

Name and surname:	Krzysztof Grzymajło
Academic Degree:	dr hab. (DSc.)
Institute/Department:	Department of Biochemistry and Molecular Biology
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ORCID:	0000-0002-1163-0679
UPWr Base of Knowledge - link:	https://bazawiedzy.upwr.edu.pl/info/author/UPWr51f62c196ed44292a4a18c87cf2d9bca?r=author&tab=&title=Profil%2Bosoby%2B%25E2%2580%2593%2BKrzysztof%2BGrzymaj%25C5%2582o%2B%25E2%2580%2593%2BUniwersytet%2BPrzyrodniczy%2Bwe%2BWroc%25C5%2582awiu&lang=pl
Researchgate:	https://www.researchgate.net/profile/Krzysztof-Grzymajlo
Personal website / Working group website:	
Participation in projects in last 5 years (chronological; with distinction into PI (kierownik) and RF (wykonawca)):	1)(PI) "The role of the sanA gene in Salmonella pathogenicity" 2019/35/O/NZ6/01590; 2020-2024 2)(PI) "Innate immune response during first stages of Salmonella infection" PPN/BEK/2018/1/00270; 2019 3)(PI) "Host-pathogen-microbiota interactions at the first stages of Salmonella enterica infection" 2020/38/E/NZ6/00182 ; 2021-2026 4 (PI) „Swim and adhere – regulation of Salmonella’s virulence factors expression and its impact on infection” 2022/47/O/NZ6/01128; 2023-2027
Do you plan to engage support of second supervisor or auxiliary supervisor?	YES
	Auxiliary supervisor
Name and surname:	Joanna Czajkowska
Academic Degree:	dr inż. (Dr.)
Faculty, Institute/Department:	Faculty of Veterinary Medicine, Department of Biochemistry and Molecular Biology
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UPWr Base of Knowledge - link or most important publications from last 3 year (JCR) / patents from last 3 years (maximum 5):	https://bazawiedzy.upwr.edu.pl/info.seam?id=UPWR549fa8086e1340998e511831ba41f879&affil=&lang=pl
Researchgate:	https://www.researchgate.net/profile/Joanna-Czajkowska
Personal website / Working group website:	
Projects in last 5 years (chronological; with distinction into PI (kierownik) and RF (wykonawca)):	1) (RF) "Host-pathogen-microbiota interactions at the first stages of Salmonella enterica infection" 2020/38/E/NZ6/00182 ; 2021-2026 2) (RF) "Analysis of the mechanisms of increased effectiveness of antimicrobial substances against biofilm in the presence of a rotating magnetic field" 2017/27/B/NZ6/02103; 2018-2022
PhD topic:	Microbiome fitness during Salmonella infections
Research discipline in Doctoral School:	Veterinary Science

<p>Short description of the research problem to be solved in the PhD (minimum 1000 characters):</p>	<p>Salmonella infections are one of the most important epidemiological issues worldwide, affecting directly hundreds of millions of people globally, as well as a serious economic problem with an estimated cost as high as 6 billion Euros only in the EU.</p> <p>Salmonella invades the gastrointestinal tract using complex and diverse pathogenic factors to ensure the infection of the host. Importantly, the mammalian gut is colonized by billions of microbes forming a natural host protection against potential pathogens. Therefore, enteropathogen infections always occur in the context of these host-pathogen-microbiome triangular interactions.</p> <p>A healthy and balanced microbiome is critical in providing effective resistance against invading pathogens. The exact mechanism by which the gut microbiota provides colonization resistance is not fully elucidated, however, it is a combination of secretion of antimicrobial peptides, competition for nutrients, direct competition between species, and finally environmental niche occupation. On the other hand, pathogens like Salmonella force changes in microbiota composition and behavior using a wide array of virulence factors to overcome colonization resistance. For example, short-chain fatty acids like butyrate, produced by microbiota, have been shown to reduce the expression of genes responsible for invasion, whereas acetate increases virulence factors expression in Salmonella. Bearing all the abovementioned in mind, we are just starting to understand the complex interplay by which commensal bacteria adapt and modify host environments during pathogen infection.</p> <p>The goal of this project is to understand and verify microbiome fitness during Salmonella infection.</p> <p>The dynamics of nutrient availability, as well as vitamins and microelements concentration at the time of pathogen infection, will be analyzed by metabolome profiling. Transcriptome analysis will allow us to track Salmonella's virulence factor expression in this dynamic environment. These results combined with 16S rRNA sequencing and metabolomic study will help us to understand the correlation between defined microbiota species and metabolites presence during Salmonella infection.</p>
<p>Professional skills for PhD candidate (e.g. master program, specializations, softwares, language, analytical techniques, minimum 500 characters):</p>	<p>Master's degree in veterinary medicine, microbiology, biotechnology, analytical chemistry, or in a related field; Sound understanding of molecular mechanisms of bacterial pathogenesis (with particular emphasis on the Salmonella genus); Basic proficiency in the use of biological databases and online resources/tools Experience in laboratory work: a) Molecular biology skills: PCR methods, DNA electrophoresis, DNA/RNA extraction, plasmid isolation, generation of deletion mutants, cloning; protein expression, and purification; b) Cell biology skills: in vitro culture of cell lines; c) Microbiology skills: cultivation of bacteria, adhesion and invasion assays; protein expression and purification; - Ability to work with animals in a research setting; Teamwork skills and strong motivation for scientific work; Ability to critically analyze and interpret data; Good written and spoken English communication skills.</p>
<p>a) Project title:</p>	<p>no</p>

b) Agreement number:	no
c) Number of months in the project to support PhD student (in months; starting from 1st of October 2024):	0
Project website:	