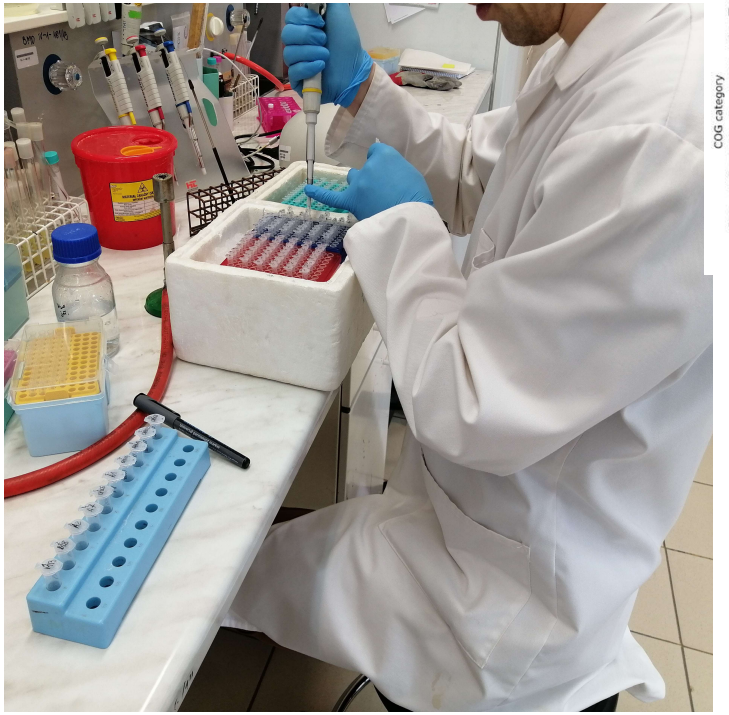
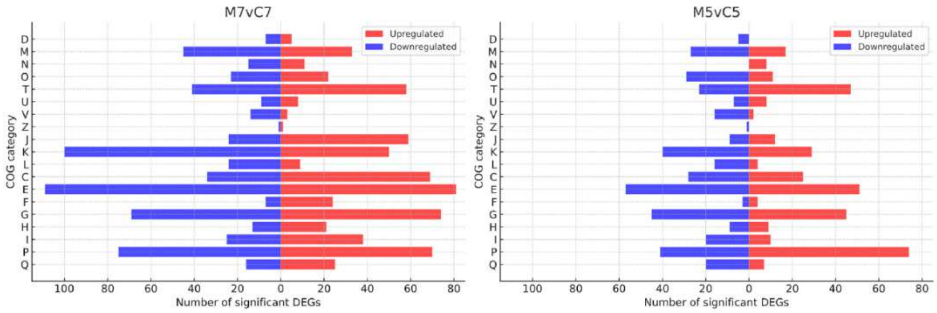
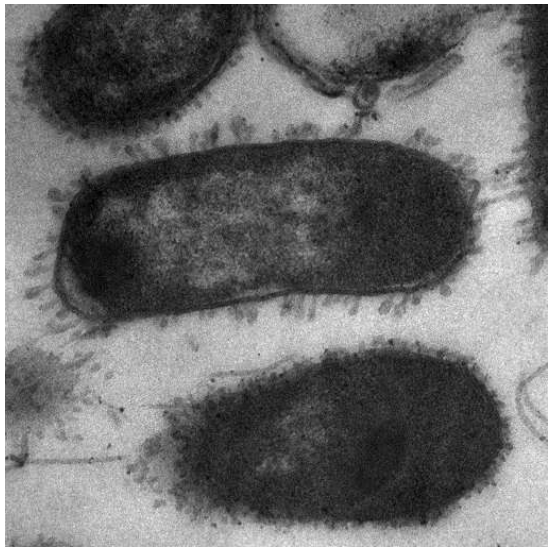
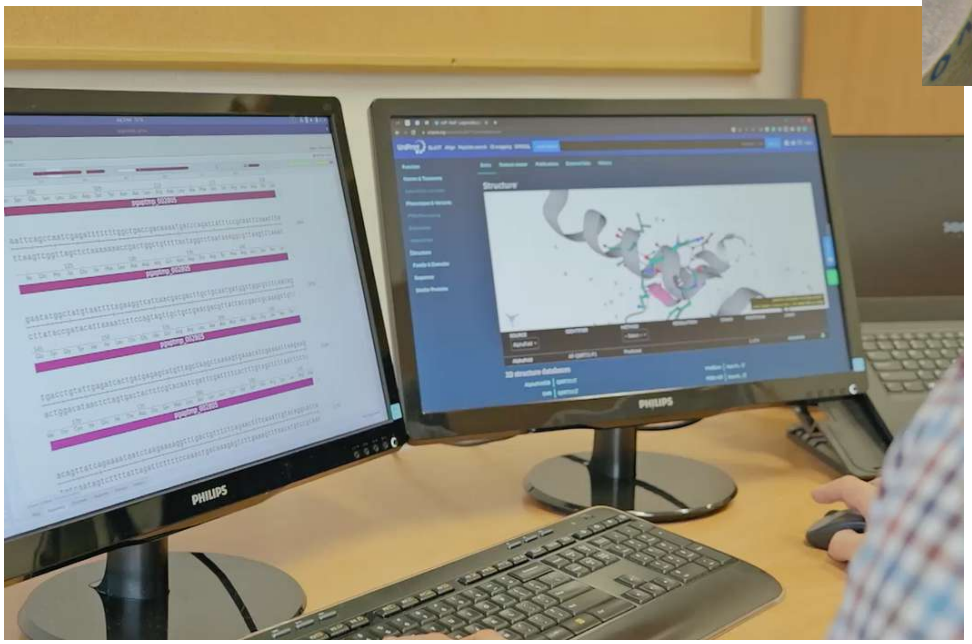
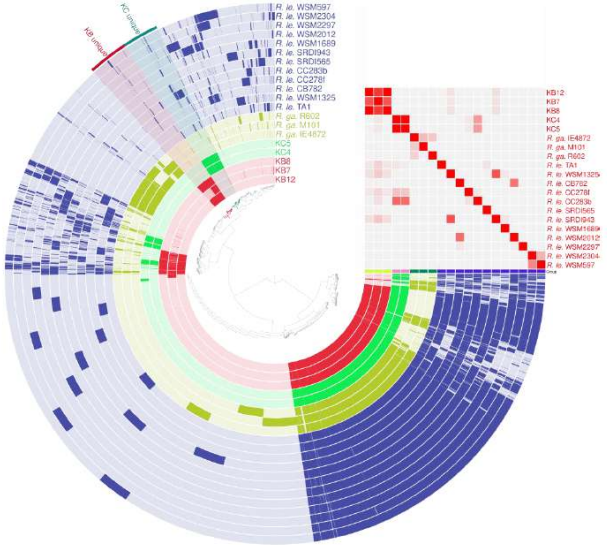
Department of Genetics and Microbiology

