natural resource from which to produce safer, cheaper and greener products. To date, very few microbial enzymes have actually made it to the commercial market. One of the major bottlenecks is the laborious, costly and unreliable enzyme optimisation process required to make enzymes more stable and perform better in industrial processes.

The strategy to circumvent this problem is focusing on the early stages of the biodiscovery pipeline towards finding better natural enzyme variants that perform a range of desirable functions under a set of realistic industrial conditions.



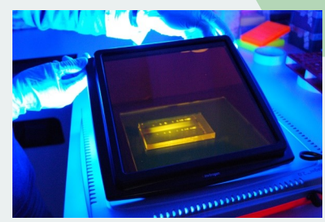
A central part of CEB work is the analysis of microbial communities found in extreme environments (for example high temperature, salinity or acidity) for identifying, developing and testing new enzymes that can be used within industrial processes.

CEB main research interests, activities and outcomes include:

- Explore novel biodiversity resources by sampling unique microbial hotspots.
- Develop innovative screening strategies to establish relevant enzyme collections.
- Shorten the enzyme optimisation steps by testing enzyme candidates suited to work in the extreme conditions of industrial applications.
- Identify new lead products and prototypes for new biocatalytic processes for targeted production of fine chemicals, drugs and materials for use in environmental clean-up applications.
- Implement environmentally friendly enzyme-based production to replace toxic chemical synthesis.

CEB Facilities

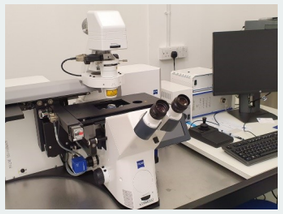
CEB has access to recently refurbished laboratories equipped with the most advanced systems, which are utilised to address a range of applications. These include single-cell imaging and manipulation instrumentation, liquid handling robotics for high throughput cloning and expression of proteins, protein purification workstations, small-to-microscale bioreactors, DNA sequencer, and a state-of-the-art mass spectrometry facility with nanoLC - high resolution accurate mass (HRAM) MS, LC-HRAM MS with ion mobility spectrometry and triple quadrupole LC-MS for targeted metabolomics.

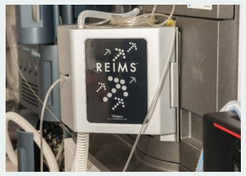


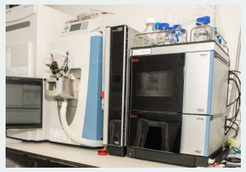
The Microbiology and Enzyme Discovery labs are dedicated to the preparation of environmental samples, microbes cultivation, DNA and protein analysis and manipulation.

Lab equipment include:

- HPLC and Akta Pure chromatography systems
- Illumina MiSeq and Oxford Nanopore Sequencers
- TECAN FreedomEvo robotic platform
- Flow cytometer and cell sorter CyFlow Cube8
- Zeiss Palm Combi Tweezer-Microdissector system
- MANTIS microfluidic liquid dispenser
- COY Anaerobic Glove-box
- oCelloScope live cell imaging system
- InforsHT PEEK Bioreactor LabForce 5
- Sonicator with interchangeable single - 96 well probes
- Agilent GC-MS system
- Microtiter plate temperature controlled spectrophotometers







The Metabolomics and Mass-spectrometry lab provides analytical instruments for the separation of complex mixtures and the detection of compounds with high sensitivity and resolution. Metabolomics, lipidomics and proteomics are some of the fields of application.

Lab equipment include:

- Thermo Scientific Q Exactive Plus with Vanquish UHPLC (LC-MS)
  Liquid chromatography for the separation of complex mixtures followed by detection through a high resolution/accurate mass (HRAM) mass spectrometer.
- Waters Xevo TQ-XS with I-class UPLC
  Triple quad mass spectrometer that can be used with either a UPLC or a GC.
- Waters Synapt G2-Si
  HRAM mass spectrometer, ions are detected by a time-of-flight MS. Samples are introduced here from UPLC (I-Class), nano-LC (M-Class) and GC (APGC) to desorption electrospray ionisation (DESI) and rapid evaporative ionisation mass spectrometry (REIMS).