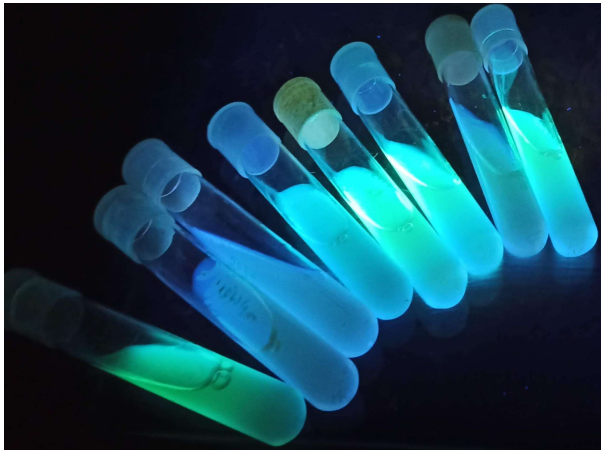












Staff of the Department of Genetics and Microbiology – supervisors of master's and bachelor's theses

Research in the field of microbiology and immunochemistry

prof. dr hab. Adam Choma - kierownik Katedry
dr hab. Iwona Komaniecka, prof. UMCS
dr hab. Jolanta Kutkowska, prof. UMCS
dr hab. Marta Palusińska-Szysz, prof. UMCS
dr hab. Anna Turska-Szewczuk, prof. UMCS
dr hab. Magdalena Karaś

Research mainly in the field of bacterial genetics and taxonomy

dr hab. Andrzej Mazur, prof. UMCS
dr hab. Sylwia Wdowiak-Wróbel, prof. UMCS
dr hab. Jerzy Wielbo, prof. UMCS
dr hab. Małgorzata Marczak, prof. UMCS
dr hab. Michał Kalita

Staff of the Department of Genetics and Microbiology – supervisors of bachelor's theses

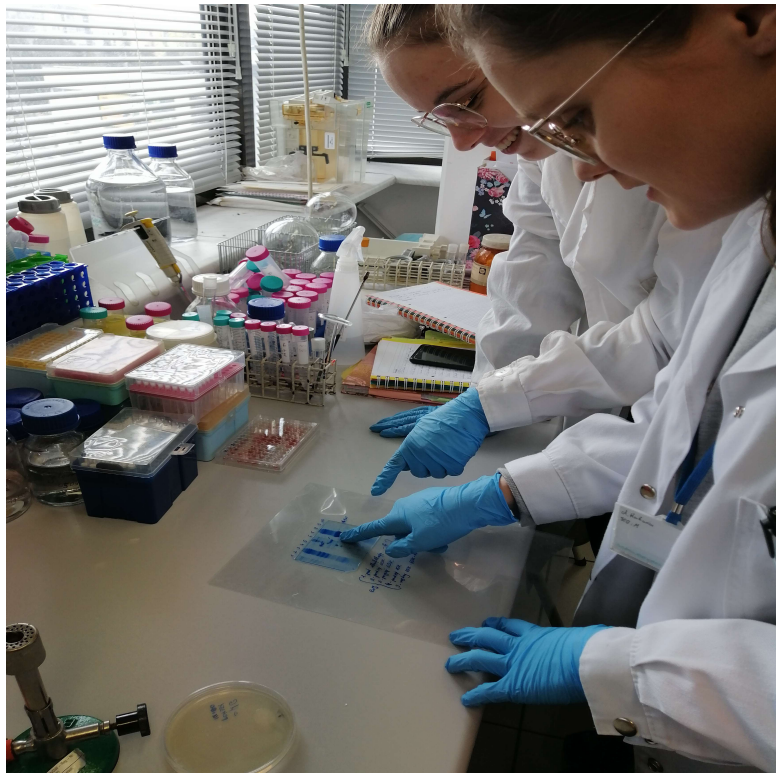
Research in the field of microbiology and immunochemistry

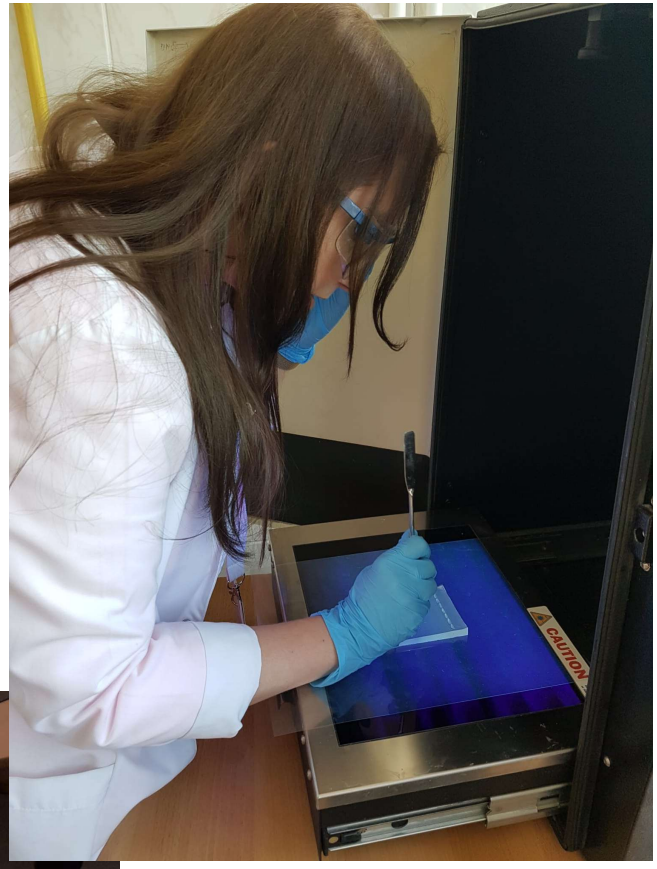
dr Dominika Kidaj
dr Katarzyna Zamłyńska
dr Bożena Kowalczyk
dr Katarzyna Dworaczek

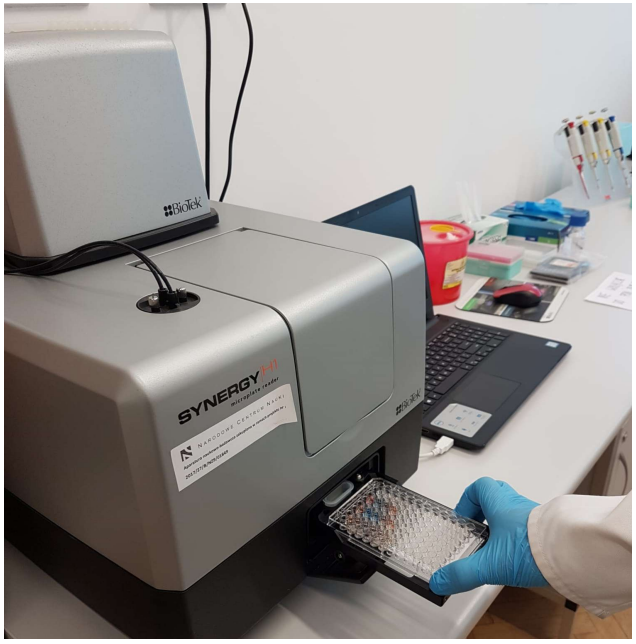
Research mainly in the field of bacterial genetics and taxonomy

dr Monika Marek-Kozaczuk
dr Piotr Koper
dr Magdalena Wójcik
dr Kamil Żebracki

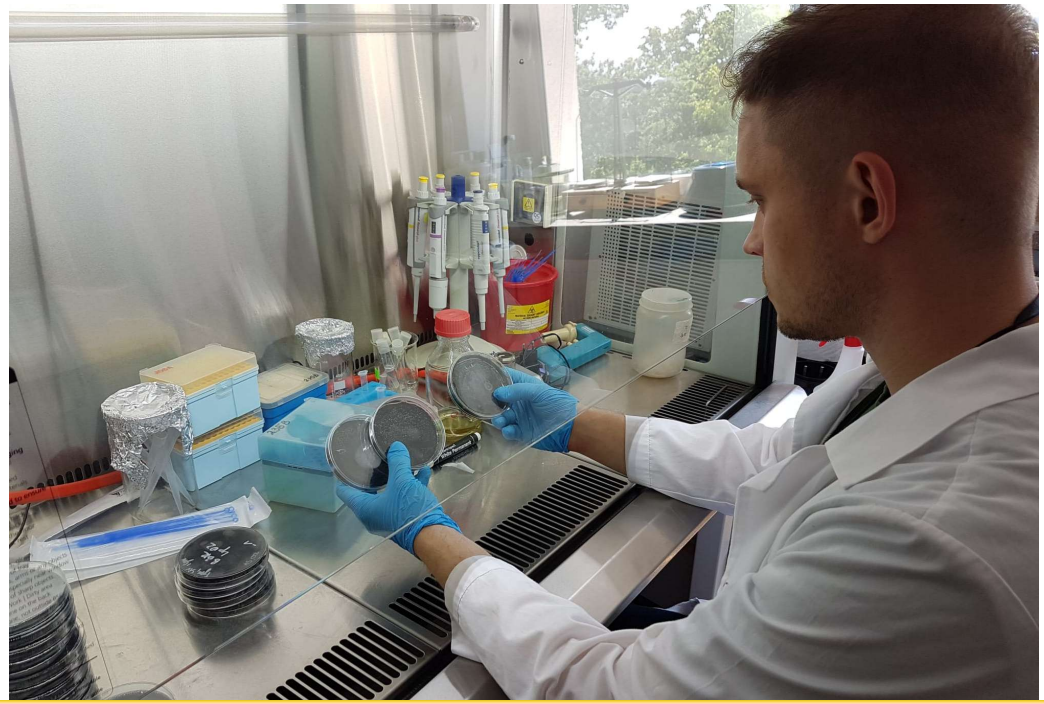
Main research fields	Staff engaged
Structural and functional genomics of symbiotic bacteria of the genus *Rhizobium* and pathogens of the genus *Legionella* The role of the plasmidome: identification and functional analysis of genes involved in bacterial adaptation to changing environments, biosynthesis of surface polysaccharides, and metagenomics of root-nodule bacteria Analysis of virulence factors and the contribution of the *Legionella* mobilome to pathogenesis	dr hab. Andrzej Mazur, prof. UMCS dr hab. Małgorzata Marczak, prof. UMCS dr Piotr Koper dr Kamil Żebracki dr Magdalena Wójcik
Chemical and structural analysis of compounds located on the bacterial surface, with a special focus on the structure and biological properties of lipopolysaccharides Profiling of gene expression associated with the virulence of plant pathogens	prof. dr hab. Adam Choma dr hab. Iwona Komaniecka, prof. UMCS dr hab. Jolanta Kutkowska, prof. UMCS dr hab. Magdalena Karaś dr Katarzyna Zamłyńska
Biodiversity and phylogeny of root-nodule bacteria Molecular taxonomy of root-nodule bacteria Endophytes and plant-growth-promoting rhizobacteria	dr hab. Jerzy Wielbo, prof. UMCS dr hab. Sylwia Wdowiak-Wróbel, prof. UMCS dr hab. Michał Kalita dr Monika Marek-Kozaczuk dr Katarzyna Zamłyńska dr Dominika Kidaj
Structural characterization of lipids and lipopolysaccharides of *Legionella* spp. and *Aeromonas* spp., and their role in pathogenesis	dr hab. Marta Palusińska –Szysz, prof. UMCS dr hab. Anna Turska-Szewczuk, prof. UMCS dr Piotr Koper dr Katarzyna Dworaczek dr Bożena Kowalczyk
Biofertilizers – ecological formulations that stimulate the growth and yield of crop plants	dr hab. Jerzy Wielbo, prof. UMCS dr Dominika Kidaj



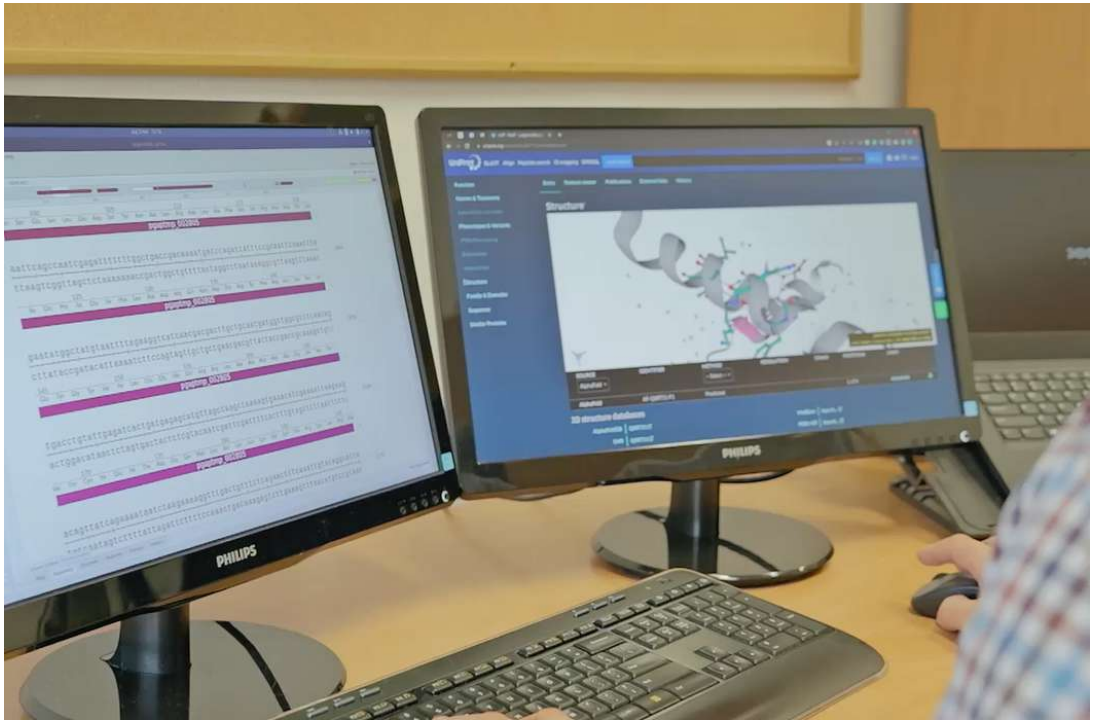


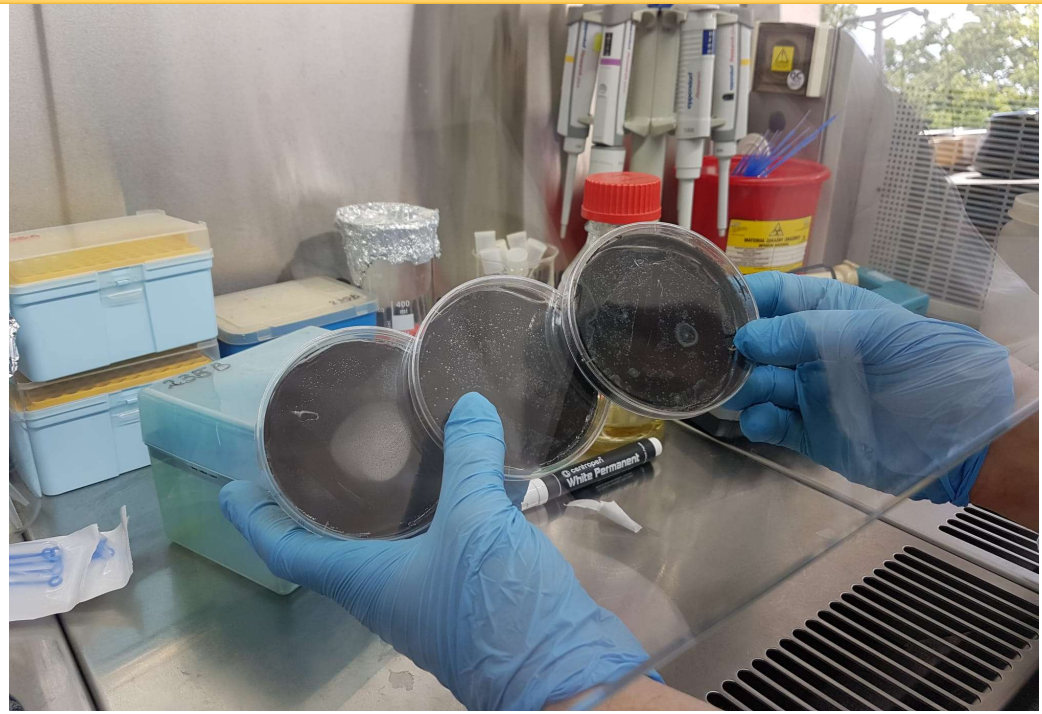


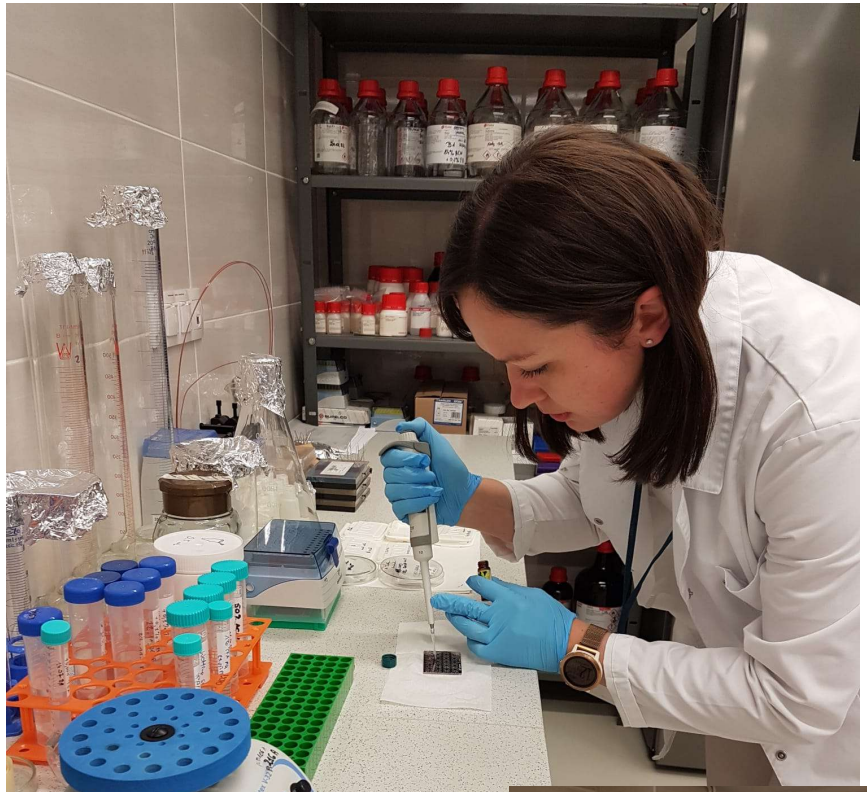
Structural and functional genomics of symbiotic bacteria of the genus *Rhizobium*: identification and functional analysis of genes involved in bacterial adaptation to changing environments and in the biosynthesis of surface polysaccharides.
Metagenomics of root-nodule bacteria.

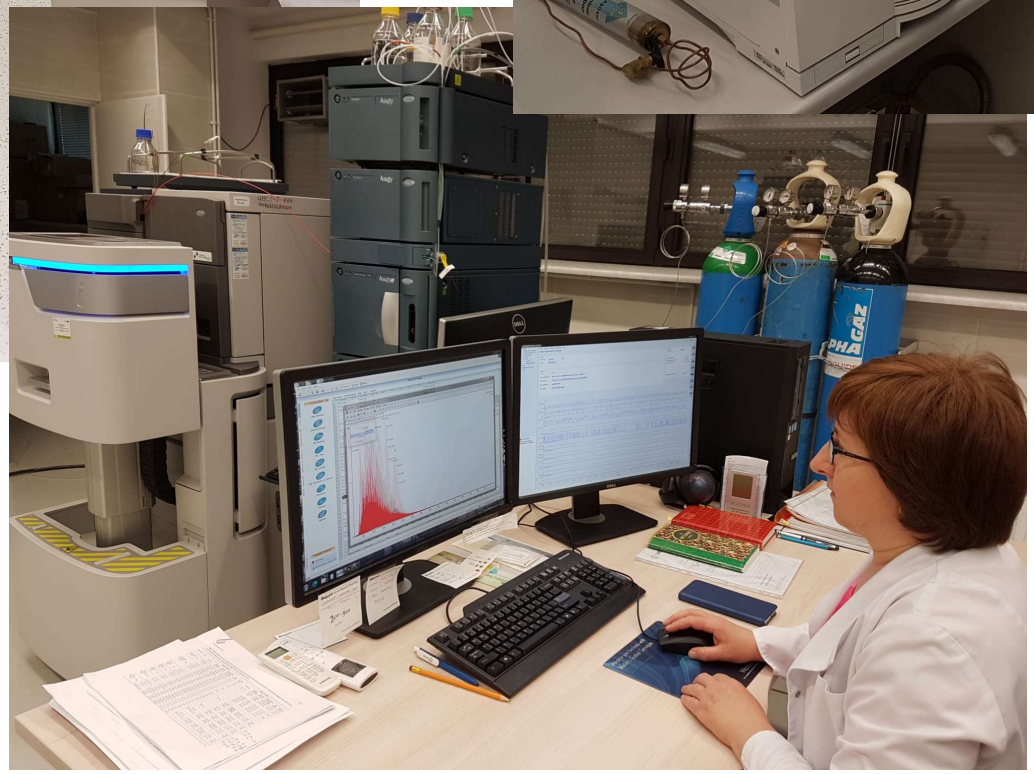


Structural and functional genomics of pathogenic bacteria of the genus *Legionella*: analysis of virulence factors and the role of the mobilome in pathogenesis.









Chemical and structural analysis of compounds located on the bacterial surface, with particular emphasis on the structure and biological properties of lipopolysaccharides.

Biodiversity, phylogeny, and molecular taxonomy of root-nodule bacteria.
Studies of endophytes and plant-growth-promoting rhizobacteria.

Sample master's thesis titles

Supervisor	Title
dr hab. Iwona Komaniecka, prof. UMCS	Interaction of endophytic bacteria with plant pathogens: a case study of tomato endophytes and *Agrobacterium tumefaciens*
dr hab. Jolanta Kutkowska, prof. UMCS	Antibiotic resistance and virulence factors of *Enterobacteriaceae* bacilli isolated from birds
dr hab. Jerzy Wielbo , prof. UMCS	Study of interactions between bacterial endophytes of *Chamaecytisus albus* (white broom)
dr hab. Anna Turska-Szewczyk, prof. UMCS	Virulence factors and antibiotic resistance profile of fish-pathogenic bacteria of the genus *Aeromonas* spp.
dr hab. Andrzej Mazur, prof. UMCS	Plasmid-encoded effector proteins as hypothetical virulence factors of *Legionella lytica*
dr hab. Małgorzata Marczak, prof. UMCS	Investigation of the topology and cellular localization of glycosyltransferases involved in the synthesis of the exopolysaccharide subunit of *Rhizobium leguminosarum* bv. *trifolii*
prof. dr hab. Adam Choma	Analysis of membrane lipids of endophytic bacteria of the genus *Pseudomonas*
dr hab. Marta Palusińska-Szysz, prof. UMCS	Structure and significance of surface components of *Legionella* spp. in interactions with host cells

Sample bachelor's thesis titles

Supervisor	Title
dr Kamil Żebracki	Diurnal rhythms in bacteria
dr Magdalena Wójcik	Biosensors in magnetotactic bacteria
dr Piotr Koper	Bacteria in the fight against viruses – bacterial viperins
dr Katarzyna Zamłyńska	The role of endophytic bacteria in the phytoremediation of contaminated soils

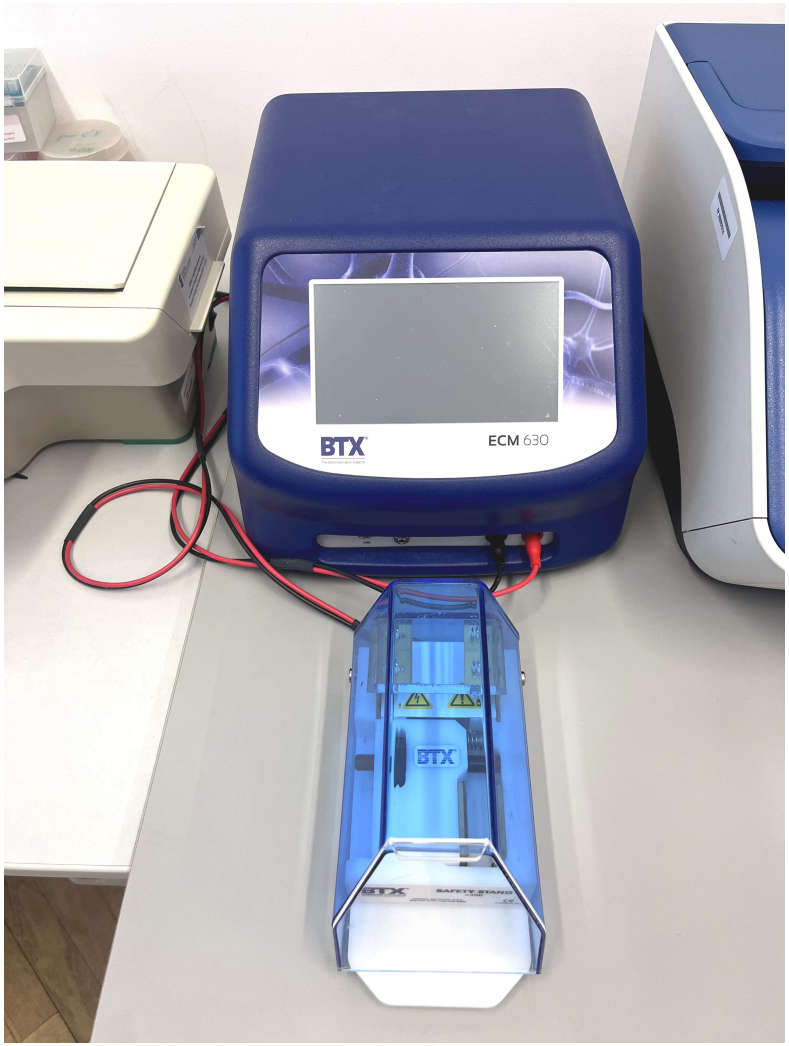
Supervisors of bachelor's theses often give students considerable freedom in choosing their topic, defining only the general "framework" of the issue, for example:

"The thesis topic should encompass medical microbiology."
"The thesis should address human genetic diseases."

Examples of research projects in which the Department's master's students have participated

Project leader: dr hab. Małgorzata Marczak, prof. UMCS	**Project NCN OPUS 14:** „Enzymatic complex of glycosyltransferases from *Rhizobium leguminosarum* as a model of the bacterial exopolysaccharide biosynthesis pathway"
Project leader: dr hab. Marta Palusińska-Szysz, prof. UMCS	**Project NCN OPUS 14:** „Bacterial determinants of increased virulence in *Legionella pneumophila* serotype 1 strains"
Project leader: dr hab. Iwona Komaniecka, prof. UMCS	**Project NCN OPUS 16:** „The importance of the outer membrane composition of *Agrobacterium tumefaciens* in the infection process of crop plants"
Project leader: dr Magdalena Wójcik	**Project Miniatura-6:** „Identification and functional characterization of non-rhizobial endophytic bacteria colonizing the root nodules of white clover (*Trifolium repens*) and red clover (*Trifolium pratense*)"
Project leader: dr Piotr Koper	**Project Sonata-18**: „The plasmidome of *Legionella* bacteria: the significance of horizontal gene transfer in the evolution and virulence of the causative agent of legionellosis"
Project leader: prof. dr hab. Zofia Piotrowska-Seget (UŚ) prof. dr hab. Adam Choma (konsorcjant UMCS)	**Project NCN OPUS 19:** „Molecular characterization of outer membrane vesicles from endophytic *Pseudomonas* and *Rhizobium* spp. and assessment of their role in eliciting induced systemic resistance in plants"

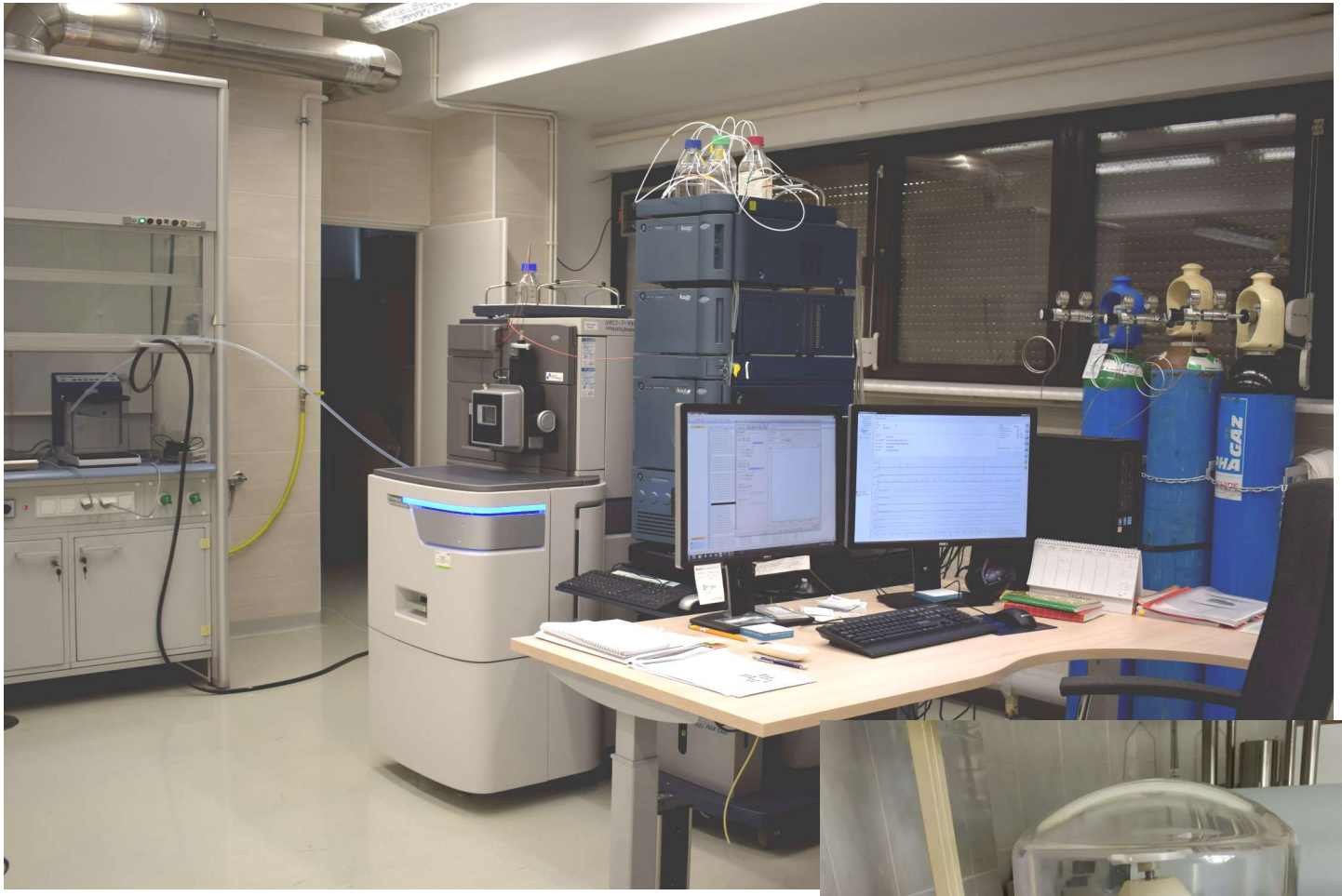
Examples of the Department's equipment



Electroporator

Thermocyclers

2D electrophoresis system



High-resolution mass spectrometer

Multifunctional microplate reader

Tissue disintegrator

Thermostatted three-level shaker

Large-volume centrifuge

Tandem gas chromatograph–mass spectrometer (GC–MS)

We invite you to the Department of Genetics and Microbiology !